SRM
ARTS AND SCIENCE COLLEGE

(Affiliated to the University of Madras)
(Accredited with **A+**Grade by NAAC & An ISO 9001:2015 Certified Institution)
Kattankulathur, Chengalpattu Dist - 603203

AQAR
(2022-2023)

CRITERION I

CURRICULAR ASPECTS

1.1.2 CIE



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AQAR
(2022-2023)

CRITERION I

CURRICULAR ASPECTS

1.1.2 CIE TIME TABLE



SRMASC/BC/2022-23/18

SRM Arts and Science College

Kattankulathur-603203

Department of Biochemistry

Unit Test I Time Table – September 2022

Circular for Students **01.09.2022**

The Students are informed that the Unit Test I will be held from 12.09.2022 to 16.09.2022 as per the following schedule. The Unit Test I will be conducted from 12.00 PM to 1.00 PM. So the students are instructed to take the unit Test I seriously and strict action will be taken on students who are not attending the exam.

Date	II-B.Sc.,		III-B.Sc.,		II-M.Sc.,	
	Sub.Code	Subject	Sub.Code	Subject	Sub.Code	Subject
12.09.2022	LA13A	Language		Enzymes	MEN3A	Biotechnology
13.09.2022	LZ31B	English		Metabolism	MEN3B	Clinical Biochemistry-I
14.09.2022	SB23A	Major		Analytical Biochemistry	MEN3C	Molecular Biology
15.09.2022	SP3AA	Allied		Human Physiology	MENAC	Biostatistics
16.09.2022	-	-	-	-	MDTBB	Environmental Biotechnology

01/09/22

Head of the Department

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SRM Arts And Science College
Kattankulathur

1/9/22

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Chengalpattu Dist - 603 203

SRMASC/BC/2022-23/24

SRM Arts and Science College

Kattankulathur-603203

Department of Biochemistry

Unit Test I Time Table for I B.Sc., Biochemistry – September 2022

Circular for Students **19.09.2022**

The Students are informed that the Unit Test I will be held from 26.09.2022 to 30.09.2022 as per the following schedule. The Unit Test I will be conducted from 12.00 PM to 1.00 PM. So the students are instructed to take the unit Test I seriously and strict action will be taken on students who are not attending the exam.

Date	Subject Code	Name of the Subject
26.09.2022	LA11A/CLE1E	Languages- Tamil-I/ Hindi-I
27.09.2022	LZ11A	English-I
28.09.2022	SB21A	Major-Nutritional Biochemistry
29.09.2022	SD3AA	Allied Chemistry-I

19/09/22

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I Bsc : CW

19/9/22

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SRMASC/BC/2022-23/40

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Department of Biochemistry
Unit Test I Time Table – November 2022
Circular for I M.Sc., Biochemistry Students

25.11.2022

The Students are informed that the Unit Test I will be held from 29.11.2022 to 02.12.2022 as per the following schedule. The Unit Test I will be conducted from 2.30 PM to 3.30 PM. So the students are instructed to take the unit Test I seriously and strict action will be taken on students who are not attending the exam.

Date	I-M.Sc., Biochemistry	
	Code	Subject
29.11.2022	**MG21A**	Biomolecules
30.11.2022	**MG21B**	Biochemical Techniques
01.12.2022	**MG21C**	Physiology and Cell Biology
02.12.2022	**MG41A**	Microbiology

I MSc - All

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25/11/22

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SRMASC/BC/2022-23/31

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Department of Biochemistry
Unit Test II Time Table – October 2022
Circular for Students **18.10.2022**

The Students are informed that the Unit Test II will be held from 31.10.2022 to 04.11.2022 as per the following schedule. The Unit Test II will be conducted from 12.00 PM to 1.00 PM. So the students are instructed to take the unit Test II seriously and strict action will be taken on students who are not attending the exam.

Date	I-B.Sc		II-B.Sc		III-B.Sc		I-M.Sc		II-M.Sc	
	Code	Subject	Code	Subject	Code	Subject	Code	Subject	Code	Subject
31.10.2022	LA11A/ CLE1E	Language	LA13A/ CLK3V	Language	SB25A	Enzymes		Biomolecules	MEN3A	Biotechnology
01.11.2022	LZ11A	English-I	LZ13B	English	SB25B	Metabolism		Biochemical Techniques	MEN3B	Clinical Biochemistry-I
02.11.2022	SB21A	Major	SB23A	Major	SB25C	Analytical Biochemistry		Physiology and Cell Biology	MEN3C	Molecular Biology
03.11.2022	SD3AA	Allied	SP3AA	Allied	SB45A	Human Physiology		Microbiology	MENAC	Biostatistics
04.11.2022	-	-	-	-	-	-	-	-	MDTBB	Environmental Biotechnology

I B.Sc :
II B.Sc :
III B.Sc :
I M.Sc :
II M.Sc :

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SRMASC/BC/2022-23/75

SRM Arts and Science College
Kattankulathur-603203
Department of Biochemistry
Unit Test II Time Table – April 2023
Circular for Students

28.03.2023

The students are informed that the Unit Test II will be held from 10.04.2023 to 17.04.2023 as per the following schedule. The Unit Test II will be conducted from 12.00 PM to 1.00 PM. So the students are instructed to write the unit Test II seriously and strict action will be taken on students who are not attending the exam.

Date	I-B.Sc.,		II-B.Sc.,		III-B.Sc.,		I-M.Sc.,		II-M.Sc.,	
	Code	Subject	Code	Subject	Code	Subject	Code	Subject	Code	Subject
10.04.2023	**LA12A**	Language-II	**LA14A**	Language-IV		Clinical Biochemistry		Enzymes and Enzyme Technology	**MEN4A**	Hormones
11.04.2023	**LZ12A**	English-II	**LZ14B**	English-IV		Molecular Biology		Cellular Metabolism with Clinical Correlation I	**MEN4B**	Clinical Biochemistry-II
12.04.2023	**SB22A**	Major-II	**SB24A**	Major-IV		Immunology		Cellular Metabolism with Clinical Correlation II	**MENAD**	Signal Transduction
13.04.2023	**SD3AC**	Allied-II	**SP3AB**	Allied-IV		Biotechnology		Energy and Drug Metabolism	**MENAE**	Immunochemistry
17.04.2023	-	-	-	-	-	-	-	Nutritional Biochemistry	-	-

28/03/23

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28/03/23

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(Even)

SRM ARTS AND SCIENCE COLLEGE
DEPARTMENT OF BIOTECHNOLOGY
UNIT TEST - I
2022 - 2023

CLASS: I B.Sc BIOTECHNOLOGY

DATE	SUBJECT NAME	SUBJECT CODE	NO OF STUDENTS
23.01.2023	Hindi - II	CLE2G	3
	Tamil - II	LA12A	29
24.01.2023	English - II	PZ1SD	32
25.01.2023	Genitics	SC22A	32
27.01.2023	Chemistry	SC32A	32

CLASS: II B.Sc BIOTECHNOLOGY

DATE	SUBJECT NAME	SUBJECT CODE	NO OF STUDENTS
23.01.2023	Hindi - IV	CLE4J	2
	French - IV	CLK4W	3
24.01.2023	Tamil - IV	LA14A	28
25.01.2023	English - IV	LZ14B	33
27.01.2023	Plant Biotechnology	SC24A	33
28.01.2023	Bioinstrumentation & Biostatistics	SC34A	33

CLASS: III B.Sc BIOTECHNOLOGY

DATE	SUBJECT NAME	NEW SUBJECT CODE AWAITED	NO OF STUDENTS
24.01.2023	Industrial Biotechnology		38
25.01.2023	Environmental Biotechnology		38
27.01.2023	Basics in Research methodology		38
28.01.2023	Bioentrepreneurship		38

CLASS: I M.Sc BIOTECHNOLOGY

DATE	SUBJECT NAME	NEW SUBJECT CODE AWAITED	NO OF STUDENTS
24.01.2023	Microbiology		23
25.01.2023	Plant and Animal Biotecnology		23
27.01.2023	Genetic Engineering		23
28.01.2023	Elective: Nutritional Biochemistry		23
29.01.2023	Elective: Environmental Biotechnology		23

CLASS: II M.Sc BIOTECHNOLOGY

DATE	SUBJECT NAME	SUBJECT CODE	NO OF STUDENTS
24.01.2023	Research Methodology	MDK4A	17
25.01.2023	Stem Cell Biology	MDKAK	17
27.01.2023	Elective: Bioethics, Human rights & Social issues	MDKAL	17

16/1/2023

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16.1.23

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16/1/23

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DEPARTMENT OF BIOTECHNOLOGY

UNIT TEST – I TIMETABLE (EVEN 2022-2023)

Room number	Date	Class	Staff in-charge
205	23.01.2023	I B.Sc.	SA
204		II B.Sc.	JY
General lab		III B.SC	IK
M.Sc classroom		I MSc	DG
Smart classroom		II MSc	DP
205	24.01.2023	I B.Sc.	MK
204		II B.Sc.	DL
General lab		III B.SC	SA
M.Sc classroom		I MSc	IK
Smart classroom		II MSc	DP
205	25.01.2023	I B.Sc.	SA
204		II B.Sc.	JY
General lab		III B.SC	IK
M.Sc classroom		I MSc	DG
Smart classroom		II MSc	DP
205	27.01.2023	I B.Sc.	MK
204		II B.Sc.	DL
General lab		III B.SC	SA
M.Sc classroom		I MSc	IK
Smart classroom		II MSc	DP
204	28.01.2023	II B.Sc.	DL
General lab		III B.SC	SA
M.Sc classroom		I MSc	MK
Smart classroom		II MSc	DG
Smart classroom	29.01.2023	II M.Sc	DG

HOD
16/1/2023

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16/1/23

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(Exam - II)

SRM ARTS AND SCIENCE COLLEGE
DEPARTMENT OF BIOTECHNOLOGY
UNIT TEST - II
2022 - 2023

CLASS: I B.Sc BIOTECHNOLOGY			
DATE	SUBJECT NAME	SUBJECT CODE	NO OF STUDENTS
06.03.2023	Hindi - II	CLE2G	3
	Tamil - II	LA12A	29
07.03.2023	English - II	PZ1SD	32
08.03.2023	Genitics	SC22A	32
09.03.2023	Chemistry	SC32A	32

CLASS: II B.Sc BIOTECHNOLOGY			
DATE	SUBJECT NAME	SUBJECT CODE	NO OF STUDENTS
06.03.2023	Hindi - IV	CLE4J	2
	French - IV	CLK4W	3
07.03.2023	Tamil - IV	LA14A	28
08.03.2023	English - IV	LZ14B	33
09.03.2023	Plant Biotechnology	SC24A	33
10.03.2023	Bioinstrumentation & Biostatistics	SC34A	33

CLASS: III B.Sc BIOTECHNOLOGY			
DATE	SUBJECT NAME	NEW SUBJECT CODE AWAITED	NO OF STUDENTS
06.03.2023	Industrial Biotechnology		38
07.03.2023	Environmental Biotechnology		38
08.03.2023	Basics in Research methodology		38
09.03.2023	Bioentrepreneurship		38

CLASS: I M.Sc BIOTECHNOLOGY			
DATE	SUBJECT NAME	NEW SUBJECT CODE AWAITED	NO OF STUDENTS
06.03.2023	Microbiology		23
07.03.2023	Plant and Animal Biotecnology		23
08.03.2023	Genetic Engineering		23
09.03.2023	Elective: Nutritional Biochemistry		23
10.03.2023	Elective: Environmental Biotechnology		23

CLASS: II M.Sc BIOTECHNOLOGY			
DATE	SUBJECT NAME	SUBJECT CODE	NO OF STUDENTS
06.03.2023	Research Methodology	MDK4A	17
07.03.2023	Stem Cell Biology	MDKAK	17
08.03.2023	Elective: Bioethics, Human rights & Social issues	MDKAL	17

27/2/2023

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27/2/23

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DEPARTMENT OF BIOTECHNOLOGY

UNIT TEST – II TIMETABLE (EVEN 2022-2023)

Room number	Date	Class	Staff in-charge
205	06.03.2023	I B.Sc.	SA
204		II B.Sc.	JY
General lab		III B.SC	IK
M.Sc classroom		I MSc	DG
Smart classroom		II MSc	DP
205	07.03.2023	I B.Sc.	MK
204		II B.Sc.	DL
General lab		III B.SC	SA
M.Sc classroom		I MSc	IK
Smart classroom		II MSc	DP
205	08.03.2023	I B.Sc.	SA
204		II B.Sc.	JY
General lab		III B.SC	IK
M.Sc classroom		I MSc	DG
Smart classroom		II MSc	DP
205	09.03.2023	I B.Sc.	MK
204		II B.Sc.	DL
General lab		III B.SC	SA
M.Sc classroom		I MSc	IK
204	10.03.2023	II B.Sc.	DL
General lab		III B.SC	SA
M.Sc classroom		I MSc	MK

HOD 3/3/2023

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Kattankulathur-603 202

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3/3/23

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SRM ARTS AND SCIENCE COLLEGEKATTANKULATHUR – 603 203
DEPARTMENT OF MICROBIOLOGY

I UNIT TEST TIME TABLE- 2022-2023

TIME: 12.00 – 1.00 PM **MAX. MARKS: 25**

DATE	CLASS	SUBJECT
23.01.2023	I B.Sc	Language
	II B.Sc	Language
	III B.Sc	Environmental Microbiology
	I M.Sc	Virology
	II M.Sc	Food, Dairy & Environmental microbiology
24.01.2023	I B.Sc	English
	II B.Sc	English
	III B.Sc	Food & Diary Microbiology
	I M.Sc	Medical Bacteriology
	II M.Sc	Research Methodology
25.01.2023	I B.Sc	Basic & Applied Immunology
	II B.Sc	Soil & Agricultural Microbiology
	III B.Sc	Industrial & Pharmaceutical Microbiology
	I M.Sc	Medical Mycology & Parasitology
27.01.2023	I B.Sc	Bio Instrumentation
	II B.Sc	Clinical Biochemistry
	III B.Sc	Microbial Marketable Products
	I M.Sc	Industrial & Fermentation Technology
28.01.2023	I M.Sc	Biostatistics, Bio informatics & Bio instrumentation

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DEPARTMENT OF MICROBIOLOGY

I UNIT TEST TIME TABLE (I BSc)- SEPTEMBER 2022

TIME: 12.00 – 1.00 PM

MAX. MARKS: 25

DATE	CLASS	SUBJECT
26.09.2022	I BSc	Language
27.09.2022	I BSc	English
28.09.2022	I BSc	General Microbiology
29.09.2022	IBSc	Bio chemistry

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DEPARTMENT OF MICROBIOLOGY

I UNIT TEST TIME TABLE- SEPTEMBER 2022

TIME: 12.00 – 1.00 PM **MAX. MARKS: 25**

DATE	CLASS	SUBJECT
12.09.2022		
	II B.Sc	LANGUAGE
	III B.Sc	MEDICAL BACTERIOLOGY
	II M.Sc	MICROBIAL GENETICS
13.09.2022	II B.Sc	ENGLISH
	III B.Sc	MYCOLOGY & PARASITOLOGY
	II M.Sc	GENETIC ENGINEERING
14.09.2022	II B.Sc	MOLECULAR BIOLOGY
	III B.Sc	VIRIOLOGY
	II M.Sc	MOLECULAR BIOLOGY
15.09.2022	II B.Sc	MEDICAL BIO CHEMISTRY
	III B.Sc	BIOTECHNOLOGY- GENTIC ENGINEERING
	II MSc	SOIL MICROBIOLOGY
16.09.2022	II M.Sc	ENVIRONMENTAL BIO TECHNOLOGY

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KATTANKULATHUR – 603203

DEPARTMENT OF COMPUTER SCIENCE - CIRCULAR

UNIT TEST-I EXAM SCHEDULE – SEPTEMBER, 2022 TIME: 12.00 NOON to 01.00 PM

II M.SC COMPUTER SCIENCE

Principles of Compiler Design	12.09.2022	PSD3A
Information Security	13.09.2022	PSD3B
Artificial Intelligence	14.09.2022	PSD3C
Elective-II: Big Data Analysis	15.09.2022	PSDED
Elective-III: Cloud Computing	16.09.2022	PSDEJ

II B.SC COMPUTER SCIENCE

Language (T/H/F)	12.09.2022	LA13A
English	13.09.2022	LZ13B
Java& Data Structure	14.09.2022	SE23A
Statistics I	15.09.2022	SP3AA
Core Practical-IV - Data Structures Using Java	16.09.2022	SE231

III B.SC COMPUTER SCIENCE

Computer Network	12.09.2022
Operating System	13.09.2022
Relational Database Management System	14.09.2022
Artificial Intelligence And Expert System	15.09.2022
Core Practical-V - Operating System Lab	16.09.2022
Core Practical-Vi - Pl/Sql Lab	19.09.2022

11/9/22

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01/09/2022

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Kattankulathur - 603 203

Date: 20/02/2023
Circular No: 05/EVEN SEMESTER/2023

SRM ARTS AND SCIENCE COLLEGE

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KATTANKULATHUR – 603203.

DEPARTMENT OF COMPUTER SCIENCE

CIRCULAR

Students are advised to write the 1st Internal Examinations in February 2023, which will be held from 27- February -2023 to 03- March -2023. The schedules for 1st internal examinations are provided below.

I B.SC COMPUTER SCIENCE

Language	LA12A	27-02-2023
English	LZ12A	28-02-2023
Computer Organization	SE22A	01-03-2023
Maths- II	SM3AE	02-03-2023
Core Practical-II - Computer Organization	SE221	03-03-2023

II B.SC COMPUTER SCIENCE

Language	LA14A	27-02-2023
English	LZ14B	28-02-2023
Web Technology	SE24A	01-03-2023
Statistics II	SP3AB	02-03-2023
Core Practical-IV - Web Technology	SE241	03-03-2023

III B.SC COMPUTER SCIENCE

Software Engineering	27-02-2023
Introduction To Data Science	28-02-2023
Introduction To Cloud Computing	01-03-2023
Elective II- IOTA	02-03-2023
Practical : CASE Tools And Testing Tools Lab	03-03-2023

I M.SC COMPUTER SCIENCE

Machine Learning	27-02-2023
Advanced Networks	28-02-2023
Principles of Compiler Design	01-03-2023
Elective-1: Internet of Things	02-03-2023
Elective-2: Full Stack Web Development	03-03-2023
Practical 3: Machine Learning Lab(FN) / Practical 4: Full Stack Web Development Lab(AN)	06-03-2023

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SRM ARTS & SCIENCE COLLEGE

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DEPARTMENT OF COMPUTER APPLICATIONS & TECHNOLOGY

I UNIT TEST – FEBRUARY 2023

TIME – TABLE

I M.C.A.

Design and Analysis of Algorithms	27.02.2023	MC22A
Agile Software Engineering	28.02.2023	MC22B
Computer Networks	01.03.2023	MC22C
Cloud Computing	02.03.2023	MC32A
Web Based Application Development	03.03.2023	MC42B

I B.C.A.

Language	27.02.2023	LA12A
English	28.02.2023	LZ12A
Object Oriented Programming Concepts using C ++	01.03.2023	SU22A
Mathematics	02.03.2023	SM3AE

II B.C.A.

Computer Network	27.02.2023	SZ24A
Open Source Technologies	28.02.2023	SZ24B
E-Commerce Technologies	01.03.2023	SZ24C
Cost and Management Accounting	02.03.2023	SZ34A

III B.C.A.

Web Design and Development	27.02.2023	SZ26A
Data Mining	28.02.2023	SZ26B
Mobile Application Development	01.03.2023	SZ26C
Elective: IOT and its Applications	02.03.2023	SU46B

22/3/23

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22/2/23

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I M.Sc Computer Science and Technology

Language	27.02.2023	LA12A
English	28.02.2023	LZ12A
Physics	01.03.2023	PZ1SC
Mathematics	02.03.2023	CTB23

II M.Sc Computer Science and Technology

Software Engineering	27.02.2023	CTC4A
Data Structures	28.02.2023	CTC4B
Computer Graphics	01.03.2023	CTC4C
Programming in C++	02.03.2023	CTC4D

III M.Sc Computer Science and Technology

Computer Architecture	27.02.2023	CTC6A
JAVA Programming	28.02.2023	CTC6B
Multimedia Systems	01.03.2023	CTC6C
Object Oriented Analysis and Design	02.03.2023	CTC6D

IV M.Sc Computer Science and Technology

Unix and Shall Programming	27.02.2023	CTC8A
Distributed Database	28.02.2023	CTC8B
E-Commerce	01.03.2023	CTC8C
Information Security	02.03.2023	CTC8D
Software Project Management	03.03.2023	CTV8A

22/8/23

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22/8/23

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SRM ARTS & SCIENCE COLLEGE

KATTANKULATHUR

DEPARTMENT OF COMPUTER APPLICATIONS & TECHNOLOGY

II UNIT TEST – APRIL 2023

TIME TABLE

I M.C.A.

Design and Analysis of Algorithms	10.04.2023	MC22A
Agile Software Engineering	11.04.2023	MC22B
Computer Networks	12.04.2023	MC22C
Cloud Computing	13.04.2023	MC32A
Web Based Application Development	17.04.2023	MC42B

I B.C.A.

Language	10.04.2023	LA12A
English	11.04.2023	LZ12A
Object Oriented Programming Concepts using C ++	12.04.2023	SU22A
Mathematics	13.04.2023	SM3AE

II B.C.A.

Computer Network	10.04.2023	SZ24A
Open Source Technologies	11.04.2023	SZ24B
E-Commerce Technologies	12.04.2023	SZ24C
Cost and Management Accounting	13.04.2023	SZ34A

III B.C.A.

Web Design and Development	10.04.2023	SZ26A
Data Mining	11.04.2023	SZ26B
Mobile Application Development	12.04.2023	SZ26C
Elective: IOT and its Applications	13.04.2023	SU46B

30/3/23

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3/13/23

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I M.Sc Computer Science and Technology

Language	10.04.2023	LA12A
English	11.04.2023	LZ12A
Physics	12.04.2023	PZ1SC
Mathematics	13.04.2023	CTB23

II M.Sc Computer Science and Technology

Software Engineering	10.04.2023	CTC4A
Data Structures	11.04.2023	CTC4B
Computer Graphics	12.04.2023	CTC4C
Programming in C++	13.04.2023	CTC4D

III M.Sc Computer Science and Technology

Multimedia Systems	10.04.2023	CTC6A
JAVA Programming	11.04.2023	CTC6B
Computer Architecture	12.04.2023	CTC6C
Object Oriented Analysis and Design	13.04.2023	CTC6D

IV M.Sc Computer Science and Technology

Unix and Shall Programming	10.04.2023	CTC8A
Distributed Database	11.04.2023	CTC8B
E-Commerce	12.04.2023	CTC8C
Information Security	13.04.2023	CTC8D
Software Project Management	17.04.2023	CTV8A

30/3/23

HOD

HEAD
Department of Computer Applications & Tech.
SRM Arts and Science College
Kattankulathur - 603 203

31/3/23

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SRM Nagar, Kattankulathur
Chengalpattu Dist - 603 203

SRM ARTS AND SCIENCE COLLEGE, KATTANKULATHUR-603 203.

Department of Mathematics

Examination Schedule (UNIT TEST - I / 2022-23 / EVEN SEMESTER)

II Year B.Sc., Mathematics

SL. No.	Date	Subject	Subject Code	Time
1	27.02.2023	Tamil-IV/Telugu-IV	LA14A/CLB4D	12:00 To 01:00 PM
2	28.02.2023	English-IV	LZ14B	12:00 To 01:00 PM
3	01.03.2023	Paper-VII Transform Technique	SM24A	12:00 To 01:00 PM
4	02.03.2023	Allied-IV Mathematical Statistics-II	SM3AG	12:00 To 01:00 PM
5	03.03.2023	Paper-VIII Statics	SM24B	12:00 To 01:00 PM

20/2/23

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SRM Nagar, Kattankulathur
Chengalpattu Dist - 603 203

Head of the Department 20/2/23

HEAD
Department of Mathematics
SRM Arts and Science College
Kattankulathur - 603 203

SRM ARTS AND SCIENCE COLLEGE, KATTANKULATHUR-603 203.

Department of Mathematics

Examination Schedule (UNIT TEST - I / 2022-23 / EVEN SEMESTER)

III Year B.Sc., Mathematics

SL. No.	Date	Subject	Subject Code	Time
1	27.02.2023	Paper-XIII Algebraic Sturctures - II		12:00 To 01:00 PM
2	28.02.2023	Paper-XIV Real Analysis-II		12:00 To 01:00 PM
3	01.03.2023	Paper-XV Complex Analysis		12:00 To 01:00 PM
4	02.03.2023	Paper-XVI Graph Theory		12:00 To 01:00 PM
5	03.03.2023	Paper-XVII Operation Research		12:00 To 01:00 PM

20/2/23

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SRM Nagar, Kattankulathur
Chengalpattu Dist - 603 203

A.J. Lalith 20/2/23

Head of the Department

HEAD
Department of Mathematics
SRM Arts and Science College
Kattankulathur - 603 203.

SRM ARTS AND SCIENCE COLLEGE, KATTANKULATHUR-603 203.

Department of Mathematics

Examination Schedule (UNIT TEST - II / 2022-23 / EVEN SEMESTER)

II Year B.Sc., Mathematics

SL. No.	Date	Subject	Subject Code	Time
1	10.04.2023	Tamil-IV/Telugu-IV	LA14A/CLB4D	12:00 To 01:00 PM
2	11.04.2023	English-IV	LZ14B	12:00 To 01:00 PM
3	12.04.2023	Paper-VII Transform Technique	SM24A	12:00 To 01:00 PM
4	13.04.2023	Allied-IV Mathematical Statistics-II	SM3AG	12:00 To 01:00 PM
5	17.04.2023	Paper-VIII Statics	SM24B	12:00 To 01:00 PM

31/03/23

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SRM ARTS AND SCIENCE COLLEGE
SRM Nagar, Kattankulathur
Chengalpattu Dist - 603 203

31/03/23

Head of the Department
HEAD
Department of Mathematics
SRM Arts and Science College
Kattankulathur - 603 203

SRM ARTS AND SCIENCE COLLEGE, KATTANKULATHUR-603 203.

Department of Mathematics

Examination Schedule (UNIT TEST - II / 2022-23 / EVEN SEMESTER)

III Year B.Sc., Mathematics

SL. No.	Date	Subject	Subject Code	Time
1	10.04.2023	Paper-XIII Algebraic Sturctures - II	SM26A	12:00 To 01:00 PM
2	11.04.2023	Paper-XIV Real Analysis-II	SM26B	12:00 To 01:00 PM
3	12.04.2023	Paper-XV Complex Analysis	SM26C	12:00 To 01:00 PM
4	13.04.2023	Paper-XVI Graph Theory	SM4AG	12:00 To 01:00 PM
5	17.04.2023	Paper-XVII Operation Research	SM4AH	12:00 To 01:00 PM

31/4/23

PRINCIPAL 31/4/23
SRM ARTS AND SCIENCE COLLEGE
SRM Nagar, Kattankulathur
Chengalpattu Dist - 603 203

31/4/23

Head of the Department

HEAD
Department of Mathematics
SRM Arts and Science College
Kattankulathur - 603 203

SRM ARTS AND SCIENCE COLLEGE,KATTANKULATHUR						
DEPARTMENT OF HOTEL MANAGEMENT- February 2023						
I Year B.Sc. (II semester) Cycle Test - I						
Maximum Marks: 25 Marks						
Date	TIME & Session	Subject Code	Subject Title	TIME	Subject Code	Subject Title
06.02.2023	9:00am-10:20am	SH22A	Basic Course in Food Production - II	01:00pm-02:30pm	CLK2R	French - II
07.02.2023	9:00am-10:20am	SH22B	Basic Course in Food and Beverage Service - II	01:00pm-02:30pm	LZ12A	Communicative English - II
08.02.2023	9:00am-10:20am	SH22C	Basic Course in Accommodation Operations	01:00pm-02:30pm	SH32A	Tourism Management

HOD 10/2/23

HEAD OF THE DEPARTMENT
Dept of Hotel & Catering Management
SRM Arts & Science College.
SRM Nagar, Kattankulathur - 603 203.
Chengalpattu Dist.

10/2/23

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SRM Nagar, Kattankulathur
Chengalpattu Dist - 603 203

SRM ARTS AND SCIENCE COLLEGE,KATTANKULATHUR						
DEPARTMENT OF HOTEL MANAGEMENT- February 2023						
III Year B.Sc. (VI semester) Cycle Test - I						
Maximum Marks: 25 Marks						
Date	**TIME & Session**	**Temporary Subject Code**	**Subject Title**	**TIME**	**Temporary Subject Code**	**Subject Title**
06.02.2023	9:00am-10:20am	BHM-DSC22	Advanced Food Production Operations - II	01:00pm-02:30pm	BHM-DSA07	Application of Computer
07.02.2023	9:00am-10:20am	BHM-DSC23	Advanced Food and Beverage Operations -II	01:00pm-02:30pm	BHM-DSA09	HACCP
08.02.2023	9:00am-10:20am	BHM-DSC24	Front Office Management	01:00pm-02:30pm	BHM-DSA10	Food & Beverage Control and Management
09.02.2023	9:00am-10:20am	BHM-DSE02	Bar Control Management	01:00pm-02:30pm	BHM-DSE03	Guest Relation Management

HOD 10/2/23

HEAD OF THE DEPARTMENT
Dept of Hotel & Catering Management
SRM Arts & Science College,
SRM Nagar, Kattankulathur - 603 203.
Chengalpattu Dist.

10/2/23

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Chengalpattu Dist - 603 203

SRM ARTS AND SCIENCE COLLEGE,KATTANKULATHUR						
DEPARTMENT OF HOTEL MANAGEMENT- MARCH 2023						
I Year B.Sc. (II semester) Cycle Test - II						
Maximum Marks:25 Marks						
Date	**TIME & Session**	**Subject Code**	**Subject Title**	**TIME**	**Subject Code**	**Subject Title**
06.03.2023	9:00am-10:20am	SH22A	Basic Course in Food Production - II	01:00pm-02:30pm	CLK2R	French - II
07.03.2023	9:00am-10:20am	SH22B	Basic Course in Food and Beverage Service - II	01:00pm-02:30pm	LZ12A	Communicative English - II
08.03.2023	9:00am-10:20am	SH22C	Basic Course in Accommodation Operations	01:00pm-02:30pm	SH32A	Tourism Management

J. Lalitha Shri 9/3/23
HOD

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Dept of Hotel & Catering Management
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9/3/23
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Chengalpattu Dist - 603 203

SRM ARTS AND SCIENCE COLLEGE,KATTANKULATHUR						
DEPARTMENT OF HOTEL MANAGEMENT- MARCH 2023						
III Year B.Sc. (VI semester) Cycle Test - II						
Maximum Marks: 25 Marks						
Date	**TIME & Session**	**Temporary Subject Code**	**Subject Title**	**TIME**	**Temporary Subject Code**	**Subject Title**
06.03.2023	9:00am-10:20am	BHM-DSC22	Advanced Food Production Operations - II	01:00pm-02:30pm	BHM-DSA07	Application of Computer
07.03.2023	9:00am-10:20am	BHM-DSC23	Advanced Food and Beverage Operations -II	01:00pm-02:30pm	BHM-DSA09	HACCP
08.03.2023	9:00am-10:20am	BHM-DSC24	Front Office Management	01:00pm-02:30pm	BHM-DSA10	Food & Beverage Control and Management
09.03.2023	9:00am-10:20am	BHM-DSE02	Bar Control Management	01:00pm-02:30pm	BHM-DSE03	Guest Relation Management

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SRM
ARTS AND SCIENCE COLLEGE

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Kattankulathur, Chengalpattu Dist - 603203

AQAR
(2022-2023)

CRITERION I

CURRICULAR ASPECTS

1.1.2 CIE INVIGILATION



SRMASC/BC/2022-23/19

SRM Arts and Science College

Kattankulathur-603203

Department of Biochemistry

Unit Test I Invigilation Duty Schedule – September 2022

Date	Room No.	Name of the Faculty	Signature of the Staff
12-09-2022	405	Dr.G.Duraimuthumani	
	406	Mrs.A.Thenmozhi	
	407	Dr.M.Yuvaraj	
13-09-2022	405	Dr.Aruna.R	
	406	Dr.G.Duraimuthumani	
	407	Mrs.M.Hemalatha	
14-09-2022	405	Dr.M.Yuvaraj	
	406	Dr.V.Chitra	
	407	Mrs.A.Thenmozhi	
15-09-2022	405	Dr.B.Arirudran	
	406	Dr.Aruna.R	
	407	Mrs.M.Hemalatha	
16-09-2022	407	Dr.B.Arirudran	

01/09/22

Head of the Department

Department of Biochemistry
SRM Arts And Science College
Kattankulathur

8/9/22

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Chengalpattu Dist - 603 203

SRM ARTS AND SCIENCE COLLEGE
KATTANKULATHUR – 603203

Department of Biochemistry

Unit Test-I, September 2022

Overall Seating Arrangement

Class	Register Number	No. of Students	Room No
III B.Sc	222005872-222005876	5 Students	405
II B.Sc	222106338-222106342	5 Students	
II M.Sc	612101262-612101266	5 Students	
III B.Sc	222005877-222005883	7 Students	406
II B.Sc	222106343-222106347	5 Students	
II M.Sc	612101267-612101271	5 Students	
III B.Sc	222005884-222005888	5 Students	407
II B.Sc	222106348-222106354	7 Students	
II M.Sc	612101262-612101277	6 Students	
Total No. of Students		**50 Students**	

01/09/22

Head of the Department

HEAD
Department of Biochemistry
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SRM Nagar, Kattankulathur
Chengalpattu Dist - 603 203.

SRM ARTS AND SCIENCE COLLEGE
KATTANKULATHUR – 603203
Department of Biochemistry
Unit Test-I, September 2022
Class Room Seating Arrangement

Room No: 405 **No. of Students: 15**

S. No	Register Number	Class
1	222005872	III B.Sc
2	222005873	
3	222005874	
4	222005875	
5	222005876	
6	222106338	II B.Sc
7	222106339	
8	222106340	
9	222106341	
10	222106342	
11	612101262	II M.Sc
12	612101263	
13	612101264	
14	612101265	
15	612101266	

01/09/22

Head of the Department

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Department of Biochemistry
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Kattankulathur

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Chengalpattu Dist - 603 203

SRM ARTS AND SCIENCE COLLEGE
KATTANKULATHUR – 603203
Department of Biochemistry
Unit Test-I, September 2022
Class Room Seating Arrangement

Room No: 406 **No. of Students: 17**

S. No	Register Number	Class
1	222005877	III B.Sc
2	222005878	
3	222005879	
4	222005880	
5	222005881	
6	222005882	
7	222005883	
8	222106343	II B.Sc
9	222106344	
10	222106345	
11	222106346	
12	222106347	
13	612101267	II M.Sc
14	612101268	
15	612101269	
16	612101270	
17	612101271	

01/09/22

Head of the Department

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Department of Biochemistry
SRM Arts And Science College
Kattankulathur

12/9/22

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SRM Nagar, Kattankulathur
Chengalpattu Dist - 603 203

SRM ARTS AND SCIENCE COLLEGE
KATTANKULATHUR – 603203
Department of Biochemistry
Unit Test-I, September 2022
Class Room Seating Arrangement

Room No: 407 **No. of Students: 18**

S. No	Register Number	Class
1	222005884	III B.Sc
2	222005885	
3	222005886	
4	222005887	
5	222005888	
6	222106348	II B.Sc
7	222106349	
8	222106350	
9	222106351	
10	222106352	
11	222106353	
12	222106354	
13	612101272	II M.Sc
14	612101273	
15	612101274	
16	612101275	
17	612101276	
18	612101277	

01/09/22

Head of the Department

HEAD
Department of Biochemistry
SRM Arts And Science College
Kattankulathur

9/9/22

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Chengalpattu Dist - 603 203

SRM ARTS AND SCIENCE COLLEGE
KATTANKULATHUR – 603203
Department of Biochemistry
Unit Test-I, September 2022
Class Room Seating Arrangement

Room No: 112 **No. of Students: 21**

S.No	Register Number	Students
1	UBC220101	BORA TRISHA REDDY
2	UBC220102	PALAK MISHRA
3	UBC220103	AZIR MOHAMMED.A
4	UBC220104	DESIK.P
5	UBC220105	HEMACHANDRAN.M
6	UBC220106	KESAVAN.R
7	UBC220107	MUKESH KUMAR.L
8	UBC220108	NITHISH KUMAR.J.K
9	UBC220109	PRAVEEN INBARAJ.S
10	UBC220110	RAHUL.K
11	UBC220111	SUDHARSANAN.R
12	UBC220112	SURESH.B
13	UBC220113	TAMILARASAN.E
14	UBC220114	VIGNESH.R
15	UBC220115	ABIRAMI.V
16	UBC220116	ANGELINE VAISIKA.P
17	UBC220117	PAVITHRA.S
18	UBC220118	SHARMI.C
19	UBC220119	SREENIDHI.S.K
20	UBC220120	VIDHUSANA.P
21	UBC220120	MADHUKRISHNA .B

19/9/22

PRINCIPAL
SRM ARTS AND SCIENCE COLLEGE
SRM Nagar, Kattankulathur
Chengalpattu Dist - 603 203

19/9/22

Head of the Department

HEAD
Department of Biochemistry
SRM Arts And Science College
Kattankulathur - 603 203

SRMASC/BC/2022-23/41

SRM Arts and Science College

Kattankulathur-603203

Department of Biochemistry

Unit Test I Invigilation Duty Schedule for I M.Sc., Biochemistry– November- 2022

Date	Room No.	Name of the Faculty	Signature of the Staff
29.11.2022	406	Dr.B.Arirudran	
30.11.2022	406	Dr.A.Thenmozhi	
01.12.2022	406	Dr.G.Duraimuthumani	
02.12.2022	406	Dr.R.Aruna	

25/11/22

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SRM ARTS AND SCIENCE COLLEGE
SRM Nagar, Kattankulathur
Chengalpattu Dist - 603 203

25/11/22

Head of the Department

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Department of Biochemistry
SRM Arts And Science College
Kattankulathur - 603 203

SRM ARTS AND SCIENCE COLLEGE, KATTANKULATHUR

Department of Biochemistry

Unit Test-I, November-2022

Seating Arrangement

Room No-406

Seat No	I M.Sc
1	PBC221101
2	PBC221102
3	PBC221103
4	PBC221104
5	PBC221105
6	PBC221121

Seat No	I M.Sc
7	PBC221106
8	PBC221107
9	PBC221108
10	PBC221109
11	PBC221110
12	PBC221111

Seat No	I M.Sc
13	PBC221112
14	PBC221113
15	PBC221114
16	PBC221115
17	PBC221116
18	PBC221117

Seat No	I M.Sc
19	PBC221118
20	PBC221119
21	PBC221120

25/11/22

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25/11/22

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Chengalpattu Dist - 603 203

SRMASC/BC/2022-23/32

SRM Arts and Science College

Kattankulathur-603203

Department of Biochemistry

Unit Test II Invigilation Duty Schedule – October 2022

Date	Room No.	Name of the Faculty	Signature of the Staff
31.10.2022	405	Dr.M.Yuvaraj	
	406	Dr.G.Duraimuthumani	
	407	Dr.A.Thenmozhi	
01.11.2022	405	Dr.A.Thenmozhi	
	406	Dr.Aruna.R	
	407	Dr.V.Chitra	
02.11.2022	405	Mrs.M.Hemalatha	
	406	Dr.Aruna.R	
	407	Dr.B.Arirudran	
03.11.2022	405	Dr.G.Duraimuthumani	
	406	Mrs.M.Hemalatha	
	407	Dr.B.Arirudran	
04.11.2022	407	Dr.M.Yuvaraj	

18/10/22

Head of the Department

18/10/22

PRINCIPAL
SRM ARTS AND SCIENCE COLLEGE
SRM Nagar, Kattankulathur
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Department of Biochemistry
SRM Arts And Science College
Kattankulathur - 603 203

SRM ARTS AND SCIENCE COLLEGE
KATTANKULATHUR – 603203

Department of Biochemistry

Unit Test-II, October 2022

Over all Seating Arrangement

Class	Register Number	No. of Student	Room No
III B.Sc	222005872-222005883	17 Students	405
II M.Sc	612101262-612101277	16 Students	
II B.Sc	222106338-222106354	17 Students	406
I M.Sc	1 to 21	21 Students	
I B.Sc	UBC220101 –UBC220123	22 Students	407
Total No. of Students		**93 Students**	

18/10/22

PRINCIPAL
SRM ARTS AND SCIENCE COLLEGE
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18/10/22

Head of the Department

HEAD
Department of Biochemistry
SRM Arts And Science College
Kattankulathur - 603 203

SRM ARTS AND SCIENCE COLLEGE, KATTANKULATHUR

Department of Biochemistry

Unit Test-II, October-2022

Seating Arrangement

Room No-405

Seat No	III B.Sc	Seat No	II M.Sc
1	222005872	6	612101262
2	222005873	7	612101263
3	222005874	8	612101264
4	222005875	9	612101265
5	222005876	10	612101266

Seat No	III B.Sc	Seat No	II M.Sc
11	222005877	17	612101267
12	222005878	18	612101268
13	222005879	19	612101269
14	222005880	20	612101270
15	222005881	21	612101271
16	222005882	22	612101272

Seat No	III B.Sc	Seat No	II M.Sc
23	222005883	29	612101273
24	222005884	30	612101274
25	222005885	31	612101275
26	222005886	32	612101276
27	222005887	33	612101277
28	222005888		

III B.Sc	17 Students
II M.Sc	16 Students
Total Students	33 Students

18/10/22

PRINCIPAL
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18/10/22

Department of Biochemistry
SRM Arts And Science College
Kattankulathur - 603 203

SRM ARTS AND SCIENCE COLLEGE, KATTANKULATHUR

Department of Biochemistry

Unit Test-II, October-2022

Seating Arrangement

Room No-406

Seat No	II B.Sc	Seat No	I M.Sc
1	222106338	7	1
2	222106339	8	2
3	222106340	9	3
4	222106341	10	4
5	222106342	11	5
6	222106343	12	6

Seat No	II B.Sc	Seat No	I M.Sc
13	222106344	19	7
14	222106345	20	8
15	222106346	21	9
16	222106347	22	10
17	222106348	23	11
18	222106349	24	12

Seat No	II B.Sc	Seat No	I M.Sc
25	222106350	32	15
26	222106351	33	16
27	222106352	34	17
28	222106353	35	18
29	222106354	36	19
30	13(I M.Sc)	37	20
31	14(M.Sc)	38	21

II B.Sc	17 Students
I M.Sc	21 Students
Total Students	37 Students

18/10/22

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Department of Biochemistry
SRM Arts And Science College
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18/10/22

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Chengalpattu Dist - 603 203

SRM ARTS AND SCIENCE COLLEGE, KATTANKULATHUR

Department of Biochemistry

Unit Test-II, October-2022

Seating Arrangement

Room No-407

Seat No	I B.Sc	Seat No	I B.Sc
1	UBC220101	6	UBC220106
2	UBC220102	7	UBC220107
3	UBC220103	8	UBC220108
4	UBC220104	9	UBC220109
5	UBC220105	10	UBC220110

Seat No	I B.Sc	Seat No	I B.Sc
11	UBC220111	16	UBC220116
12	UBC220112	17	UBC220117
13	UBC220113	18	UBC220118
14	UBC220114	19	UBC220119
15	UBC220115	20	UBC220120

Seat No	I B.Sc
21	UBC220121
22	UBC220122
23	UBC220123

I B.Sc	22 Students
Total Students	22 Students

18/10/22

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SRM ARTS AND SCIENCE COLLEGE
SRM Nagar, Kattankulathur
Chengalpattu Dist - 603 203

18/10/22

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Department of Biochemistry
SRM Arts And Science College
Kattankulathur - 603 203

SRMASC/BC/2022-23/56

SRM Arts and Science College

Kattankulathur-603203

Department of Biochemistry

Unit Test I Invigilation Duty Schedule – February- 2023

Date	Room No.	Name of the Faculty	Signature of the Staff
27.02.2023	405	Dr.A.Thenmozhi	
	406	Mrs.M.Hemalatha	
	407	Dr.G.Duraimuthumani	
28.02.2023	405	Dr.M.Yuvaraj	
	406	Dr.Aruna.R	
	407	Dr.V.Chitra	
01.03.2023	405	Dr.G.Duraimuthumani	
	406	Dr.Aruna.R	
	407	Dr.M.Yuvaraj	
02.03.2023	405	Dr.B.Arirudran	
	406	Dr.A.Thenmozhi	
	407	Mrs.M.Hemalatha	
03.03.2023	406	Dr.B.Arirudran	

13/2/23

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13/02/23

Head of the Department

HEAD
Department of Biochemistry
SRM Arts And Science College
Kattankulathur - 603 203

SRM ARTS AND SCIENCE COLLEGE
KATTANKULATHUR – 603203

Department of Biochemistry

Unit Test-I, February- 2023

Overall Seating Arrangement

Class	Register Number	No. of Students	Room No
III B.Sc	222005872-222005888	17	**405**
II M.Sc	612101262-612101276	16	
I M.Sc	612200930-612200934	15	**406**
II B.Sc	222106338-222106354	17	
I M.Sc	612200935-612200940	6	**407**
I B.Sc	222207504-222207520	22	
Total no of Students		93	

13/2/23

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Kattankulathur-603203

Department of Biochemistry

Unit Test II Invigilation Duty Schedule – April- 2023

Date	Room No.	Name of the Faculty	Signature of the Staff
10.04.2023	405	Dr.M.Yuvaraj	
	406	Dr.V.Chitra	
	407	Dr.G.Duraimuthumani	
11.04.2023	405	Dr.R.Aruna	
	406	Mrs.M.Hemalatha	
	407	Dr.B.Arirudran	
12.04.2023	405	Dr.G.Duraimuthumani	
	406	Dr.B.Arirudran	
	407	Dr.A.Thenmozhi	
13.04.2023	405	Dr.M.Yuvaraj	
	406	Mrs.M.Hemalatha	
	407	Dr.A.Thenmozhi	
17.04.2023	406	Dr.R.Aruna	

28/03/23

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KATTANKULATHUR – 603203

Department of Biochemistry

Unit Test-II, April- 2023

Overall Seating Arrangement

Class	Register Number	No. of Students	Room No
III B.Sc	222005872-222005888	17	**405**
II M.Sc	612101262-612101276	16	
I M.Sc	612200930-612200934	14	**406**
II B.Sc	222106338-222106354	17	
I M.Sc	612200935-612200940	6	**407**
I B.Sc	222207504-222207520	22	
Total no of Students		92	

28/03/23

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SRM ARTS AND SCIENCE COLLEGE

KATTANKULATHUR- 603 203

DEPARTMENT OF BIOTECHNOLOGY

UNIT TEST- I

EVEN SEMESTER - JANUARY 2023

SEATING ARRANGEMENT - I B.Sc Biotechnology

ROOM NO: 205 Venue : Extension Block , Second Floor

Seat Number	Students Register Number	Seat Number	Students Register Number
1	222207521	17	222207537
2	222207522	18	222207538
3	222207523	19	222207539
4	222207524	20	222207540
5	222207525	21	222207541
6	222207526	22	222207542
7	222207527	23	222207543
8	222207528	24	222207544
9	222207529	25	222207545
10	222207530	26	222207546
11	222207531	27	222207547
12	222207532	28	222207548
13	222207533	29	222207549
14	222207534	30	222207550
15	222207535	31	222207551
16	222207536	32	222207552

20/1/2023

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DEPARTMENT OF BIOTECHNOLOGY

UNIT TEST- I

EVEN SEMESTER - JANUARY 2023

SEATING ARRANGEMENT - II B.Sc Biotechnology

ROOM NO: 204 Venue : Extension Block , Second Floor

Seat Number	Students Register Number	Seat Number	Students Register Number
1	222106355	18	222106372
2	222106356	19	222106373
3	222106357	20	222106374
4	222106358	21	222106375
5	222106359	22	222106376
6	222106360	23	222106377
7	222106361	24	222106378
8	222106362	25	222106379
9	222106363	26	222106380
10	222106364	27	222106381
11	222106365	28	222106382
12	222106366	29	222106383
13	222106367	30	222106384
14	222106368	31	222106385
15	222106369	32	222106386
16	222106370	33	222106387
17	222106371	34	222106388

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DEPARTMENT OF BIOTECHNOLOGY

UNIT TEST- I

EVEN SEMESTER - JANUARY2023

SEATING ARRANGEMENT - III B.Sc Biotechnology

ROOM NO: Genereal lab

Venue : PG Block Ground floor

Seat Number	Students Register Number	Seat Number	Students Register Number
1	222005889	20	222005908
2	222005890	21	222005909
3	222005891	22	222005910
4	222005892	23	222005911
5	222005893	24	222005912
6	222005894	25	222005913
7	222005895	26	222005914
8	222005896	27	222005915
9	222005897	28	222005916
10	222005898	29	222005917
11	222005899	30	222005918
12	222005900	31	222005919
13	222005901	32	222005920
14	222005902	33	222005921
15	222005903	34	222005922
16	222005904	35	222005923
17	222005905	36	222005924
18	222005906	37	222005925
19	222005907	38	222005926

20/1/2023

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DEPARTMENT OF BIOTECHNOLOGY

UNIT TEST- I

EVEN SEMESTER - JANUARY 2023

SEATING ARRANGEMENT - I M.Sc Biotechnology

ROOM NO: MSc. Classroom

Venue : PG Block Ground floor

Seat Number	Students Register Number	Seat Number	Students Register Number
1	612200987	13	612200999
2	612200988	14	612201000
3	612200989	15	612201001
4	612200990	16	612201002
5	612200991	17	612201003
7	612200993	18	612201004
8	612200994	19	612201005
9	612200995	20	612201006
10	612200996	21	612201007
11	612200997	22	612201008
12	612200998	23	612201009

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DEPARTMENT OF BIOTECHNOLOGY

UNIT TEST- I

EVEN SEMESTER - JANUARY 2023

SEATING ARRANGEMENT - II M.Sc Biotechnology

ROOM NO: SMART CLASS

Venue : PG Block Ground floor

Seat Number	Students Register Number	Seat Number	Students Register Number
1	612101216	10	612101224
2	612101217	11	612101225
3	612101218	12	612101226
4	612101219	13	612101227
5	612101220	14	612101228
7	612101221	15	612101229
8	612101222	16	612101230
9	612101223	17	612101231

20/1/2023

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SRM ARTS AND SCIENCE COLLEGE

KATTANKULATHUR- 603 203

DEPARTMENT OF BIOTECHNOLOGY

UNIT TEST- II

EVEN SEMESTER - MARCH 2023

SEATING ARRANGEMENT - I B.Sc Biotechnology

ROOM NO: 205 Venue : Extension Block , Second Floor

Seat Number	Students Register Number	Seat Number	Students Register Number
1	222207521	17	222207537
2	222207522	18	222207538
3	222207523	19	222207539
4	222207524	20	222207540
5	222207525	21	222207541
6	222207526	22	222207542
7	222207527	23	222207543
8	222207528	24	222207544
9	222207529	25	222207545
10	222207530	26	222207546
11	222207531	27	222207547
12	222207532	28	222207548
13	222207533	29	222207549
14	222207534	30	222207550
15	222207535	31	222207551
16	222207536	32	222207552

31/3/2023

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KATTANKULATHUR- 603 203

DEPARTMENT OF BIOTECHNOLOGY

UNIT TEST- II

EVEN SEMESTER - MARCH 2023

SEATING ARRANGEMENT - II B.Sc Biotechnology

ROOM NO: 204 Venue : Extension Block , Second Floor

Seat Number	Students Register Number	Seat Number	Students Register Number
1	222106355	18	222106372
2	222106356	19	222106373
3	222106357	20	222106374
4	222106358	21	222106375
5	222106359	22	222106376
6	222106360	23	222106377
7	222106361	24	222106378
8	222106362	25	222106379
9	222106363	26	222106380
10	222106364	27	222106381
11	222106365	28	222106382
12	222106366	29	222106383
13	222106367	30	222106384
14	222106368	31	222106385
15	222106369	32	222106386
16	222106370	33	222106387
17	222106371	34	222106388

31/3/2023

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SRM ARTS AND SCIENCE COLLEGE

KATTANKULATHUR- 603 203

DEPARTMENT OF BIOTECHNOLOGY

UNIT TEST- II

EVEN SEMESTER - MARCH 2023

SEATING ARRANGEMENT - III B.Sc Biotechnology

ROOM NO: Genereal lab Venue : PG Block Ground floor

Seat Number	Students Register Number	Seat Number	Students Register Number
1	222005889	20	222005908
2	222005890	21	222005909
3	222005891	22	222005910
4	222005892	23	222005911
5	222005893	24	222005912
6	222005894	25	222005913
7	222005895	26	222005914
8	222005896	27	222005915
9	222005897	28	222005916
10	222005898	29	222005917
11	222005899	30	222005918
12	222005900	31	222005919
13	222005901	32	222005920
14	222005902	33	222005921
15	222005903	34	222005922
16	222005904	35	222005923
17	222005905	36	222005924
18	222005906	37	222005925
19	222005907	38	222005926

3/3/2023

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KATTANKULATHUR- 603 203

DEPARTMENT OF BIOTECHNOLOGY

UNIT TEST- II

EVEN SEMESTER - MARCH 2023

SEATING ARRANGEMENT - I M.Sc Biotechnology

ROOM NO: MSc. Classroom

Venue : PG Block Ground floor

Seat Number	Students Register Number	Seat Number	Students Register Number
1	612200987	13	612200999
2	612200988	14	612201000
3	612200989	15	612201001
4	612200990	16	612201002
5	612200991	17	612201003
7	612200993	18	612201004
8	612200994	19	612201005
9	612200995	20	612201006
10	612200996	21	612201007
11	612200997	22	612201008
12	612200998	23	612201009

3/3/2023

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Department of Biotechnology
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KATTANKULATHUR- 603 203

DEPARTMENT OF BIOTECHNOLOGY

UNIT TEST- II

EVEN SEMESTER - MARCH 2023

SEATING ARRANGEMENT - II M.Sc Biotechnology

ROOM NO: SMART CLASS

Venue : PG Block Ground floor

Seat Number	Students Register Number	Seat Number	Students Register Number
1	612101216	10	612101224
2	612101217	11	612101225
3	612101218	12	612101226
4	612101219	13	612101227
5	612101220	14	612101228
7	612101221	15	612101229
8	612101222	16	612101230
9	612101223	17	612101231

3/3/2023

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Department of Biotechnology
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3/3/23

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SRM ARTS AND SCIENCE COLLEGE
KATTANKULATHUR- 603 203
DEPARTMENT OF MICROBIOLOGY
UNIT TEST I- 2022-2023
DUTY LIST

Date	Room no.	Name of the staff
23.01.2023	110	Dr. P. Sujith
	111	Mrs.V. Aswini
	112	Dr.M. Arputha Bibiana
	115	Dr. K. Abirami
	116	Dr. A. Kalidoss
24.01.2023	110	Mr. S. Balamurugan
	111	Dr. P. Nehru
	112	Dr.M. Arputha Bibiana
	115	Mrs.V. Aswini
	116	Dr. A. Kalidoss
25.01.2023	110	Dr. P. Nehru
	111	Mrs.V. Aswini
	112	Dr. N. Prabha
	115	Dr. K. Abirami
	116	Dr. P. Nehru
27.01.2023	110	Dr. P. Sujith
	111	Mr. S. Balamurugan
	112	Dr. Paul Beulah
	115	Dr.M. Arputha Bibiana
28.01.2023	111	Dr. P. Sujith
	112	

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DEPARTMENT OF MICROBIOLOGY
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KATTANKULATHUR- 603 203
DEPARTMENT OF MICROBIOLOGY
UNIT TEST- I- 2022-23
SEATING ARRANGEMENT

ROOM NO: 110 **FLOOR: I-PG Block** **DATE: 23.01.23 to 27.01.23**

Seat Number	Students Register Number	Seat number	Students Register Number
1	222207725	25	612101233
2	222207726	26	612101234
3	222207727	27	612101235
4	222207728	28	612101236
5	222207729	29	612101237
6	222207730	30	612101238
7	222207731	31	612101239
8	222207732	32	612101240
9	222207733	33	612101241
10	222207734	34	612101242
11	222207735	35	612101243
12	222207736	36	612101244
13	222207737	37	612101245
14	222207738	38	612101246
15	222207739	39	
16	222207740	40	
17	222207741	41	
18	222207742	42	
19	222207743	43	
20	222207744	44	
21		45	
22		46	
23		47	
24		48	

S.NO	Name of the Class	Register number	Total
1	I. B.Sc Microbiology	222207725-744	20
2	II M.Sc Applied Microbiology	612101233-246	14

ROOM NO: 111 **FLOOR: I-PG Block** **DATE: 23.01.23 to 27.01.23**

Seat Number	Students Register Number	Seat Number	Students Register Number
1	222207745	19	612101247
2	222207746	20	612101248
3	222207747	21	612101249
4	222207748	22	612101250
5	222207749	23	612101251
6	222207750	24	612101252
7	222207751	25	612101253
8	612200941	26	612101254
9	612200942	27	612101255
10	612200943	28	612101256
11	612200944	29	612101257
12	612200945	30	612101258
13	612200946	31	612101259
14	612200947	32	612101260
15	612200948	33	612101261
16	612200949		
17	612200950		
18	612200951		

S.No	Name of the Class	Register number	Total
1	I.B.Sc. Microbiology	222207745-751	7
2	II M.sc Microbiology	612101247-261	15
3	I M.sc Microbiology	612200941-951	11

ROOM NO: 112 **FLOOR: I-PG Block** **DATE: 23.01.23 to 27.01.23**

Seat Number	Students Register Number	Seat Number	Students Register number
1	612200952	15	612200966
2	612200953	16	612200967
3	612200954	17	612200968
4	612200955	18	
5	612200956	19	
6	612200957	20	
7	612200958	21	
8	612200959	22	
9	612200960	23	
10	612200961	24	
11	612200962	25	
12	612200963	26	
13	612200964	27	
14	612200965	28	

S.No	Name of the Class	Register number	Total
1	I. M.Sc Microbiology	612200952-968	17

ROOM NO: 115 **FLOOR: I-PG Block** **DATE: 23.01.23 to 27.01.23**

Seat Number	Students Register Number	Seat number	Students Register Number
1	222006100	25	22106524
2	222006101	26	22106525
3	222006102	27	22106526
4	222006103	28	22106527
5	222006104	29	22106528
6	222006105	30	22106529
7	222006106	31	22106530
8	222006107	32	22106531
9	222006108	33	22106532
10	222006109	34	22106533
11	222006110	35	22106534
12	222006111	36	22106535
13	222006112	37	22106536
14	222006113	38	22106537
15	222006114	39	22106538
16	222006115	40	
17	222006116	41	
18	222006117	42	
19	222006118	43	
20	222006119	44	
21	222006120	45	
22	222006121	46	
23	222006122	47	
24	222006123	48	

III B.Sc Microbiology	222006100-123	24
II B.Sc Microbiology	22106524-538	15

ROOM NO: 116 **FLOOR: I-PG Block** **DATE: 23.01.23 to 27.01.23**

Seat Number	Students Register Number	Seat number	Students Register Number
1	222006124	25	22106539
2	222006125	26	22106540
3	222006126	27	22106541
4	222006127	28	22106542
5	222006128	29	22106543
6	222006129	30	221065244
7	222006130	31	221065245
8	222006131	32	221065246
9	222006132	33	221065247
10	222006133	34	221065248
11	222006134	35	221065249
12	222006135	36	221065250
13	222006136	37	221065251
14	222006137	38	221065252
15	222006138	39	221065253
16	222006139	40	221065254
17	222006140		
18	222006141		
19			
20			
21			
22			
23			
24			

III B.Sc Microbiology	222006124-141	18
II B.Sc Microbiology	22106539-252	16

ROOM NO: 110 **FLOOR: I-PG Block** **DATE: 28.01.23**

Seat Number	Students Register Number	Seat number	Students Register Number
1	612101233	17	612200941
2	612101234	18	612200942
3	612101235	19	612200943
4	612101236	20	612200944
5	612101237	21	612200945
6	612101238	22	612200946
7	612101239	23	612200947
8	612101240	24	612200948
9	612101241	25	612200949
10	612101242	26	612200950
11	612101243	27	612200951
12	612101244	28	
13	612101245	29	
14	612101246		
15	612101247		
16	612101248		

S.NO	Name of the Class	Register number	Total
1	II M.Sc Applied Microbiology	612101233-248	16
2	I M.Sc Applied Microbiology	612200941-951	11

ROOM NO: 111 **FLOOR: I-PG Block** **DATE: 28.01.23**

Seat Number	Students Register Number	Seat number	Students Register Number
1	612200952	17	612101249
2	612200953	18	612101250
3	612200954	19	612101251
4	612200955	20	612101252
5	612200956	21	612101253
6	612200957	22	612101254
7	612200958	23	612101255
8	612200959	24	612101256
9	612200960	25	612101257
10	612200961	26	612101258
11	612200962	27	612101259
12	612200963	28	612101260
13	612200964	29	612101261
14	612200965		
15	612200966		
16	612200967		
17	612200968		

S.NO	Name of the Class	Register number	Total
1	II M.Sc Applied Microbiology	612101249-261	13
2	I M.Sc Applied Microbiology	612200952-968	17

28/01/2023

HEAD
DEPARTMENT OF MICROBIOLOGY
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28/1/23

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Chengalpattu Dist - 603 203

SRM ARTS AND SCIENCE COLLEGE
KATTANKULATHUR- 603 203
DEPARTMENT OF MICROBIOLOGY
UNIT TEST-I SEPTEMBER- 2022
DUTY LIST

DATE	Room no	SUBJECT
26.09.2022	BC lab	Dr.G. DuraiMuthumani
27.09.2022	110	Dr. P. Sujith
28.09.2022	110	Dr. P. Sujith
29.09.2022	110	Mr. S. BalaMurugan

21/09/2022

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SRM ARTS AND SCIENCE COLLEGEKATTANKULATHUR – 603 203
DEPARTMENT OF MICROBIOLOGY

I & II UNIT TEST TIME TABLE - OCTOBER 2022

TIME: 12.00 – 1.00 PM **MAX. MARKS: 25**

DATE	CLASS	SUBJECT
31.10.2022	I BSc	Language
	I MSc	Microbial Diversity & Taxonomy
01.11.2022	I BSc	English
	I MSc	General microbiology & Lab animal science
02.11.2022	I BSc	General Microbiology
	I MSc	Immunology
03.11.2022	I BSc	Bio chemistry
	I MSc	Metabolic pathway
04.11.2022	I MSc	Pharmaceutical Microbiology

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DEPARTMENT OF MICROBIOLOGY
UNIT TEST-I& II OCTOBER- 2022
DUTY LIST

DATE	ROOM NO	SUBJECT
31.10.2022	110	Dr. P. Sujith
	111	Dr. M. ArputhaBibinia
01.11.2022	110	Dr. Yuvaraj
	111	Dr. A. Kalidoss
02.11.2022	110	Dr. P.Sujith
	111	Dr. M. ArputhaBibinia
03.11.2022	110	Mr. S. BalaMurugan
	111	Dr. B.F. Paul Beula
04.11.2022	111	Dr. A. Kalidoss

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DEPARTMENT OF MICROBIOLOGY
UNIT TEST- II-OCT' 2022
SEATING ARRANGEMENT

ROOM NO: 110 **FLOOR: I-PG Block** **DATE: 31.10.22 to 03.11.22**

Seat Number	Students Register Number	Seat number	Students Register Number
1	222006100	25	PMB220201
2	222006101	26	PMB220202
3	222006102	27	PMB220204
4	222006103	28	PMB220205
5	222006104	29	PMB220206
6	222006105	30	PMB220207
7	222006106	31	PMB220208
8	222006107	32	PMB220209
9	222006108	33	UMB220201
10	222006109	34	UMB220202
11	222006110	35	UMB220203
12	222006111	36	UMB220204
13	222006112	37	UMB220205
14	222006113	38	UMB220206
15	222006114	39	UMB220207
16	222006115	40	UMB220208
17	222006116	41	
18	222006117	42	
19	222006118	43	
20	222006119	44	
21	222006120	45	
22	222006121	46	
23	222006122	47	
24	222006123	48	

S.NO	Name of the Class	Register number	Total
1	III B.Sc Microbiology	222006100-123	24
2	I M.Sc Applied Microbiology	PMB220201-217	15
3	I B.Sc Microbiology		8

ROOM NO: 111 **FLOOR: I-PG Block** **DATE: 31.10.22 to 03.11.22**

Seat Number	Students Register Number	Seat number	Students Register Number
1	612101233	24	PMB220218
2	612101234	25	PMB220219
3	612101233	26	PMB220220
4	612101235	27	PMB220221
5	612101236	28	PMB220222
6	612101237	29	PMB220223
7	612101238	30	PMB220224
8	612101239	31	PMB220225
9	612101240	32	PMB220226
10	612101241	33	PMB220227
11	612101242	34	PMB220228
12	612101243	35	PMB220229
13	612101244	36	UMB220209
14	612101245	37	UMB220210
15	612101246	38	UMB220211
16	PMB220210	39	UMB220212
17	PMB220211	40	UMB220213
18	PMB220212	41	UMB220214
19	PMB220213	42	UMB220215
20	PMB220214		
21	PMB220215		
22	PMB220216		
23	PMB220217		

S.NO	Name of the Class	Register number	Total
1	I M.Sc Applied Microbiology	PMB220210-229	20
2	II M.Sc Applied Microbiology	612101233-246	15
3.	I B.Sc Microbiology	UMB220209-215	7

ROOM NO: 112 **FLOOR: I-PG Block** **DATE: 31.10.22 to 03.11.22**

Seat Number	Students Register Number	Seat Number	Students Register Number
1	222006124	19	22106524
2	222006125	20	22106525
3	222006126	21	22106526
4	222006127	22	22106527
5	222006128	23	22106528
6	222006129	24	22106529
7	222006130	25	22106530
8	222006131	26	22106531
9	222006132	27	22106532
10	222006133	28	22106533
11	222006134	29	22106534
12	222006135	30	22106535
13	222006136	31	22106536
14	222006137	32	22106537
15	222006138	33	22106538
16	222006139		
17	222006140		
18	222006141		

S.No	Name of the Class	Register number	Total
1	III B.Sc Microbiology	222006124-141	18
2	II B.Sc Microbiology	22106524-538	15

ROOM NO: 204 **FLOOR: II MBA Block** **DATE: 31.10.22 to 03.11.22**

Seat Number	Students Register Number	Seat Number	Students Register number
1	22106539	15	612101247
2	22106540	16	612101248
3	22106541	17	612101249
4	22106542	18	612101250
5	22106543	19	612101251
6	221065244	20	612101252
7	221065245	21	612101253
8	221065246	22	612101254
9	221065247	23	612101255
10	221065248	24	612101256
11	221065249	25	612101257
12	221065250	26	612101258
13	221065251	27	612101259
14	221065252	28	612101260
15	221065253	29	612101261
16	221065254		

S.No	Name of the Class	Register number	Total
1	II B.Sc Microbiology	22106539-251	16
2	II M.Sc Microbiology	612101247-261	14

ROOM NO: 204 **FLOOR: II MBA Block** **DATE: 31.10.22 to 03.11.22**

Seat Number	Students Register Number	Seat Number	Students Register number
1	22106539	15	612101248
2	22106540	16	612101249
3	22106541	17	612101250
4	22106542	18	612101251
5	22106543	19	612101252
6	221065244	20	612101253
7	221065245	21	612101254
8	221065246	22	612101255
9	221065247	23	612101256
10	221065248	24	612101257
11	221065249	25	612101258
12	221065250	26	612101259
13	221065251	27	612101260
14	612101247	28	612101261

S.No	Name of the Class	Register number	Total
1	II B.Sc Microbiology	22106539-252	14
2	II M.Sc Microbiology	612101247-261	14

ROOM NO: 205 **FLOOR: II MBA Block** **DATE: 31.10.22 to 03.11.22**

Seat Number	Students Register Number	Seat number	Students Register Number
1	U2B220216	17	612101252
2	UMB220217	18	612101253
3	UMB220218	19	612101254
4	UMB220219	20	612101255
5	UMB220220	21	612101256
6	UMB220221	22	612101257
7	UMB220222	23	612101258
8	UMB220223	24	612101259
9	UMB220224	25	612101260
10	UMB220225	26	612101261
11	UMB220226	27	
12	UMB220227	28	
13	UMB220227	29	
14	612101249		
15	612101250		
16	612101251		

S.No	Name of the Class	Register number	Total
1	I B.Sc Microbiology	U2B220216-227	13
2	II M.Sc Microbiology	612101250-261	14

ROOM NO: 110 **FLOOR: I-PG Block** **DATE: 04.11.22**

Seat Number	Students Register Number	Seat number	Students Register Number
1	PMB220201	17	612101233
2	PMB220202	18	612101234
3	PMB220204	19	612101233
4	PMB220205	20	612101235
5	PMB220206	21	612101236
6	PMB220207	22	612101237
7	PMB220208	23	612101238
8	PMB220209	24	612101239
9	PMB220210	25	612101240
10	PMB220211	26	612101241
11	PMB220212	27	612101242
12	PMB220213	28	612101243
13	PMB220214	29	612101244
14	PMB220215	30	612101245
15	PMB220216		
16	PMB220217		

S.NO	Name of the Class	Register number	Total
1	I M.sc Microbiology	PMB220201-217	16
2	II M.Sc Applied Microbiology	612101250	14

ROOM NO: 111 **FLOOR: I-PG Block** **DATE: 04.11.22**

Seat Number	Students Register Number	Seat number	Students Register Number
1	612101246	16	PMB220218
2	612101248	17	PMB220219
3	612101249	18	PMB220220
4	612101250	19	PMB220221
5	612101251	20	PMB220222
6	612101252	21	PMB220223
7	612101253	22	PMB220224
8	612101254	23	PMB220225
9	612101255	24	PMB220226
10	612101256	25	PMB220227
11	612101257	26	PMB220228
12	612101258	27	PMB220229
13	612101259	28	
14	612101260	29	
15	612101261		

S.NO	Name of the Class	Register number	Total
1	I M.sc Microbiology	PMB220201-217	12
2	II M.Sc Applied Microbiology	612101250	15

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DEPARTMENT OF MICROBIOLOGY
UNIT TEST-II SEPTEMBER- 2022
DUTY LIST

Date	Room no.	Name of the staff
12/09/2022	110	Dr. A. Kalidoss
	111	Dr.K. Abirami
	112	Mrs. V. Aswini
	204 MBA block	Dr. N. Prabha
	205 MBA block	Dr.B.F.Paul Beulah
13/09/2022	110	Dr.M. ArputhaBibiana
	111	Dr. P. Sujith
	112	Dr.N.Prabha
	204 MBA block	Dr.B.F.Paul Beulah
	205 MBA block	Mrs. V. Aswini
14/09/2022	110	Dr.B.F.Paul Beulah
	111	Dr. A. Kalidoss
	112	Dr.M. ArputhaBibiana
	204 MBA block	Dr. P. Sujith
	205 MBA block	Dr.K. Abirami
15/09/2022	110	Mrs. V.Aswini
	111	Dr.K. Abirami
	112	Dr. A. Kalidoss
	204 MBA block	Dr.M. ArputhaBibiana
	205 MBA block	Dr.B.F.Paul Beulah
16/09/2022	111	Dr. P. Sujith
	112	Dr. A. Kalidoss

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DEPARTMENT OF COMPUTER SCIENCE
SEATING ARRANGEMENT
ODD SEM - UNIT TEST - I EXAMINATIONS, SEPTEMBER 2022

DATE: 12.09.2022-13.09.2022 & 16.09.2022 TIME: 12.00 PM- 1.00 PM

01	UCS200571 - UCS200587 222106448 - 222106470 832100424 - 832100431	III B.SC(CS) II BATCH II B.SC(CS) II BATCH II M.SC(CS)	17 16 8	JAMES GOSLING LAB – I (MBA BLOCK)
02	UCS200588 - UCS200606 832100402 - 832100423	III B.SC(CS) II BATCH II M.SC(CS)	18 22	RASMUS LERDORF LAB – II (MBA BLOCK

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DEPARTMENT OF COMPUTER SCIENCE
SEATING ARRANGEMENT
ODD SEM - UNIT TEST - I EXAMINATIONS, SEPTEMBER 2022

DATE: 15.09.2022 TIME: 12.00 PM- 1.00 PM

S.NO	ROLL NO / REGISTER NO	CLASS	STRENGTH	HALL NO
01	UCS200571 - UCS200587	III B.SC(CS) II BATCH	17	JAMES GOSLING LAB – I (MBA BLOCK)
	222106448 - 222106470	II B.SC(CS) II BATCH	16	
	832100424 - 832100431	II M.SC(CS)	8	
02	UCS200588 - UCS200606	III B.SC(CS) II BATCH	18	103 (MAIN BLOCK)
	832100402 - 832100423	II M.SC(CS)	22	

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DEPARTMENT OF COMPUTER SCIENCE
SEATING ARRANGEMENT
ODD SEM - UNIT TEST - I EXAMINATIONS, SEPTEMBER 2022

DATE: 14.09.2022 TIME: 12.00 PM- 1.00 PM

S.NO	ROLL NO / REGISTER NO	CLASS	STRENGTH	HALL NO
01	UCS200571 - UCS200587 222106448 - 222106470 832100424 - 832100431	III B.SC(CS) II BATCH II B.SC(CS) II BATCH II M.SC(CS)	17 16 8	102 (MAIN BLOCK)
02	UCS200588 - UCS200606 832100402 - 832100423	III B.SC(CS) II BATCH II M.SC(CS)	18 22	RASMUS LERDORF LAB – II (MBA BLOCK

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I UNIT TEST – INVIGILATION DUTY SCHEDULE (ODD SEM – SEPTEMBER 2022)

CLASS ROOM	12/09/22	Staff sign	13/09/22	Staff sign	14/09/22	Staff sign	15/09/22	Staff sign	16/09/22	Staff sign
302 (MBA BLOCK)	RM		VS		VSH		VS		KN	
303 (MBA BLOCK)	MS		RM		TAM		DRJ		TAM	
304 (MBA BLOCK)	VS		MAT		TAM		TAM		TAM	
202 (MBA BLOCK)	TP		MAT		DB		TAM		VS	
LAB – I (MBA BLOCK)	DB		VSH		VPN		MS		DRJ	
RASMUS LERDORF LAB – II (MBA BLOCK)	KN		TP		MS		KN		VPN	

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DEPARTMENT OF COMPUTER SCIENCE
SEATING ARRANGEMENT
EVEN SEM - UNIT TEST - EXAMINATIONS, FEBRUARY 2023

DATE: 27.02.2023 - 06.03.2023 TIME : 12.00 PM- 1.00 PM

S.NO	ROLL NO / REGISTER NO	CLASS	STRENGTH	HALL NO
01	222207554 - 222207573 832200322 - 832200341	I B.SC(CS) I BATCH I M.SC(CS)	20 20	102 (MAIN BLOCK)
02	222207574 - 222207593 832200342 - 832200349 222207594 - 222207605	I B.SC(CS) I BATCH I M.SC(CS) I B.SC(CS) II BATCH	20 08 12	103 (MAIN BLOCK)
03	222005927 - 222005947 222207606 - 222207646	III B.SC(CS) I BATCH I B.SC(CS) I BATCH	17 15	302 (MBA BLOCK)

S.NO	ROLL NO / REGISTER NO	CLASS	STRENGTH	HALL NO
04	222005948 - 222005965 222207607 - 222207623	III B.SC(CS) I BATCH I B.SC(CS) II BATCH	17 17	303 (MBA BLOCK)
05	222005966 - 222006018 222207624 - 222207654	III B.SC(CS) I BATCH I B.SC(CS) II BATCH	17 17	304 (MBA BLOCK)
06	22207655 - 222207658 222106389 - 222106415 222005930 - 222005989 222006019 - 222006020	I B.SC(CS) I BATCH II B.SC(CS) I BATCH III B.SC(CS) II BATCH III B.SC(CS) I BATCH	04 23 21 02	LAB - I (MBA BLOCK)

S.NO	ROLL NO / REGISTER NO	CLASS	STRENGTH	HALL NO
07	222106416 – 222106464 222005990 – 222006023 222106390 – 222106428 222106468 - 222103794	II B.SC(CS) I BATCH III B.SC(CS) II BATCH II B.SC(CS) II BATCH II B.SC(CS) II BATCH	17 23 06 05	LAB - II (MBA BLOCK)
08	222006024 - 222006031 222106429 - 222106467	III B.SC(CS) II BATCH II B.SC(CS) II BATCH	08 32	202 (MBA BLOCK)

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DEPARTMENT OF COMPUTER SCIENCE

UNIT TEST – INVIGILATION DUTY SCHEDULE (EVEN SEM – FEBRUARY 2023)

CLASS ROOM	27/02/23 III	Staff sign	28/02/23 IV	Staff sign	01/03/23 V	Staff sign	02/03/23 VI	Staff sign	03/03/23 I	Staff sign
302 (MBA BLOCK)	MAT		TAM		TAM		TP KN		KN	
303 (MBA BLOCK)	DB		DRJ		MS		MS		TP	
304 (MBA BLOCK)	MS		VSH		VPN		VS		DB	
202 (MBA BLOCK)	MAT		TAM		TAM		VSH		VS	
JAMES GOSLING LAB – I (MBA BLOCK)	VS		KN		VSH		DRJ		VPN	
RASMUS LERDORF LAB – II (MBA BLOCK)	DRJ		TP		KN TP		DB		MS	
102	DG		RM		DG		TAM		MAT	
103	RM		DG		RM		TAM		MAT	

24/02/2023

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DEPARTMENT OF COMPUTER APPLICATIONS AND TECHNOLOGY
I UNIT TEST - FEBRUARY 2023
DUTY LIST

S.No	Room No.	27.02.2023 Time : 12 PM TO 1 PM		28.02.2022 Time : 10 AM TO 11 AM		01.03.2023 Time : 12 PM TO 1 PM		02.03.2023 Time : 12 PM TO 1 PM	
		Staff Name	Signature	Staff Name	Signature	Staff Name	Signature	Staff Name	Signature
1	Dennis Ritchie Lab	Mr. P. LOGANATHAN		Mr. S. SIVAKUMAR		Dr. G. PARTHIBAN		Mrs. N. ANNALAKSHMI	
2	Larry Ellison Lab	Mr. M. RAMESH		Mrs. S.SAHAYA SUGIRTHA CINDRELLA		Mrs. V. PRIYALAKSHMI		Mrs. T. SUJATHA	
3	MBA BLOCK G8	Mrs. V. PRIYALAKSHMI		Mrs. V. MALATHI		Dr. K. PRIYA		Mrs. V. MALATHI	
4	402	MATHS		LANGUAGE		Mrs.T.S.VASUGHI		ENGLISH	
5	MBA BLOCK 403	Mrs. N. ANNALAKSHMI		Mrs.T.S.VASUGHI		ACCOUNTS		Mrs. M.SARANIYA	
6	MBA BLOCK 404	Mrs. M.SARANIYA		Dr. K. PRIYA		MATHS		PHYSICS	

S.No	Room No.	03.03.2023 Time : 12 PM TO 1 PM	
		Staff Name	Signature
1	MBA BLOCK G7	Mr. P. LOGANATHAN	
2	MBA BLOCK G8	Mrs. S.SAHAYA SUGIRTHA CINDRELLA	

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DEPARTMENT OF COMPUTER APPLICATIONS AND TECHNOLOGY
I UNIT TEST - FEBRUARY 2023
DUTY LIST

S.No	Room No.	27.02.2023 Time : 12 PM TO 1 PM		28.02.2023 Time : 10 AM TO 11 AM		01.03.2023 Time : 12 PM TO 1 PM		02.03.2023 Time : 12 PM TO 1 PM	
		Staff Name	Signature	Staff Name	Signature	Staff Name	Signature	Staff Name	Signature
1	Dennis Ritchie Lab	Mr. P. LOGANATHAN		Mr. S. SIVAKUMAR		Dr. G. PARTHIBAN		Mrs. N. ANNALAKSHMI	
2	Larry Ellison Lab	Mr. M. RAMESH		Mrs. S.SAHAYA SUGIRTHA CINDRELLA		Mrs. V. PRIYALAKSHMI		Mrs. T. SUJATHA	
3	MBA BLOCK G8	Mrs. V. PRIYALAKSHMI		Mrs. V. MALATHI		Dr. K. PRIYA		Mrs. V. MALATHI	
4	402	MATHS		LANGUAGE		Mrs.T.S.VASUGHI		ENGLISH	
5	MBA BLOCK 403	Mrs. N. ANNALAKSHMI		Mrs.T.S.VASUGHI		ACCOUNTS		Mrs. M.SARANIYA	
6	MBA BLOCK 404	Mrs. M.SARANIYA		Dr. K. PRIYA		MATHS		PHYSICS	

S.No	Room No.	03.03.2023 Time : 12 PM TO 1 PM	
		Staff Name	Signature
1	MBA BLOCK G7	Mr. P. LOGANATHAN	
2	MBA BLOCK G8	Mrs. S.SAHAYA SUGIRTHA CINDRELLA	

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DEPARTMENT OF COMPUTER APPLICATIONS AND TECHNOLOGY
II UNIT TEST - APRIL 2023
DUTY LIST

S.No	Room No.	10.04.2023 Time : 12 PM TO 1 PM		11.04.2023 Time : 12 PM TO 1 AM		12.04.2023 Time : 12 PM TO 1 PM		13.04.2023 Time : 12 PM TO 1 AM	
		Staff Name	Signature	Staff Name	Signature	Staff Name	Signature	Staff Name	Signature
1	Dennis Ritchie Lab	Dr. G. PARTHIBAN		Mrs. T. SUJATHA		Mr. S. SIVAKUMAR		Mr. M .RAMESH	
2	MBA BLOCK 402	Mrs. M.SARANIYA		ENGLISH		Mrs.V.MALATHI		Mrs. N.ANNALAKSHMI	
3	MBA BLOCK 403	Mrs.T.S.VASUGHI		Mrs. M.SARANIYA		Mrs.Mrs. SAHAYA SUGIRTHA		ACCOUNTS	
4	MBA BLOCK 404	Dr. K. PRIYA		Mr. P. LOGANATHAN		Mrs.T.S.VASUGHI		Mrs. V. PRIYALAKSHMI	
5	MBA BLOCK G8	Mrs. V. MALATHI		Mrs. V. PRIYALAKSHMI		ENGLISH		Mr. S. SIVAKUMAR	
6	MBA BLOCK G9	Mr. P. LOGANATHAN		PHYSICS		Dr. K. PRIYA		Mrs.Mrs. SAHAYA SUGIRTHA CINDRELLA	

S.No	Room No.	17.04.2023 Time : 12 PM TO 1 AM	
		Staff Name	Signature
1	MBA BLOCK G7	Dr. G. PARTHIBAN	
2	MBA BLOCK G8	Mrs. N.ANNALAKSHMI	

30/3/23

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DEPARTMENT OF COMPUTER APPLICATIONS AND TECHNOLOGY
II UNIT TEST - APRIL 2023
DUTY LIST

S.No	Room No.	10.04.2023 Time : 12 PM TO 1 PM		11.04.2023 Time : 12 PM TO 1 AM		12.04.2023 Time : 12 PM TO 1 PM		13.04.2023 Time : 12 PM TO 1 AM	
		Staff Name	Signature	Staff Name	Signature	Staff Name	Signature	Staff Name	Signature
1	Dennis Ritchie Lab	Dr. G. PARTHIBAN		Mrs. T. SUJATHA		Mr. S. SIVAKUMAR		Mr. M .RAMESH	
2	MBA BLOCK 402	Mrs. M.SARANIYA		ENGLISH		Mrs.V.MALATHI		Mrs. N.ANNALAKSHMI	
3	MBA BLOCK 403	Mrs.T.S.VASUGHI		Mrs. M.SARANIYA		Mrs.Mrs. SAHAYA SUGIRTHA		ACCOUNTS	
4	MBA BLOCK 404	Dr. K. PRIYA		Mr. P. LOGANATHAN		Mrs.T.S.VASUGHI		Mrs. V. PRIYALAKSHMI	
5	MBA BLOCK G8	Mrs. V. MALATHI		Mrs. V. PRIYALAKSHMI		ENGLISH		Mr. S. SIVAKUMAR	
6	MBA BLOCK G9	Mr. P. LOGANATHAN		PHYSICS		Dr. K. PRIYA		Mrs.Mrs. SAHAYA SUGIRTHA CINDRELLA	

S.No	Room No.	17.04.2023 Time : 12 PM TO 1 AM	
		Staff Name	Signature
1	MBA BLOCK G7	Dr. G. PARTHIBAN	
2	MBA BLOCK G8	Mrs. N.ANNALAKSHMI	

30/3/23

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SEATING ARRANGEMENT

I UNIT TEST, FEBRUARY 2023

ROOM NO: G2 FLOOR: MBA BLOCK DATE: 27.02.2023 To 03.03.2023

Register Number	Seat No	Register Number	Seat No	Register Number	Seat No
212002378	1	812200165	21	212102866	41
212002380	2	812200166	22	212102868	42
212002381	3	812200167	23	212102869	43
212002382	4	812200168	24	212102870	44
212002384	5	812200169	25	212102871	45
212002385	6	812200170	26	212102872	46
212002386	7	812200171	27	212102873	47
212002387	8	812200172	28	212102874	48
212002388	9	812200173	29	212102875	49
212002389	10	812200174	30	212102876	50
212002390	11		31	812200175	51
212002391	12		32	812200176	52
212002392	13		33	812200177	53
212002393	14		34	812200178	54
212002394	15		35	812200179	55
212002395	16		36	812200180	56
212002396	17		37	812200181	57
212002397	18		38	812200182	58
212002398	19		39	812200183	59
212002399	20		40	812200184	60

I MCA - 812200165 - 812200184 — 20

III BCA - 212002378 - 212002399 — 20

II BCA - 212102866 , 212102868 - 212102876 — 10

21/2/23

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22/2/23

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DEPARTMENT OF COMPUTER APPLICATIONS & TECHNOLOGY
SEATING ARRANGEMENT
I UNIT TEST, FEBRUARY 2023

ROOM NO: 403 FLOOR: MBA BLOCK DATE: 27.02.2023 To 03.03.2023

Register Number	Seat No	Register Number	Seat No	Register Number	Seat No
212203370	1	212102877	19	212002415	37
212203371	2	212102878	20	212002416	38
212203372	3	212102879	21	212002417	39
212203373	4	212102880	22	212002418	40
212203374	5	212102881	23	212002419	41
212203375	6	212102882	24	212002420	42
212203376	7	212102883	25	212002421	43
212203377	8	212102884	26	812200200	44
212203378	9		27	812200201	45
212203379	10		28	812200202	46
212203380	11		29	812200203	47
212203381	12		30	812200204	48
212203382	13		31	812200205	49
212203383	14		32	812200206	50
212203384	15		33	212102888	51
212102886	16		34	212102889	52
212102887	17		35	212102890	53
212102885	18		36	212102891	54

I BCA - 212203370 - 212203384 15
II BCA - 212102877 - 212102891 15
III BCA -212002415 - 212002421 7
I MCA - 812200200 - 812200206 7

21/2/23
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22/2/23
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DEPARTMENT OF COMPUTER APPLICATIONS & TECHNOLOGY
SEATING ARRANGEMENT
I UNIT TEST, FEBRUARY 2023

ROOM NO: 404 **FLOOR: MBA BLOCK** **DATE: 27.02.2023 To 03.03.2023**

Register Number	Seat No	Register Number	Seat No	Register Number	Seat No
212102892	1	212203385	19	622000017	37
212102893	2	212203386	20	622000018	38
212102894	3	212203387	21	622000019	39
212102895	4	212203388	22	622000020	40
212102896	5	212203389	23	622000021	41
212102897	6	212203390	24	621900021	42
212102898	7	622200001	25	621900022	43
212102899	8	622200002	26	621900023	44
212102900	9	622200003	27	621900024	45
212102901	10		28	621900025	46
212102902	11		29	621900026	47
212102903	12		30	621900027	48
212102904	13		31	621900028	49
212102905	14		32	621900029	50
212102906	15		33	622200006	51
212102907	16		34	622200007	52
622200004	17		35	622200010	53
622200005	18		36	622200011	54

II BCA - 212102892 - 212102907	16
I BCA - 212203385 - 212203390	6
I CST - 622200001 - 622200007, 622200010 - 622200011	9
III CST - 622000017 -622000021	5
IV CST - 621900021 - 621900029	9

21/2/23
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DEPARTMENT OF COMPUTER APPLICATIONS & TECHNOLOGY
SEATING ARRANGEMENT
I UNIT TEST, FEBRUARY 2023

ROOM NO: Dennis Ritchie FLOOR: PG BLOCK DATE: 27.02.2023 To 03.03.2023

Register Number	Seat No	Register Number	Seat No	Register Number	Seat No
812200207	1	622200008	19	212002379	37
812200208	2	622200009	20	212002383	38
812200209	3	622000022	21	212002422	39
812200210	4	622000023	22	212002423	40
812200211	5	622000024	23	212002424	41
812200212	6	621900030	24	212002425	42
812200213	7	621900031	25	212002426	43
812200214	8		26	212002427	44
812200215	9		27	212002428	45
812200216	10		28	212002429	46
812200217	11		29	212002430	47
812200218	12		30	212002431	48
812200219	13		31	212002432	49
812200220	14		32	622100020	50
812200221	15		33	622100021	51
812200222	16		34	622100022	52
812200223	17		35	622100023	53
812200224	18		36	622100024	54

I MCA - 812200207 - 812200224	18
III BCA -212002379 - 212002432	13
I CST -622200008 - 622200009	2
II CST - 622100020 -622100024	5
III CST - 622000022 -622000024	3
IV CST - 621900030 - 621900031	2

21/2/23
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22/2/23
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DEPARTMENT OF COMPUTER APPLICATIONS & TECHNOLOGY
SEATING ARRANGEMENT
I UNIT TEST, FEBRUARY 2023

ROOM NO: Larry Ellison FLOOR: PG BLOCK DATE: 27.02.2023 To 03.03.2023

Register Number	Seat No	Register Number	Seat No	Register Number	Seat No
212102867	1			212203391	19
212102908	2			212203392	20
212102909	3			212203393	21
212102910	4			212203394	22
212102911	5			212203395	23
212102912	6			212203396	24
212102913	7			212203397	25
212102914	8			212203398	26
212102915	9			212203399	27
212102916	10			212203400	28
212102917	11			212203401	29
212102918	12			212203402	30
212102919	13			212203403	31
212102920	14			212203404	32
212102921	15			212203405	33
212102922	16			212203406	34
212102923	17			212203407	35
212203409	18			212203408	36

I BCA -212203391 - 212203409 19

II BCA -212102867 - 212102923 17

21/2/23
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Kattankulathur - 603 203

22/2/23
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SRM ARTS AND SCIENCE COLLEGE, KATTANKULATHUR
DEPARTMENT OF COMPUTER APPLICATIONS & TECHNOLOGY
SEATING ARRANGEMENT
I UNIT TEST, FEBRUARY 2023

ROOM NO: 402 FLOOR: MBA BLOCK DATE: 27.02.2023 To 03.03.2023

Register Number	Seat No	Register Number	Seat No	Register Number	Seat No
212002400	1	812200185	19	212203355	37
212002401	2	812200186	20	212203356	38
212002402	3	812200187	21	212203357	39
212002403	4	812200188	22	212203358	40
212002404	5	812200189	23	212203359	41
212002405	6	812200190	24	212203360	42
212002406	7	812200191	25	212203361	43
212002407	8	812200192	26	212203362	44
212002408	9	812200193	27	212203363	45
212002409	10		28	212203364	46
212002410	11		29	212203365	47
212002411	12		30	212203366	48
212002412	13		31	212203367	49
212002413	14		32	212203368	50
212002414	15		33	212203369	51
812200194	16		34	812200197	52
812200195	17		35	812200198	53
812200196	18		36	812200199	54

I MCA - 812200185 - 812200199 15

III BCA - 212002400 - 212002414 15

I BCA - 212203355 - 212203369 15

21/2/23

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22/2/23

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DEPARTMENT OF COMPUTER APPLICATIONS & TECHNOLOGY
SEATING ARRANGEMENT
II UNIT TEST, APRIL 2023

ROOM NO: G8 FLOOR: MBA BLOCK DATE: 10.04.2023 TO 13.04.2023

Register Number	Seat No	Register Number	Seat No	Register Number	Seat No
212102867	1			212203391	19
212102908	2			212203392	20
212102909	3			212203393	21
212102910	4			212203394	22
212102911	5			212203395	23
212102912	6			212203396	24
212102913	7			212203397	25
212102914	8			212203398	26
212102915	9			212203399	27
212102916	10			212203400	28
212102917	11			212203401	29
212102918	12			212203402	30
212102919	13			212203403	31
212102920	14			212203404	32
212102921	15			212203405	33
212102922	16			212203406	34
212102923	17			212203407	35
212203409	18			212203408	36

I BCA -212203391 - 212203409 19

II BCA -212102867 - 212102923 17

30/3/23

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Department of Computer Applications & Tech.
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Kattankulathur - 603 203

31/3/23

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SRM ARTS AND SCIENCE COLLEGE, KATTANKULATHUR

DEPARTMENT OF COMPUTER APPLICATIONS & TECHNOLOGY

SEATING ARRANGEMENT

II UNIT TEST, APRIL 2023

ROOM NO: G7 FLOOR: MBA BLOCK DATE: 13.04.2023

Register Number	Seat No	Register Number	Seat No	Register Number	Seat No
812200165	1	621900021		812200180	16
812200166	2	621900022		812200181	17
812200167	3	621900023		812200182	18
812200168	4	621900024		812200183	19
812200169	5	621900025		812200184	20
812200170	6	621900026		812200185	21
812200171	7	621900027		812200186	22
812200172	8	621900028		812200187	23
812200173	9	621900029		812200188	24
812200174	10			812200189	25
812200175	11			812200190	26
812200176	12			812200191	27
812200177	13			812200192	28
812200178	14			812200193	29
812200179	15			812200194	30

I MCA - 812200165 - 812200184 20

IV CST - 621900021- 621900029 9

30/3/23

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Department of Computer Applications & Tech.
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Kattankulathur - 603 203

31/3/23

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Chengalpattu Dist - 603 203

SRM ARTS AND SCIENCE COLLEGE, KATTANKULATHUR
DEPARTMENT OF COMPUTER APPLICATIONS & TECHNOLOGY
SEATING ARRANGEMENT
II UNIT TEST, APRIL 2023

ROOM NO: 404 FLOOR: MBA BLOCK DATE: 13.04.2023

Register Number	Seat No	Register Number	Seat No	Register Number	Seat No
812200195	1	621900030		812200210	16
812200196	2	621900031		812200211	17
812200197	3			812200212	18
812200198	4			812200213	19
812200199	5			812200214	20
812200200	6			812200215	21
812200201	7			812200216	22
812200202	8			812200217	23
812200203	9			812200218	24
812200204	10			812200219	25
812200205	11			812200220	26
812200206	12			812200221	27
812200207	13			812200222	28
812200208	14			812200223	29
812200209	15			812200224	30

I MCA - 812200195 - 812200224 30

IV CST - 621900030- 621900031 2

30/3/23

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3/13/23

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DEPARTMENT OF COMPUTER APPLICATIONS & TECHNOLOGY

SEATING ARRANGEMENT

II UNIT TEST, APRIL 2023

ROOM NO: G9 FLOOR: MBA BLOCK DATE: 10.04.2023 TO 13.04.2023

Register Number	Seat No	Register Number	Seat No	Register Number	Seat No
212002378	1	812200165	21	212102866	41
212002380	2	812200166	22	212102868	42
212002381	3	812200167	23	212102869	43
212002382	4	812200168	24	212102870	44
212002384	5	812200169	25	212102871	45
212002385	6	812200170	26	212102872	46
212002386	7	812200171	27	212102873	47
212002387	8	812200172	28	212102874	48
212002388	9	812200173	29	212102875	49
212002389	10	812200174	30	212102876	50
212002390	11		31	812200175	51
212002391	12		32	812200176	52
212002392	13		33	812200177	53
212002393	14		34	812200178	54
212002394	15		35	812200179	55
212002395	16		36	812200180	56
212002396	17		37	812200181	57
212002397	18		38	812200182	58
212002398	19		39	812200183	59
212002399	20		40	812200184	60

I MCA - 812200165 - 812200184 20

III BCA - 212002378 - 212002399 20

II BCA - 212102866 , 212102868 - 212102876 10

31/3/23

HEAD

Department of Computer Applications & Tech.
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Kattankulathur - 603 203

31/3/23

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Chengalpattu Dist - 603 203

SRM ARTS AND SCIENCE COLLEGE, KATTANKULATHUR
DEPARTMENT OF COMPUTER APPLICATIONS & TECHNOLOGY
SEATING ARRANGEMENT
II UNIT TEST, APRIL 2023

ROOM NO: 404 **FLOOR: MBA BLOCK** **DATE: 10.04.2023 TO 13.04.2023**

Register Number	Seat No	Register Number	Seat No	Register Number	Seat No
212002400	1	812200185	19	212203355	37
212002401	2	812200186	20	212203356	38
212002402	3	812200187	21	212203357	39
212002403	4	812200188	22	212203358	40
212002404	5	812200189	23	212203359	41
212002405	6	812200190	24	212203360	42
212002406	7	812200191	25	212203361	43
212002407	8	812200192	26	212203362	44
212002408	9	812200193	27	212203363	45
212002409	10		28	212203364	46
212002410	11		29	212203365	47
212002411	12		30	212203366	48
212002412	13		31	212203367	49
212002413	14		32	212203368	50
212002414	15		33	212203369	51
812200194	16		34	812200197	52
812200195	17		35	812200198	53
812200196	18		36	812200199	54

I MCA - 812200185 - 812200199 15

III BCA - 212002400 - 212002414 15

I BCA - 212203355 - 212203369 15

30/3/23

HEAD
Department of Computer Applications & Tech.
SRM Arts and Science College
Kattankulathur - 603 203

31/3/23

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Chengalpattu Dist - 603 203

SRM ARTS AND SCIENCE COLLEGE, KATTANKULATHUR
DEPARTMENT OF COMPUTER APPLICATIONS & TECHNOLOGY
SEATING ARRANGEMENT
II UNIT TEST, APRIL 2023

ROOM NO: 402 FLOOR: MBA BLOCK DATE: 10.04.2023 TO 13.04.2023

Register Number	Seat No	Register Number	Seat No	Register Number	Seat No
212203370	1	212102877	19	212002415	37
212203371	2	212102878	20	212002416	38
212203372	3	212102879	21	212002417	39
212203373	4	212102880	22	212002418	40
212203374	5	212102881	23	212002419	41
212203375	6	212102882	24	212002420	42
212203376	7	212102883	25	212002421	43
212203377	8	212102884	26	812200200	44
212203378	9		27	812200201	45
212203379	10		28	812200202	46
212203380	11		29	812200203	47
212203381	12		30	812200204	48
212203382	13		31	812200205	49
212203383	14		32	812200206	50
212203384	15		33	212102888	51
212102886	16		34	212102889	52
212102887	17		35	212102890	53
212102885	18		36	212102891	54

I BCA - 212203370 - 212203384 15

II BCA - 212102877 - 212102891 15

III BCA -212002415 - 212002421 7

I MCA - 812200200 - 812200206 7

30/3/23

HEAD
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Kattankulathur - 603 203

31/3/23

PRINCIPAL
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SRM Nagar, Kattankulathur
Chengalpattu Dist - 603 203

SRM ARTS AND SCIENCE COLLEGE, KATTANKULATHUR
DEPARTMENT OF COMPUTER APPLICATIONS & TECHNOLOGY
SEATING ARRANGEMENT
II UNIT TEST, APRIL 2023

ROOM NO: 403 FLOOR: MBA BLOCK DATE: 10.04.2023 TO 13.04.2023

Register Number	Seat No	Register Number	Seat No	Register Number	Seat No
212102892	1	212203385	19	622000017	37
212102893	2	212203386	20	622000018	38
212102894	3	212203387	21	622000019	39
212102895	4	212203388	22	622000020	40
212102896	5	212203389	23	622000021	41
212102897	6	212203390	24	621900021	42
212102898	7	622200001	25	621900022	43
212102899	8	622200002	26	621900023	44
212102900	9	622200003	27	621900024	45
212102901	10		28	621900025	46
212102902	11		29	621900026	47
212102903	12		30	621900027	48
212102904	13		31	621900028	49
212102905	14		32	621900029	50
212102906	15		33	622200006	51
212102907	16		34	622200007	52
622200004	17		35	622200010	53
622200005	18		36	622200011	54

II BCA - 212102892 - 212102907	16
I BCA - 212203385 - 212203390	6
I CST - 622200001 - 622200007, 622200010 - 62220001	9
III CST - 622000017 -622000021	5
IV CST - 621900021 - 621900029	9

30/3/23
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Kattankulathur - 603 203

31/3/23
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Chengalpattu Dist - 603 203

SRM ARTS AND SCIENCE COLLEGE, KATTANKULATHUR
DEPARTMENT OF COMPUTER APPLICATIONS & TECHNOLOGY
SEATING ARRANGEMENT
II UNIT TEST, APRIL 2023

ROOM NO: DR LAB **FLOOR: PG BLOCK** **DATE: 10.04.2023 TO 13.04.2023**

Register Number	Seat No	Register Number	Seat No	Register Number	Seat No
812200207	1	622200008	19	212002379	37
812200208	2	622200009	20	212002383	38
812200209	3	622000022	21	212002422	39
812200210	4	622000023	22	212002423	40
812200211	5	622000024	23	212002424	41
812200212	6	621900030	24	212002425	42
812200213	7	621900031	25	212002426	43
812200214	8		26	212002427	44
812200215	9		27	212002428	45
812200216	10		28	212002429	46
812200217	11		29	212002430	47
812200218	12		30	212002431	48
812200219	13		31	212002432	49
812200220	14		32	622100020	50
812200221	15		33	622100021	51
812200222	16		34	622100022	52
812200223	17		35	622100023	53
812200224	18		36	622100024	54

I MCA - 812200207 - 812200224	18
III BCA -212002379 - 212002432	13
I CST -622200008 - 622200009	2
II CST - 622100020 -622100024	5
III CST - 622000022 -622000024	3
IV CST - 621900030 - 621900031	2

30/3/23
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31/3/23
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SRM ARTS AND SCIENCE COLLEGE, KATTANKULATHUR-603 203.

Department of Mathematics

Invigilator Schedule (UNIT TEST-I / 2022-23 / EVEN SEMSTER)

SESSION : FN Time : 12:00 To 01:00 PM

SL. No.	DATE	NAME OF THE FACULTY	SIGNATURE
1	27.02.2023	Mr. P. Ramesh	
2	28.02.2023	Mr. S. Arul	
3	01.03.2023	Mr. P. Ramesh	
4	02.03.2023	Mr. P. Udhayashankar	
5	03.03.2023	Mrs. D. Mahalakshmi	

27/2/23

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27/2/23
Head of the Department

HEAD
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Kattankulathur - 603 203

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Department of Mathematics

Seating Arrangement (UNIT TEST - I / 2022-23 / EVEN SEMESTER)

Room No. 207 **Venue : VISCOM Block**

SL. No.	REG. No./ROLL No.	NAME	CLASS/YEAR	SEAT No.
1	222106518	BALLA VENKATARAMANA	II MATHS	1
2	222106520	SHREE VATHSA. V.K.	II MATHS	2
3	222106521	UTHIRA VISHANTH. V	II MATHS	3
4	222106523	WASIMA BEGAM. A	II MATHS	4
5	222006094	SOMOJU ROJESH LOVA	III MATHS	5
6	222006095	ARAVIND. S.	III MATHS	6
7	222006096	JINOTH. B.	III MATHS	7
8	222006097	KISHORE. M.G	III MATHS	8
9	222006098	NISHA. R.	III MATHS	9
10	222006099	SANDHIYA. R.	III MATHS	10

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Head of the Department 22/2/23

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Department of Mathematics

ATTENDANCE REPORT (UNIT TEST-I / 2022-23 / EVEN SEMESTER)

II Year B.Sc., Mathematics

DATE : 27.02.2023 **SUBJECT :** Tamil-IV/Telugu-IV

SESSION : FN **SUBJECT CODE :** LA14A/CLB4D

SL. No.	REG. / ROLL No.	NAME	SIGNATURE
1	222106518	BALLA VENKATARAMANA	B. Venkata Ramana
2	222106520	SHREE VATHSA. V.K	Shreevathsa
3	222106521	UTHIRA VISHANTH. V	V. Uthira
4	222106523	WASIMA BEGAM. A	A. Wasima

P. Ramesh
(P. RAMESH)
Invigilator Signature

L.J. Lalitha
Head of the Department 6/3/23

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6/3/23

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Department of Mathematics

ATTENDANCE REPORT (UNIT TEST-I / 2022-23 / EVEN SEMESTER)

III Year B.Sc., Mathematics

DATE : 27.02.2023 **SUBJECT :** Paper-XIII Algebraic Sturctures - II

SESSION : FN **SUBJECT CODE :** LA14A/CLB4D.

SL. No.	REG. / ROLL No.	NAME	SIGNATURE
1	222006094	SOMOJU ROJESH LOVA	S. Rojesh Lova
2	222006095	ARAVIND. S.	S. [illegible]
3	222006096	JINOTH. B.	B. Jinoth
4	222006097	KISHORE. M.G	M.G. Kishore
5	222006098	NISHA. R.	R. Nisha.
6	222006099	SANDHIYA. R.	R-Sandhiya

P. Ramesh
(P. RAMESH)
Invigilator Signature

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Department of Mathematics

ATTENDANCE REPORT (UNIT TEST-I / 2022-23 / EVEN SEMESTER)

II Year B.Sc., Mathematics

DATE : 28.02.2023 **SUBJECT :** English-IV

SESSION : FN **SUBJECT CODE :** LZ14B

SL. No.	REG. / ROLL No.	NAME	SIGNATURE
1	222106518	BALLA VENKATARAMANA	B. Venkata Ramana
2	222106520	SHREE VATHSA. V.K	Shreevathsa
3	222106521	UTHIRA VISHANTH. V	V. Chanth.
4	222106523	WASIMA BEGAM. A	A. Wasimah.

Invigilator Signature

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Department of Mathematics

ATTENDANCE REPORT (UNIT TEST-I / 2022-23 / EVEN SEMESTER)

III Year B.Sc., Mathematics

DATE : 28.02.2023 **SUBJECT :** Paper-XIV Real Analysis-II

SESSION : FN **SUBJECT CODE :**

SL. No.	REG. / ROLL No.	NAME	SIGNATURE
1	222006094	SOMOJU ROJESH LOVA	S. Rojesh Lova
2	222006095	ARAVIND. S.	S. Arvind
3	222006096	JINOTH. B.	B. Jinoth
4	222006097	KISHORE. M.G	M.G. Kishore
5	222006098	NISHA. R.	R. Nisha
6	222006099	SANDHIYA. R.	Sandhiya R.

Invigilator Signature

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Department of Mathematics

ATTENDANCE REPORT (UNIT TEST-I / 2022-23 / EVEN SEMESTER)

II Year B.Sc., Mathematics

DATE : 01.03.2023 **SUBJECT :** Paper-VII Transform Technique

SESSION : FN **SUBJECT CODE :** SM24A

SL. No.	REG. / ROLL No.	NAME	SIGNATURE
1	222106518	BALLA VENKATARAMANA	B. Venkata Ramana
2	222106520	SHREE VATHSA. V.K	Shreevathsa
3	222106521	UTHIRA VISHANTH. V	V. Uthira
4	222106523	WASIMA BEGAM. A	A. Wasima.

P. Ramesh (P. RAMESH)
Invigilator Signature

E.J. Lalith 6/3/23
Head of the Department

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Department of Mathematics

ATTENDANCE REPORT (UNIT TEST-I / 2022-23 / EVEN SEMESTER)

III Year B.Sc., Mathematics

DATE : 01.03.2023 **SUBJECT :** Paper-XV Complex Analysis

SESSION : FN **SUBJECT CODE :**

SL. No.	REG. / ROLL No.	NAME	SIGNATURE
1	222006094	SOMOJU ROJESH LOVA	S. Rojesh Lova
2	222006095	ARAVIND. S.	S Aravind
3	222006096	JINOTH. B.	B. Jinoth
4	222006097	KISHORE. M.G	M.G Kishore
5	222006098	NISHA. R.	R. Nisha
6	222006099	SANDHIYA. R.	

P. Ramesh
(P. RAMESH)
Invigilator Signature

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Department of Mathematics

ATTENDANCE REPORT (UNIT TEST-I / 2022-23 / EVEN SEMESTER)

II Year B.Sc., Mathematics

DATE : 02.03.2023 **SUBJECT :** Allied-IV Mathematical Statistics-II

SESSION : FN **SUBJECT CODE :** SM3AG

SL. No.	REG. / ROLL No.	NAME	SIGNATURE
1	222106518	BALLA VENKATARAMANA	B. VenkataRamana
2	222106520	SHREE VATHSA. V.K	Shreevathsa
3	222106521	UTHIRA VISHANTH. V	V. Uthira
4	222106523	WASIMA BEGAM. A	A. Wasima

Invigilator Signature

Head of the Department 6/3/23

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Department of Mathematics

ATTENDANCE REPORT (UNIT TEST-I / 2022-23 / EVEN SEMESTER)

III Year B.Sc., Mathematics

DATE : 02.03.2023 **SUBJECT :** Elec: Operation Research

SESSION : FN **SUBJECT CODE :**

SL. No.	REG. / ROLL No.	NAME	SIGNATURE
1	222006094	SOMOJU ROJESH LOVA	S. Rojesh Lova
2	222006095	ARAVIND. S.	S. Aravind
3	222006096	JINOTH. B.	B. Jinoth
4	222006097	KISHORE. M.G	M.G. Kishore
5	222006098	NISHA. R.	R. Nisha.
6	222006099	SANDHIYA. R.	R-Sandhiya

Invigilator Signature

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ATTENDANCE REPORT (UNIT TEST-I / 2022-23 / EVEN SEMESTER)

III Year B.Sc., Mathematics

DATE : 03.03.2023 **SUBJECT :** Paper-XVI Graph Theory

SESSION : FN **SUBJECT CODE :**

SL. No.	REG. / ROLL No.	NAME	SIGNATURE
1	222006094	SOMOJU ROJESH LOVA	S. Rajesh Lova
2	222006095	ARAVIND. S.	S. Avi
3	222006096	JINOTH. B.	B. Jinoth
4	222006097	KISHORE. M.G	M.G. Kishore
5	222006098	NISHA. R.	R. Nisha
6	222006099	SANDHIYA. R.	R. Sandhiya

Invigilator Signature

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Department of Mathematics

ATTENDANCE REPORT (UNIT TEST-I / 2022-23 / EVEN SEMESTER)

II Year B.Sc., Mathematics

DATE : 03.03.2023 **SUBJECT :** Paper-VIII Statics

SESSION : FN **SUBJECT CODE :** SM24B

SL. No.	REG. / ROLL No.	NAME	SIGNATURE
1	222106518	BALLA VENKATARAMANA	B. Venkata Ramana
2	222106520	SHREE VATHSA. V.K	Shreevathsa
3	222106521	UTHIRA VISHANTH. V	V. Chinth..
4	222106523	WASIMA BEGAM. A	A. Wasima.

Invigilator Signature

Head of the Department 6/3/23

PRINCIPAL 6/3/23
SRM ARTS AND SCIENCE COLLEGE
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Department of Mathematics

ATTENDANCE REPORT (UNIT TEST - II / 2022-23 / EVEN SEMESTER)

III Year B.Sc., Mathematics

DATE : 10.04.2023 **SUBJECT :** Paper-XIII Algebraic Sturctures - II

SESSION : FN **SUBJECT CODE :** SM26A

SL. No.	REG. / ROLL No.	NAME	SIGNATURE
1	222006094	SOMOJU ROJESH LOVA	S. Rojesh Lova
2	222006095	ARAVIND. S.	S Ard
3	222006096	JINOTH. B.	B. Jinoth
4	222006097	KISHORE. M.G	M.G. Kishore
5	222006098	NISHA. R.	R. Nisha
6	222006099	SANDHIYA. R.	R-Sandhiya

R. Ramesh
(R. RAMESH)
Invigilator Signature

PRINCIPAL 10/4/23
SRM ARTS AND SCIENCE COLLEGE
SRM Nagar, Kattankulathur
Chengalpattu Dist - 603 203

A.J. Lalitha 20/4/23
Head of the Department
HEAD
Department of Mathematics
SRM Arts and Science College
Kattankulathur - 603 203

SRM ARTS AND SCIENCE COLLEGE, KATTANKULATHUR-603 203.

Department of Mathematics

ATTENDANCE REPORT (UNIT TEST - II / 2022-23 / EVEN SEMESTER)

II Year B.Sc., Mathematics

DATE : 10.04.2023 SUBJECT : Tamil-IV/Telugu-IV

SESSION : FN SUBJECT CODE : LA14A/CLP4D

SL. No.	REG. / ROLL No.	NAME	SIGNATURE
1	222106518	BALLA VENKATARAMANA	B. Venkata Ramana
2	222106520	SHREE VATHSA. V.K	Shreevathsa
3	222106521	UTHIRA VISHANTH. V	V. Vishanth
4	222106523	WASIMA BEGAM. A	A. Wasima

C. Ramesh

Invigilator Signature

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A. J. Lalitha 20/4/23

Head of the Department

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Department of Mathematics

ATTENDANCE REPORT (UNIT TEST - II / 2022-23 / EVEN SEMESTER)

III Year B.Sc., Mathematics

DATE : 11.04.2023 **SUBJECT :** Paper-XVI Real Analysis-II

SESSION : FN **SUBJECT CODE :** SMXC6A

SL. No.	REG. / ROLL No.	NAME	SIGNATURE
1	222006094	SOMOJU ROHESH LOVA	
2	222006095	ARAVIND. S.	
3	222006096	JINOTH. B.	
4	222006097	KISHORE. M.G	
5	222006098	NISHA. R.	
6	222006099	SANDHIYA. R.	

Invigilator Signature

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Department of Mathematics

ATTENDANCE REPORT (UNIT TEST - II / 2022-23 / EVEN SEMESTER)

II Year B.Sc., Mathematics

DATE : 11.04.2023 **SUBJECT :** English-IV

SESSION : FN **SUBJECT CODE :** LZ14B

SL. No.	REG. / ROLL No.	NAME	SIGNATURE
1	222106518	BALLA VENKATARAMANA	B. Venkata Ramana
2	222106520	SHREE VATHSA. V.K.	Shreevathsa
3	222106521	UTHIRA VISHANTH. V	V. Uthira
4	222106523	WASIMA BEGAM. A	A. Wasima

Invigilator Signature

Head of the Department 20/4/23

PRINCIPAL 20/4/23
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Department of Mathematics

ATTENDANCE REPORT (UNIT TEST - II / 2022-23 / EVEN SEMESTER)

III Year B.Sc., Mathematics

DATE : 12.04.2023 **SUBJECT :** Paper-XV Complex Analysis

SESSION : FN **SUBJECT CODE :** SM26C

Sl. No.	REG. / ROLL No.	NAME	SIGNATURE
1	222006094	SOMOJU ROJESH LOVA	S. Rajesh Lova
2	222006095	ARAVIND, S.	S Aravind
3	222006096	JINOTH, B.	B. Jinoth
4	222006097	KISHORE, M.G	M. G. Kishore
5	222006098	NISHA, R.	R. Nisha
6	222006099	SANDHIYA, R.	R. Sandhiya

Invigilator Signature

PRINCIPAL 12/4/23
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D. J. Lalitha 20/4/23
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Department of Mathematics

ATTENDANCE REPORT (UNIT TEST - II / 2022-23 / EVEN SEMESTER)

II Year B.Sc., Mathematics

DATE : 12.04.2023 **SUBJECT :** Paper-VII Transform Technique

SESSION : FN **SUBJECT CODE :** SM24A

SL. No.	REG. / ROLL No.	NAME	SIGNATURE
1	222106518	BALLA VENKATARAMANA	B. Venkata Ramana
2	222106520	SHREE VATHSA. V.K	Shreevathsa
3	222106521	UTHIRA VISHANTH. V	V. Uthira
4	222106523	WASIMA BEGAM. A	A. Wasima

Invigilator Signature

PRINCIPAL 16/4/23
SRM ARTS AND SCIENCE COLLEGE
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A.J. Lalitha 20/4/23
Head of the Department

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Department of Mathematics

ATTENDANCE REPORT (UNIT TEST - II / 2022-23 / EVEN SEMESTER)

II Year B.Sc., Mathematics

DATE : 13.04.2023 SUBJECT : Allied-IV Mathematical Statistics-II

SESSION : FN SUBJECT CODE : SM3AG

SL. No.	REG. / ROLL No.	NAME	SIGNATURE
1	222106518	BALLA VENKATARAMANA	B. Venkata Ramana
2	222106520	SHREE VATHSA. V.K	Shreevathsa
3	222106521	UTHIRA VISHANTH. V	V. Vishanth
4	222106523	WASIMA BEGAM. A	A. Wasima

P. [signature] (P. MOHAN) 13/04/23

Invigilator Signature

[signature] 20/4/23

Head of the Department

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[signature] 20/4/23

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Department of Mathematics

ATTENDANCE REPORT (UNIT TEST - II / 2022-23 / EVEN SEMESTER)

III Year B.Sc., Mathematics

DATE : 13.04.2023 **SUBJECT :** Paper-XVI Graph Theory

SESSION : FN **SUBJECT CODE :** SM4AG

SL. No.	REG. / ROLL No.	NAME	SIGNATURE
1	222006094	SOMOJU ROJESH LOVA	S. Rojesh Lova
2	222006095	ARAVIND. S.	S.
3	222006096	JINOTH. B.	B. Jinoth
4	222006097	KISHORE. M.G	M.G. Kishore
5	222006098	NISHA. R.	R. Nisha
6	222006099	SANDHIYA. R.	R. Sandhiya

P. Mohan (P.MOHAN)

Invigilator Signature 13/04/23

A.J. Lalitha 20/4/23

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Department of Mathematics

ATTENDANCE REPORT (UNIT TEST - II / 2022-23 / EVEN SEMESTER)

II Year B.Sc., Mathematics

DATE : 17.04.2023 **SUBJECT :** Paper-VIII Statics

SESSION : FN **SUBJECT CODE :** SM24B

SL. No.	REG. / ROLL No.	NAME	SIGNATURE
1	222106518	BALLA VENKATARAMANA	B. Venkata Ramana
2	222106520	SHREE VATHSA. V.K	Shreevathsa
3	222106521	UTHIRA VISHANTH. V	V. Chan. B.
4	222106523	WASIMA BEGAM. A	A. Wasim

Invigilator Signature

Head of the Department

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ATTENDANCE REPORT (UNIT TEST - II / 2022-23 / EVEN SEMESTER)

III Year B.Sc., Mathematics

DATE : 17.04.2023 **SUBJECT :** Paper-XVII Operation Research

SESSION : FN **SUBJECT CODE :** SMAAH

SL. No.	REG. / ROLL No.	NAME	SIGNATURE
1	222006094	SOMOJU ROJESH LOVA	S. Rojesh Lova
2	222006095	ARAVIND. S.	S Arvind
3	222006096	JINOTH. B.	B. Jinoth
4	222006097	KISHORE. M.G	M.G. Kishore
5	222006098	NISHA. R.	R. Nisha
6	222006099	SANDHIYA. R.	R. Sandhiya

Invigilator Signature

D.J. Lalitha 20/9/23

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Phone No: 044-27454862, 27454863, Extn: 8851 Fax – 044-27451487

P. NATARAJAN
HOD

Internal Assessment Test I - SEPT– 2022

Invigilation schedule

S.No.	Date	Time	Invigilator	Room
1	12.09.2022	12.00 PM TO 1.00 PM	HARI PRASAD	211
			SELVAKUMARI	212
			SURESH	214
2	13.09.2022	12.00 PM TO 1.00 PM	SELVAKUMARI	212
			SURESH	214
3	14.09.2022	12.00 PM TO 1.00 PM	SELVAKUMARI	212
			SURESH	214
4	15.09.2022	12.00 PM TO 1.00 PM	SELVAKUMARI	212

P. N

P. NATARAJAN
HOD

P. NATARAJAN
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SRM ARTS & SCIENCE COLLEGE

KATTANKULATHUR – 603 203

Phone No: 044-27454862, 27454863, Extn: 8851 Fax – 044-27451487

P. NATARAJAN
HOD

Internal Assessment Test I - SEPT– 2022

Invigilation schedule

S.No.	Date	Time	Invigilator	Room
2	26.09.2022	12.00 PM TO 1.00 PM	EPCIBA	213
			SURESH	214
3	27.09.2022	12.00 PM TO 1.00 PM	EPCIBA	213
			SURESH	214
4	28.09.2022	12.00 PM TO 1.00 PM	EPCIBA	213
			SURESH	214

P. N

P. NATARAJAN
HOD

P. NATARAJAN
HEAD
Department of Visual Communication
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SRM Nagar, Kattankulathur
Chengalpattu Dist - 603

SRM ARTS & SCIENCE COLLEGE

DEPARTMENT OF VISUAL COMMUNICATION

SRM ARTS & SCIENCE COLLEGE

KATTANKULATHUR – 603 203

Phone No: 044-27454862, 27454863, Extn: 8851 Fax – 044-27451487

P. NATARAJAN
HOD

Internal Assessment Test I - OCT– 2022

Invigilation schedule

S.No.	Date	Time	Invigilator	Room
1	31.11.2022	12.00 PM TO 1.00 PM	HARI PRASAD	211
			SELVAKUMARI	212
			EPCIBA	213
			SURESH	214
2	01.11.2022	12.00 PM TO 1.00 PM	SELVAKUMARI	212
			EPCIBA	213
			SURESH	214
3	02.11.2022	12.00 PM TO 1.00 PM	SELVAKUMARI	212
			EPCIBA	213
			SURESH	214
4	03.11.2022	12.00 PM TO 1.00 PM	SELVAKUMARI	212

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DEPARTMENT OF VISUAL COMMUNICATION

SRM ARTS AND SCIENCE COLLEGE

ROOM NO: 211 **DATE :12.09.2022**

S.no	REG NO	SEAT NO
1	432000269	A1
2	432000270	A2
3	432000271	A3
4	432000272	A4
5	432000273	A5
6	432000274	A6
7	432000275	A7
8	432000276	A8
9	432000277	A9
10	432000278	A10
11	432000279	A11
12	432000280	A12
13	432000281	A13
14	432000282	A14
15	432000283	A15
16	432000284	A16
17	432000285	A17

S.no	REG NO	SEAT NO
18	432000286	B1
19	432000287	B2
20	432000288	B3
21	432000290	B4
22	432000291	B5
23	432000292	B6
24	432000294	B7
25	432000295	B8
26	432000296	B9
27	432000297	B10
28	432000298	B11
29	432000300	B12
30	432000301	B13
31	432000302	B14
32	432000303	B15
33	432000304	B16
34	432000305	B17

S.no	REG NO	SEAT NO
35	432000306	A18
36	432000307	A19
37	432000308	A20
38	432000309	A21
39	432000310	A22
40	432000311	A23
41	432000312	A24
42	432000313	A25
43	432000314	A26
44	432000315	A27
45	432000316	A28
46	432000317	A29
47	432000318	A30
48	432000319	A31
49	432000320	A32
50	432000321	A33
51	432000322	A34
52	432000323	A35

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DEPARTMENT OF VISUAL COMMUNICATION

SRM ARTS AND SCIENCE COLLEGE

ROOM NO: 211 **DATE :13.09.2022**

S.no	REG NO	SEAT NO
1	432000269	**A1**
2	432000270	**A2**
3	432000271	**A3**
4	432000272	**A4**
5	432000273	**A5**
6	432000274	**A6**
7	432000275	**A7**
8	432000276	**A8**
9	432000277	**A9**
10	432000278	**A10**
11	432000279	**A11**
12	432000280	**A12**
13	432000281	**A13**
14	432000282	**A14**
15	432000283	**A15**
16	432000284	**A16**
17	432000285	**A17**

S.no	REG NO	SEAT NO
18	432000286	**B1**
19	432000287	**B2**
20	432000288	**B3**
21	432000290	**B4**
22	432000291	**B5**
23	432000292	**B6**
24	432000294	**B7**
25	432000295	**B8**
26	432000296	**B9**
27	432000297	**B10**
28	432000298	**B11**
29	432000300	**B12**
30	432000301	**B13**
31	432000302	**B14**
32	432000303	**B15**
33	432000304	**B16**
34	432000305	**B17**

S.no	REG NO	SEAT NO
35	432000306	**A18**
36	432000307	**A19**
37	432000308	**A20**
38	432000309	**A21**
39	432000310	**A22**
40	432000311	**A23**
41	432000312	**A24**
42	432000313	**A25**
43	432000314	**A26**
44	432000315	**A27**
45	432000316	**A28**
46	432000317	**A29**
47	432000318	**A30**
48	432000319	**A31**
49	432000320	**A32**
50	432000321	**A33**
51	432000322	**A34**
52	432000323	**A35**

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DEPARTMENT OF VISUAL COMMUNICATION

SRM ARTS AND SCIENCE COLLEGE

ROOM NO: 212 **DATE :12.09.2022**

S.no	REG NO	SEAT NO
1	432100355	**A1**
2	432100356	**A2**
3	432100357	**A3**
4	432100358	**A4**
5	432100360	**A5**
6	432100361	**A6**
7	432100362	**A7**
8	432100363	**A8**
9	432100364	**A9**
10	432100365	**A10**
11	432100366	**A11**
12	432100367	**A12**
13	432100368	**A13**
14	432100369	**A14**
15	432100370	**A15**
16	432100371	**A16**
17	432100372	**A17**

S.no	REG NO	SEAT NO
18	432100373	**B1**
19	432100374	**B2**
20	432100375	**B3**
21	432100376	**B4**
22	432100377	**B5**
23	432100378	**B6**
24	432100379	**B7**
25	432100380	**B8**
26	432100381	**B9**
27	432100383	**B10**
28	432100384	**B11**
29	432100385	**B12**
30	432100386	**B13**
31	432100387	**B14**
32	432100388	**B15**
33	432100389	**B16**
34	432100390	**B17**

S.no	REG NO	SEAT NO
35	432100391	**A18**
36	432100392	**A19**
37	432100393	**A20**
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DEPARTMENT OF VISUAL COMMUNICATION

SRM ARTS AND SCIENCE COLLEGE

ROOM NO: 212 **DATE :13.09.2022**

S.no	REG NO	SEAT NO
1	432100355	**A1**
2	432100356	**A2**
3	432100357	**A3**
4	432100358	**A4**
5	432100360	**A5**
6	432100361	**A6**
7	432100362	**A7**
8	432100363	**A8**
9	432100364	**A9**
10	432100365	**A10**
11	432100366	**A11**
12	432100367	**A12**
13	432100368	**A13**
14	432100369	**A14**
15	432100370	**A15**
16	432100371	**A16**
17	432100372	**A17**

S.no	REG NO	SEAT NO
18	432100373	**B1**
19	432100374	**B2**
20	432100375	**B3**
21	432100376	**B4**
22	432100377	**B5**
23	432100378	**B6**
24	432100379	**B7**
25	432100380	**B8**
26	432100381	**B9**
27	432100383	**B10**
28	432100384	**B11**
29	432100385	**B12**
30	432100386	**B13**
31	432100387	**B14**
32	432100388	**B15**
33	432100389	**B16**
34	432100390	**B17**

S.no	REG NO	SEAT NO
35	432100391	**A18**
36	432100392	**A19**
37	432100393	**A20**
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ROOM NO: 212 **DATE :14.09.2022**

S.no	REG NO	SEAT NO
1	432100355	**A1**
2	432100356	**A2**
3	432100357	**A3**
4	432100358	**A4**
5	432100360	**A5**
6	432100361	**A6**
7	432100362	**A7**
8	432100363	**A8**
9	432100364	**A9**
10	432100365	**A10**
11	432100366	**A11**
12	432100367	**A12**
13	432100368	**A13**
14	432100369	**A14**
15	432100370	**A15**
16	432100371	**A16**
17	432100372	**A17**

S.no	REG NO	SEAT NO
18	432100373	**B1**
19	432100374	**B2**
20	432100375	**B3**
21	432100376	**B4**
22	432100377	**B5**
23	432100378	**B6**
24	432100379	**B7**
25	432100380	**B8**
26	432100381	**B9**
27	432100383	**B10**
28	432100384	**B11**
29	432100385	**B12**
30	432100386	**B13**
31	432100387	**B14**
32	432100388	**B15**
33	432100389	**B16**
34	432100390	**B17**

S.no	REG NO	SEAT NO
35	432100391	**A18**
36	432100392	**A19**
37	432100393	**A20**
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ROOM NO: 212 **DATE :15.09.2022**

S.no	REG NO	SEAT NO
1	432100355	**A1**
2	432100356	**A2**
3	432100357	**A3**
4	432100358	**A4**
5	432100360	**A5**
6	432100361	**A6**
7	432100362	**A7**
8	432100363	**A8**
9	432100364	**A9**
10	432100365	**A10**
11	432100366	**A11**
12	432100367	**A12**
13	432100368	**A13**
14	432100369	**A14**
15	432100370	**A15**
16	432100371	**A16**
17	432100372	**A17**

S.no	REG NO	SEAT NO
18	432100373	**B1**
19	432100374	**B2**
20	432100375	**B3**
21	432100376	**B4**
22	432100377	**B5**
23	432100378	**B6**
24	432100379	**B7**
25	432100380	**B8**
26	432100381	**B9**
27	432100383	**B10**
28	432100384	**B11**
29	432100385	**B12**
30	432100386	**B13**
31	432100387	**B14**
32	432100388	**B15**
33	432100389	**B16**
34	432100390	**B17**

S.no	REG NO	SEAT NO
35	432100391	**A18**
36	432100392	**A19**
37	432100393	**A20**
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SRM ARTS AND SCIENCE COLLEGE

ROOM NO: 213 **DATE :26.09.2022**

S.no	REG NO	SEAT NO
1	VC001	A1
2	VC002	A2
3	VC003	A3
4	VC004	A4
5	VC005	A5
6	VC006	A6
7	VC007	A7
8	VC008	A8
9	VC009	A9
10	VC010	A10
11	VC011	A11
12	VC012	A12
13	VC013	A13
14	VC014	A14
15	VC015	A15
16	VC016	A16
17	VC017	A17

S.no	REG NO	SEAT NO
18	VC018	B1
19	VC019	B2
20	VC020	B3
21	VC021	B4
22	VC022	B5
23	VC023	B6
24	VC024	B7
25	VC025	B8
26	VC026	B9
27	VC027	B10
28	VC028	B11
29	VC029	B12
30	VC030	B13
31	VC031	B14
32	VC032	B15
33	VC033	B16
34	VC034	B17

S.no	REG NO	SEAT NO
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SRM ARTS AND SCIENCE COLLEGE

ROOM NO: 213 **DATE :27.09.2022**

S.no	REG NO	SEAT NO
1	VC001	A1
2	VC002	A2
3	VC003	A3
4	VC004	A4
5	VC005	A5
6	VC006	A6
7	VC007	A7
8	VC008	A8
9	VC009	A9
10	VC010	A10
11	VC011	A11
12	VC012	A12
13	VC013	A13
14	VC014	A14
15	VC015	A15
16	VC016	A16
17	VC017	A17

S.no	REG NO	SEAT NO
18	VC018	B1
19	VC019	B2
20	VC020	B3
21	VC021	B4
22	VC022	B5
23	VC023	B6
24	VC024	B7
25	VC025	B8
26	VC026	B9
27	VC027	B10
28	VC028	B11
29	VC029	B12
30	VC030	B13
31	VC031	B14
32	VC032	B15
33	VC033	B16
34	VC034	B17

S.no	REG NO	SEAT NO
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DEPARTMENT OF VISUAL COMMUNICATION

SRM ARTS AND SCIENCE COLLEGE

ROOM NO: 213 **DATE :28.09.2022**

S.no	REG NO	SEAT NO
1	VC001	A1
2	VC002	A2
3	VC003	A3
4	VC004	A4
5	VC005	A5
6	VC006	A6
7	VC007	A7
8	VC008	A8
9	VC009	A9
10	VC010	A10
11	VC011	A11
12	VC012	A12
13	VC013	A13
14	VC014	A14
15	VC015	A15
16	VC016	A16
17	VC017	A17

S.no	REG NO	SEAT NO
18	VC018	B1
19	VC019	B2
20	VC020	B3
21	VC021	B4
22	VC022	B5
23	VC023	B6
24	VC024	B7
25	VC025	B8
26	VC026	B9
27	VC027	B10
28	VC028	B11
29	VC029	B12
30	VC030	B13
31	VC031	B14
32	VC032	B15
33	VC033	B16
34	VC034	B17

S.no	REG NO	SEAT NO
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SRM ARTS AND SCIENCE COLLEGE

DEPARTMENT OF VISUAL COMMUNICATION

SRM ARTS AND SCIENCE COLLEGE

ROOM NO: 214 **DATE :26.09.2022**

S.no	REG NO	SEAT NO
1	VC035	A1
2	VC036	A2
3	VC037	A3
4	VC038	A4
5	VC039	A5
6	VC040	A6
7	VC041	A7
8	VC042	A8
9	VC043	A9
10	VC044	A10
11	VC045	A11
12	VC046	A12
13	VC047	A13
14	VC048	A14
15	VC049	A15
16	VC050	A16
17	VC051	A17

S.no	REG NO	SEAT NO
18	VC052	B1
19	VC053	B2
20	VC054	B3
21	VC055	B4
22	VC056	B5
23	VC057	B6
24	VC058	B7
25	VC059	B8
26	VC060	B9
27	VC061	B10
28	VC062	B11
29	VC063	B12
30	VC064	B13
31	VC065	B14
32	VC066	B15
33	VC067	B16
34		B17

S.no	REG NO	SEAT NO
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DEPARTMENT OF VISUAL COMMUNICATION

SRM ARTS AND SCIENCE COLLEGE

ROOM NO: 214 **DATE :27.09.2022**

S.no	REG NO	SEAT NO
1	VC035	A1
2	VC036	A2
3	VC037	A3
4	VC038	A4
5	VC039	A5
6	VC040	A6
7	VC041	A7
8	VC042	A8
9	VC043	A9
10	VC044	A10
11	VC045	A11
12	VC046	A12
13	VC047	A13
14	VC048	A14
15	VC049	A15
16	VC050	A16
17	VC051	A17

S.no	REG NO	SEAT NO
18	VC052	B1
19	VC053	B2
20	VC054	B3
21	VC055	B4
22	VC056	B5
23	VC057	B6
24	VC058	B7
25	VC059	B8
26	VC060	B9
27	VC061	B10
28	VC062	B11
29	VC063	B12
30	VC064	B13
31	VC065	B14
32	VC066	B15
33	VC067	B16
34		B17

S.no	REG NO	SEAT NO
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ROOM NO: 214 **DATE :28.09.2022**

S.no	REG NO	SEAT NO
1	VC035	A1
2	VC036	A2
3	VC037	A3
4	VC038	A4
5	VC039	A5
6	VC040	A6
7	VC041	A7
8	VC042	A8
9	VC043	A9
10	VC044	A10
11	VC045	A11
12	VC046	A12
13	VC047	A13
14	VC048	A14
15	VC049	A15
16	VC050	A16
17	VC051	A17

S.no	REG NO	SEAT NO
18	VC052	B1
19	VC053	B2
20	VC054	B3
21	VC055	B4
22	VC056	B5
23	VC057	B6
24	VC058	B7
25	VC059	B8
26	VC060	B9
27	VC061	B10
28	VC062	B11
29	VC063	B12
30	VC064	B13
31	VC065	B14
32	VC066	B15
33	VC067	B16
34		B17

S.no	REG NO	SEAT NO
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DEPARTMENT OF VISUAL COMMUNICATION

SRM ARTS AND SCIENCE COLLEGE

ROOM NO: 211 **DATE :31.10.2022**

S.no	REG NO	SEAT NO
1	432000269	A1
2	432000270	A2
3	432000271	A3
4	432000272	A4
5	432000273	A5
6	432000274	A6
7	432000275	A7
8	432000276	A8
9	432000277	A9
10	432000278	A10
11	432000279	A11
12	432000280	A12
13	432000281	A13
14	432000282	A14
15	432000283	A15
16	432000284	A16
17	432000285	A17

S.no	REG NO	SEAT NO
18	432000286	B1
19	432000287	B2
20	432000288	B3
21	432000290	B4
22	432000291	B5
23	432000292	B6
24	432000294	B7
25	432000295	B8
26	432000296	B9
27	432000297	B10
28	432000298	B11
29	432000300	B12
30	432000301	B13
31	432000302	B14
32	432000303	B15
33	432000304	B16
34	432000305	B17

S.no	REG NO	SEAT NO
35	432000306	A18
36	432000307	A19
37	432000308	A20
38	432000309	A21
39	432000310	A22
40	432000311	A23
41	432000312	A24
42	432000313	A25
43	432000314	A26
44	432000315	A27
45	432000316	A28
46	432000317	A29
47	432000318	A30
48	432000319	A31
49	432000320	A32
50	432000321	A33
51	432000322	A34
52	432000323	A35

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DEPARTMENT OF VISUAL COMMUNICATION

SRM ARTS AND SCIENCE COLLEGE

ROOM NO: 211 **DATE :01.11.2022**

S.no	REG NO	SEAT NO
1	432000269	**A1**
2	432000270	**A2**
3	432000271	**A3**
4	432000272	**A4**
5	432000273	**A5**
6	432000274	**A6**
7	432000275	**A7**
8	432000276	**A8**
9	432000277	**A9**
10	432000278	**A10**
11	432000279	**A11**
12	432000280	**A12**
13	432000281	**A13**
14	432000282	**A14**
15	432000283	**A15**
16	432000284	**A16**
17	432000285	**A17**

S.no	REG NO	SEAT NO
18	432000286	**B1**
19	432000287	**B2**
20	432000288	**B3**
21	432000290	**B4**
22	432000291	**B5**
23	432000292	**B6**
24	432000294	**B7**
25	432000295	**B8**
26	432000296	**B9**
27	432000297	**B10**
28	432000298	**B11**
29	432000300	**B12**
30	432000301	**B13**
31	432000302	**B14**
32	432000303	**B15**
33	432000304	**B16**
34	432000305	**B17**

S.no	REG NO	SEAT NO
35	432000306	**A18**
36	432000307	**A19**
37	432000308	**A20**
38	432000309	**A21**
39	432000310	**A22**
40	432000311	**A23**
41	432000312	**A24**
42	432000313	**A25**
43	432000314	**A26**
44	432000315	**A27**
45	432000316	**A28**
46	432000317	**A29**
47	432000318	**A30**
48	432000319	**A31**
49	432000320	**A32**
50	432000321	**A33**
51	432000322	**A34**
52	432000323	**A35**

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SRM ARTS AND SCIENCE COLLEGE

DEPARTMENT OF VISUAL COMMUNICATION

SRM ARTS AND SCIENCE COLLEGE

ROOM NO: 212 **DATE :31.10.2022**

S.no	REG NO	SEAT NO
1	432100355	**A1**
2	432100356	**A2**
3	432100357	**A3**
4	432100358	**A4**
5	432100360	**A5**
6	432100361	**A6**
7	432100362	**A7**
8	432100363	**A8**
9	432100364	**A9**
10	432100365	**A10**
11	432100366	**A11**
12	432100367	**A12**
13	432100368	**A13**
14	432100369	**A14**
15	432100370	**A15**
16	432100371	**A16**
17	432100372	**A17**

S.no	REG NO	SEAT NO
18	432100373	**B1**
19	432100374	**B2**
20	432100375	**B3**
21	432100376	**B4**
22	432100377	**B5**
23	432100378	**B6**
24	432100379	**B7**
25	432100380	**B8**
26	432100381	**B9**
27	432100383	**B10**
28	432100384	**B11**
29	432100385	**B12**
30	432100386	**B13**
31	432100387	**B14**
32	432100388	**B15**
33	432100389	**B16**
34	432100390	**B17**

S.no	REG NO	SEAT NO
35	432100391	**A18**
36	432100392	**A19**
37	432100393	**A20**
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DEPARTMENT OF VISUAL COMMUNICATION

SRM ARTS AND SCIENCE COLLEGE

ROOM NO: 212 **DATE :01.11.2022**

S.no	REG NO	SEAT NO
1	432100355	**A1**
2	432100356	**A2**
3	432100357	**A3**
4	432100358	**A4**
5	432100360	**A5**
6	432100361	**A6**
7	432100362	**A7**
8	432100363	**A8**
9	432100364	**A9**
10	432100365	**A10**
11	432100366	**A11**
12	432100367	**A12**
13	432100368	**A13**
14	432100369	**A14**
15	432100370	**A15**
16	432100371	**A16**
17	432100372	**A17**

S.no	REG NO	SEAT NO
18	432100373	**B1**
19	432100374	**B2**
20	432100375	**B3**
21	432100376	**B4**
22	432100377	**B5**
23	432100378	**B6**
24	432100379	**B7**
25	432100380	**B8**
26	432100381	**B9**
27	432100383	**B10**
28	432100384	**B11**
29	432100385	**B12**
30	432100386	**B13**
31	432100387	**B14**
32	432100388	**B15**
33	432100389	**B16**
34	432100390	**B17**

S.no	REG NO	SEAT NO
35	432100391	**A18**
36	432100392	**A19**
37	432100393	**A20**
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DEPARTMENT OF VISUAL COMMUNICATION

SRM ARTS AND SCIENCE COLLEGE

ROOM NO: 212 **DATE :02.11.2022**

S.no	REG NO	SEAT NO
1	432100355	**A1**
2	432100356	**A2**
3	432100357	**A3**
4	432100358	**A4**
5	432100360	**A5**
6	432100361	**A6**
7	432100362	**A7**
8	432100363	**A8**
9	432100364	**A9**
10	432100365	**A10**
11	432100366	**A11**
12	432100367	**A12**
13	432100368	**A13**
14	432100369	**A14**
15	432100370	**A15**
16	432100371	**A16**
17	432100372	**A17**

S.no	REG NO	SEAT NO
18	432100373	**B1**
19	432100374	**B2**
20	432100375	**B3**
21	432100376	**B4**
22	432100377	**B5**
23	432100378	**B6**
24	432100379	**B7**
25	432100380	**B8**
26	432100381	**B9**
27	432100383	**B10**
28	432100384	**B11**
29	432100385	**B12**
30	432100386	**B13**
31	432100387	**B14**
32	432100388	**B15**
33	432100389	**B16**
34	432100390	**B17**

S.no	REG NO	SEAT NO
35	432100391	**A18**
36	432100392	**A19**
37	432100393	**A20**
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ROOM NO: 212 **DATE :03.11.2022**

S.no	REG NO	SEAT NO
1	432100355	**A1**
2	432100356	**A2**
3	432100357	**A3**
4	432100358	**A4**
5	432100360	**A5**
6	432100361	**A6**
7	432100362	**A7**
8	432100363	**A8**
9	432100364	**A9**
10	432100365	**A10**
11	432100366	**A11**
12	432100367	**A12**
13	432100368	**A13**
14	432100369	**A14**
15	432100370	**A15**
16	432100371	**A16**
17	432100372	**A17**

S.no	REG NO	SEAT NO
18	432100373	**B1**
19	432100374	**B2**
20	432100375	**B3**
21	432100376	**B4**
22	432100377	**B5**
23	432100378	**B6**
24	432100379	**B7**
25	432100380	**B8**
26	432100381	**B9**
27	432100383	**B10**
28	432100384	**B11**
29	432100385	**B12**
30	432100386	**B13**
31	432100387	**B14**
32	432100388	**B15**
33	432100389	**B16**
34	432100390	**B17**

S.no	REG NO	SEAT NO
35	432100391	**A18**
36	432100392	**A19**
37	432100393	**A20**
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DEPARTMENT OF VISUAL COMMUNICATION

SRM ARTS AND SCIENCE COLLEGE

ROOM NO: 213 **DATE :31.10.2022**

S.no	REG NO	SEAT NO
1	VC001	A1
2	VC002	A2
3	VC003	A3
4	VC004	A4
5	VC005	A5
6	VC006	A6
7	VC007	A7
8	VC008	A8
9	VC009	A9
10	VC010	A10
11	VC011	A11
12	VC012	A12
13	VC013	A13
14	VC014	A14
15	VC015	A15
16	VC016	A16
17	VC017	A17

S.no	REG NO	SEAT NO
18	VC018	B1
19	VC019	B2
20	VC020	B3
21	VC021	B4
22	VC022	B5
23	VC023	B6
24	VC024	B7
25	VC025	B8
26	VC026	B9
27	VC027	B10
28	VC028	B11
29	VC029	B12
30	VC030	B13
31	VC031	B14
32	VC032	B15
33	VC033	B16
34	VC034	B17

S.no	REG NO	SEAT NO
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DEPARTMENT OF VISUAL COMMUNICATION

SRM ARTS AND SCIENCE COLLEGE

ROOM NO: 213 **DATE :01.11.2022**

S.no	REG NO	SEAT NO
1	VC001	A1
2	VC002	A2
3	VC003	A3
4	VC004	A4
5	VC005	A5
6	VC006	A6
7	VC007	A7
8	VC008	A8
9	VC009	A9
10	VC010	A10
11	VC011	A11
12	VC012	A12
13	VC013	A13
14	VC014	A14
15	VC015	A15
16	VC016	A16
17	VC017	A17

S.no	REG NO	SEAT NO
18	VC018	B1
19	VC019	B2
20	VC020	B3
21	VC021	B4
22	VC022	B5
23	VC023	B6
24	VC024	B7
25	VC025	B8
26	VC026	B9
27	VC027	B10
28	VC028	B11
29	VC029	B12
30	VC030	B13
31	VC031	B14
32	VC032	B15
33	VC033	B16
34	VC034	B17

S.no	REG NO	SEAT NO
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DEPARTMENT OF VISUAL COMMUNICATION

SRM ARTS AND SCIENCE COLLEGE

ROOM NO: 213 **DATE :02.11.2022**

S.no	REG NO	SEAT NO
1	VC001	A1
2	VC002	A2
3	VC003	A3
4	VC004	A4
5	VC005	A5
6	VC006	A6
7	VC007	A7
8	VC008	A8
9	VC009	A9
10	VC010	A10
11	VC011	A11
12	VC012	A12
13	VC013	A13
14	VC014	A14
15	VC015	A15
16	VC016	A16
17	VC017	A17

S.no	REG NO	SEAT NO
18	VC018	B1
19	VC019	B2
20	VC020	B3
21	VC021	B4
22	VC022	B5
23	VC023	B6
24	VC024	B7
25	VC025	B8
26	VC026	B9
27	VC027	B10
28	VC028	B11
29	VC029	B12
30	VC030	B13
31	VC031	B14
32	VC032	B15
33	VC033	B16
34	VC034	B17

S.no	REG NO	SEAT NO
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SRM ARTS AND SCIENCE COLLEGE

DEPARTMENT OF VISUAL COMMUNICATION

SRM ARTS AND SCIENCE COLLEGE

ROOM NO: 214 **DATE :31.10.2022**

S.no	REG NO	SEAT NO
1	VC035	A1
2	VC036	A2
3	VC037	A3
4	VC038	A4
5	VC039	A5
6	VC040	A6
7	VC041	A7
8	VC042	A8
9	VC043	A9
10	VC044	A10
11	VC045	A11
12	VC046	A12
13	VC047	A13
14	VC048	A14
15	VC049	A15
16	VC050	A16
17	VC051	A17

S.no	REG NO	SEAT NO
18	VC052	B1
19	VC053	B2
20	VC054	B3
21	VC055	B4
22	VC056	B5
23	VC057	B6
24	VC058	B7
25	VC059	B8
26	VC060	B9
27	VC061	B10
28	VC062	B11
29	VC063	B12
30	VC064	B13
31	VC065	B14
32	VC066	B15
33	VC067	B16
34		B17

S.no	REG NO	SEAT NO
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DEPARTMENT OF VISUAL COMMUNICATION

SRM ARTS AND SCIENCE COLLEGE

ROOM NO: 214 **DATE :01.11.2022**

S.no	REG NO	SEAT NO
1	VC035	A1
2	VC036	A2
3	VC037	A3
4	VC038	A4
5	VC039	A5
6	VC040	A6
7	VC041	A7
8	VC042	A8
9	VC043	A9
10	VC044	A10
11	VC045	A11
12	VC046	A12
13	VC047	A13
14	VC048	A14
15	VC049	A15
16	VC050	A16
17	VC051	A17

S.no	REG NO	SEAT NO
18	VC052	B1
19	VC053	B2
20	VC054	B3
21	VC055	B4
22	VC056	B5
23	VC057	B6
24	VC058	B7
25	VC059	B8
26	VC060	B9
27	VC061	B10
28	VC062	B11
29	VC063	B12
30	VC064	B13
31	VC065	B14
32	VC066	B15
33	VC067	B16
34		B17

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ROOM NO: 214 **DATE :02.11.2022**

S.no	REG NO	SEAT NO
1	VC035	A1
2	VC036	A2
3	VC037	A3
4	VC038	A4
5	VC039	A5
6	VC040	A6
7	VC041	A7
8	VC042	A8
9	VC043	A9
10	VC044	A10
11	VC045	A11
12	VC046	A12
13	VC047	A13
14	VC048	A14
15	VC049	A15
16	VC050	A16
17	VC051	A17

S.no	REG NO	SEAT NO
18	VC052	B1
19	VC053	B2
20	VC054	B3
21	VC055	B4
22	VC056	B5
23	VC057	B6
24	VC058	B7
25	VC059	B8
26	VC060	B9
27	VC061	B10
28	VC062	B11
29	VC063	B12
30	VC064	B13
31	VC065	B14
32	VC066	B15
33	VC067	B16
34		B17

S.no	REG NO	SEAT NO
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KATTANKULATHUR

DEPARTMENT OF HOTEL MANAGEMENT

STAFF INVIGILATION LIST

UNIT TEST – I FEBRAURY 2023

S.No.	STAFF NAME	HALL NO	SIGN
3	MR NITHYANANTHAM	301	
4	MRS G.SUMITHA	302	

HOD 9/2/23

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DEPARTMENT OF HOTEL MANAGEMENT

STAFF INVIGILATION LIST

UNIT TEST – II MARCH 2023

S.No.	STAFF NAME	HALL NO	SIGN
1	MR HEMACHALAM	301	
2	MR TAMILSELVAN	302	

13/3/23

HOD

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DEPARTMENT OF HOTEL MANAGEMENT

SEATING ARRANGEMENT LIST

UNIT TEST – I FEBRAURY 2023

S.No.	Registe . No	YEAR	HALL NO
1	222207703 - 222207724	I YEAR	301
2	222006073 - 222006093	III YEAR	302

9/2/23

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DEPARTMENT OF HOTEL MANAGEMENT

SEATING ARRANGEMENT LIST

UNIT TEST – II MARCH 2023

S.No.	Registe . No	YEAR	HALL NO
1	222207703 - 222207724	I YEAR	302
2	222006073 - 222006093	III YEAR	302

13/3/23

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AQAR
(2022-2023)

CRITERION I

CURRICULAR ASPECTS

1.1.2 CIE - QUESTION PAPER



SRM ARTS AND SCIENCE COLLEGE, KATTANKULATHUR

DEPARTMENT OF BIOCHEMISTRY

UNIT TEST –I, AUGUST -2023

Class: II B.Sc., Biochemistry
Subject: Biomolecules
Subject Code: SB23A

Date: 09.08.2023
Time: 12.00pm to 1.00pm
Max. Mark: 25

Section A (5 x 2 =10)

Answer any **FIVE** questions.

CO 1 BL1 1. Define epimers.

CO 1 BL1 2. Define mutarotation

CO 1 BL1 3. Name any two reducing sugars.

CO 1 BL1 4. Define Stereoisomerism.

CO 5 BL1 5. State peptide bond

CO 5 BL1 6. Tell about Hydrophobic interaction.

CO 5 BL1 7. Enumerate Ionic bond.

Section B (1 x 5 = 5)

Answer any **ONE** question.

CO 1 BL 2 8. Explain the structure and properties of reducing disaccharides.

CO 5 BL 2 9. Explain briefly about the bonds involved in proteins.

Section C (1 x 10 = 10)

Answer any **ONE** question.

CO 1 BL 6 10. Write a brief note on the classification of carbohydrates.

CO 5 BL 3 11. Illustrate Primary, secondary, tertiary and quaternary structure.

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Answer key

Section A (5 x 2 =10)

Answer any **FIVE** questions.

1. **Define epimers**

Epimers are carbohydrates which vary in one position for the placement of the -OH group. The best examples are for D-glucose and D-galactose. Both monosaccharides are D-sugars, meaning that the -OH group on carbon-5 of these hexoses is located on the right in Fischer Projection.

2. **Define mutarotation**

Mutarotation is a difference in the specific rotation of plane-polarized light due to the change in the equilibrium between two anomers in the solution. Any molecule to show mutarotation must have a hemiketal or hemiacetal group. Mutarotation property was first observed in sugar.

3. **Name any two reducing sugars**.

All monosaccharides are reducing sugars. Glucose, fructose, and galactose are monosaccharides and are all reducing sugars.

4. **Define Stereoisomerism.**

Stereoisomers are isomers that differ in spatial arrangement of atoms, rather than order of atomic connectivity. One of their most interesting type of isomer is the mirror-image stereoisomers, a non-superimposable set of two molecules that are mirror image of one another.

5. **State peptide bond**

A peptide bond is basically an amide-type of the covalent chemical bond. This bond links two consecutive alpha-amino acids from C1 (carbon number one) of one alpha-amino acid and N2 (nitrogen number two) of another. This linkage is found along a peptide or protein chain.

6. **Tell about Hydrophobic interaction.**

Hydrophobic interaction, also known as hydrophobic effect, is a kind of property of nonpolar molecules (or hydrophobic moieties of amphiphiles), which can drive these molecules to assemble to form anhydrous domains in aqueous solution.

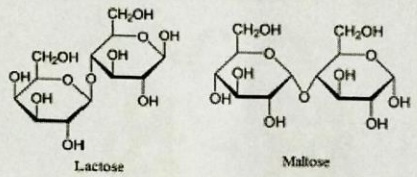
7. **Enumerate Ionic bond.**

Ionic bonds are formed as atoms of amino acids bearing opposite electrical charges are juxtaposed. Ionic bonds can be important to protein structure because they are potent electrostatic attractions. In the hydrophobic interior of proteins, ionic bonds can even approach the strength of covalent bonds.

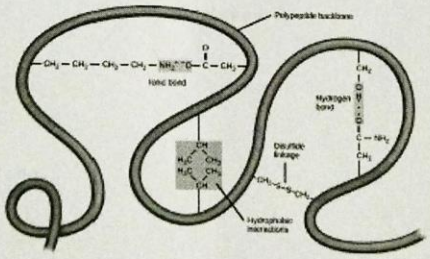
Section B (1 x 5 = 5)

Answer any **ONE** question.

8. **Explain the structure and properties of reducing disaccharides.**



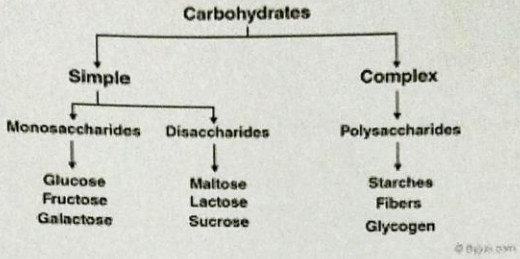
9. **Explain briefly about the bonds involved in proteins.**



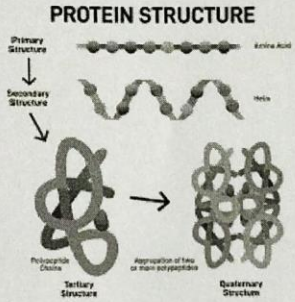
Section C (1 x 10 = 10)

Answer any **ONE** question.

10. **Write a brief note on the classification of carbohydrates.**



11. **Illustrate Primary, secondary, tertiary and quaternary structure.**



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DEPARTMENT OF BIOCHEMISTRY

UNIT TEST –I, AUGUST -2023

Class: III B.Sc., Biochemistry
Subject: Enzymes
Subject Code: SB25A

Date: 07.08.2023
Time: 12.00pm to 1.00pm
Max. Mark: 25

Section A (5 x 2 =10)

Answer any **FIVE** questions.

CO 1 BL1 1. Define the term active site.

CO 1 BL6 2. Write notes on allosteric enzymes.

CO 1 BL2 3. Classify enzyme specificity.

CO 1 BL6 4. Write notes on isoenzymes.

CO 4 BL1 5. State Salting out.

CO 4 BL1 6. Define Dialysis.

CO 4 BL1 7. Enumerate Ion exchange chromatography.

Section B (1 x 5 = 5)

Answer any **ONE** question.

CO 1 BL2 8. Discuss about induced fit theory.

CO 4 BL2 9. Explain briefly the principle of purification of enzymes.

Section C (1 x 10 = 10)

Answer any **ONE** question.

CO1 BL4 10. Explain the nomenclature and classification of enzymes.

CO 4 BL 2 11. Describe an account on isolation and purification of enzymes.

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Answer key

Section A (5 x 2 =10)

Answer any **FIVE** questions.

1. **Define the term active site.**

The active site is a region on the surface of an enzyme or a catalyst where substrates bind and undergo chemical reactions. It facilitates the catalysis of reactions by reducing the activation energy required for the reaction to occur, increasing the reaction rate, and providing specificity for substrate binding.

2. **Write notes on allosteric enzymes.**

Allosteric Regulation:

- Allosteric enzymes are enzymes that can be regulated by the binding of specific molecules at sites other than the active site.
- Allosteric regulation can enhance (positive allosteric regulation) or inhibit (negative allosteric regulation) the enzyme's activity, allowing cells to finely control metabolic pathways.

Cooperativity and Feedback Inhibition:

- Many allosteric enzymes exhibit cooperativity, where the binding of a substrate at one active site influences the affinity of other active sites for the same substrate.
- Allosteric regulation is crucial for feedback inhibition, where the end product of a metabolic pathway acts as an allosteric inhibitor, preventing overproduction of the product.

Ex: Aspartate transcarbomylase

3. **Classify enzyme specificity.**

1. Absolute substrate specificity
2. Absolute group substrate specificity or broad specificity
3. Relative group substrate specificity or bond specificity
4. Geometrical specificity
5. Optical specificity (Stereo specificity)
6. Reaction specificity

4. **Write notes on isoenzymes.**

Isoenzymes, also known as isozymes, are different forms of enzymes that catalyze the same chemical reaction but have distinct structural compositions. They arise due to genetic variations in the genes that encode them, resulting in variations in their amino acid sequences and, consequently, their physical properties.

Example : LDH - 5 isoenzyme forms, CK - 3 isoenzyme forms

5. **State Salting out.**

Salting-out is formally defined as the phenomenon when the solubility of a nonelectrolyte substance in water decreases with increasing salt concentration. (34, 35) Conversely, salting-in is defined for instances when the solubility of a nonelectrolyte in water increases with increasing salt concentration.

6. **Define Dialysis.**

Dialysis is a procedure to remove waste products and excess fluid from the blood when the kidneys stop working properly. It often involves diverting blood to a machine to be cleaned.

7. **Enumerate Ion exchange chromatography.**

Ion exchange chromatography (IEX) separates proteins with differences in surface charge to give high-resolution separation with high sample loading capacity. The separation is based on the reversible interaction between a charged protein and an oppositely charged chromatography resin.

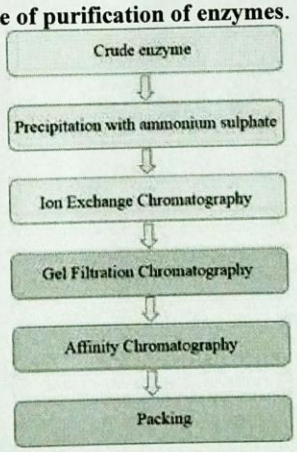
Section B (1 x 5 = 5)

Answer any **ONE** question.

8. **Discuss about induced fit theory.**

Introduction (1M)
Explanation (3M)
Diagram (1M)

9. **.Explain briefly the principle of purification of enzymes.**



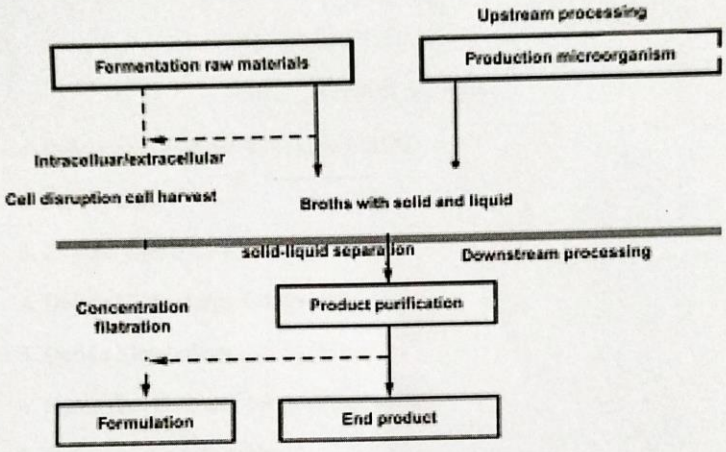
Section C (1 x 10 = 10)

Answer any **ONE** question.

10. **Explain the nomenclature and classification of enzymes.**

Nomenclature (3M)
6 Classes of enzyme (5M)
Example (2M)

11. **Describe an account on isolation and purification of enzymes.**



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DEPARTMENT OF BIOCHEMISTRY

UNIT TEST –I, AUGUST -2023

Class: III B.Sc., Biochemistry
Subject: Metabolism
Subject Code: SB25B

Date: 08.08.2023
Time: 12.00pm to 1.00pm
Max. Mark: 25

Section A (5 x 2 =10)

Answer any **FIVE** questions.

CO 1 BL1 1. Define Substrate level Phosphorylation.

CO 1 BL1 2. Define Redox.

CO 1 BL2 3. Explain Lipman's ATP cycle.

CO 1 BL1 4. Define High energy Compounds.

CO 2 BL1 5. Define Metabolism

CO 2 BL1 6. Name the substrates for gluconeogenesis.

CO 2 BL1 7. Define glyoxylate cycle.

Section B (1 x 5 = 5)

Answer any **ONE** question.

CO2 BL6 8. Write the significance of HMP

CO1 BL2 9. Explain in detail about the electron transport chain and its inhibitors.

Section C (1 x 10 = 10)

Answer any **ONE** question.

CO1BL3 10. Illustrate any 5 high energy compounds with suitable energetics.

CO2BL6 11. Write about glycolysis with its energetics.

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Answer key

Section A (5 x 2 =10)

Answer any **FIVE** questions.

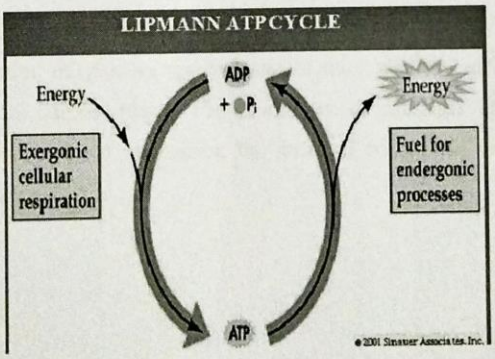
1. Define Substrate level Phosphorylation.

Substrate level phosphorylation is defined as addition of phosphate to ADP directly from the substrate moiety phosphoenol pyruvate then it becomes ATP and Pyruvate was produced. The above reaction is a very good example for substrate level phosphorylation.

2. Define Redox.

Redox is common term in chemistry and biology. Both reduction and Oxidation reaction are simultaneously occurs between chemical substances. In this reaction, there is the *actual* transfer or shifting of electrons that takes place among different chemical species. In this reaction, one species *loses* electrons while the other *gains* the electron. The species which gain the electron is said to be ***reduced*** while the species that lost the electron is said to be ***oxidized.*** In biology, a redox reaction has defined all aspects of life as it is the form of reaction that occurs in multifarious biological processes.

3. Explain Lipman's ATP cycle.



4. Define High energy Compounds.

High energy compounds are also called energy-rich compounds. Compounds present in the biological system that when hydrolysed, produce free energy that is greater or equal to that of ATP ($\triangle G$ is -7.3 kcal/mol) are termed high energy compounds.

5. Define Metabolism.

Metabolism is the total amount of the biochemical reactions involved in maintaining the living condition of the cells in an organism. All living organisms require energy for different essential processes and for producing new organic substances.

The metabolic processes help in growth and reproduction and help in maintaining the structures of living organisms. The organisms respond to the surrounding environment due to metabolic activities. All the chemical reactions occurring in the living organisms from digestion to transportation of substances from cell to cell require energy.

Metabolic Process

There are two types of metabolic process:

Catabolism – This process is mainly involved in breaking down large organic molecules into smaller molecules. This metabolic process releases energy.

Anabolism – This process is mainly involved in building up or synthesizing compounds from simpler substances required by the cells. This metabolic process requires and stores energy.

6. Name the substrates for gluconeogenesis.

The major substrates of gluconeogenesis are lactate, glycerol, and glucogenic amino acids. Glycerol comes from adipose tissue. The breakdown of triacylglycerols in adipose tissue yields free fatty acids and glycerol molecules, the latter of which can circulate freely in the bloodstream until it reaches the liver.

7. Define glyoxylate cycle.

- Glyoxylate cycle is an anabolic pathway and take place in fungi, bacteria, plants, protist, and nematodes, etc.
- In the Glyoxylate cycle, the acetyl-CoA converted to succinate for the synthesis of carbohydrates.
- There are a total of eight enzymes that are involved in the Glyoxylate cycle and five out of these eight enzymes are associated with the TCA cycle such as citrate synthase, aconitase, succinate dehydrogenase, fumarase, and malate dehydrogenase.
- The Glyoxylate cycle occurs in the glyoxysomes of plant cells, it is a specialized peroxisome.
- It has two additional enzymes called isocitrate lyase and malate synthase.
- This cycle is mainly activated in the germinating seeds of plants and in few microorganisms those use acetate as a sole carbon source.
- Vertebrates can't synthesize glucose from acetate or fatty acids because they lack the Glyoxylate cycle.

Section B (1 x 5 = 5)

Answer any **ONE** question.

8. Write the significance of HMP

Introduction (1M)
Explanation (2M)
Significance (2M)

9. Explain in detail about the electron transport chain and its inhibitors.

Introduction (1M)
Pathway (2M)
Inhibitors (2M)

Section C (1 x 10 = 10)

Answer any **ONE** question.

10. Illustrate any 5 high energy compounds with suitable energetics.

Introduction (1M)
Explanation (2M)
Compounds with energetics (7M)

11. Write about glycolysis with its energetics.

Introduction (1M)
Explanation (2M)
Pathway (5M)
Energytices (2M)

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DEPARTMENT OF BIOCHEMISTRY

UNIT TEST –I, AUGUST -2023

Class: III B.Sc., Biochemistry
Subject: Human Physiology
Subject Code: SB45A

Date: 10.08.2023
Time: 12.00pm to 1.00pm
Max. Mark: 25

Section A (5 x 2 =10)

Answer any **FIVE** questions.

CO 3 BL6 1. Write the composition of air and significance of O_2 in the respiration system.

CO 3 BL1 2. Define tidal and residual volume.

CO 3 BL6 3. Write about the respiratory pigments.

CO 3 BL1 4. Quote Bhore effect

CO 2 BL6 5. Write the role of microvilli.

CO 2 BL4 6. Explain the role of bile salts in digestion.

CO 2 BL1 7. Define peristalsis.

Section B (1 x 5 = 5)

Answer any **ONE** question.

CO 1 BL 4 8. Explain the structure of the digestive system.

CO 4 BL 4 9. Explain the chloride shift.

Section C (1 x 10 = 10)

Answer any **ONE** question.

CO 1 BL 2 10. Describe the structure and function of nephrons.

CO4 BL 2 11. Describe in detail about the respiration process with a neat diagram.

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Answer key

Section A (5 x 2 =10)

Answer any **FIVE** questions.

1. **Write the composition of air and significance of O_2 in the respiration system.**

   Dry air contains 78.08% nitrogen, 20.95% oxygen, 0.93% argon, 0.04% carbon dioxide, and small amounts of other gasses. Air also contains a variable amount of water vapor, on average around 1% at sea level, and 0.4% over the entire atmosphere.

2. **Define tidal and residual volume.**

   Tidal volume is the amount of air that moves in or out of the lungs with each respiratory cycle. It measures around 500 mL in an average healthy adult male and approximately 400 mL in a healthy female. It is a vital clinical parameter that allows for proper ventilation to take place. **Residual volume** is the amount of air that remains in a person's lungs after fully exhaling. Normal residual volume is 1 to 1.2 L.

3. **Write about the respiratory pigments.**

   A respiratory pigment is a molecule, such as hemoglobin in humans and other vertebrates that increases the oxygen-carrying capacity of the blood. The four most common invertebrate respiratory pigments are hemoglobin, hemocyanin, hemerythrin and chlorocruorin.

4. **Quote Bhore effect.**

   The Bohr effect describes hemoglobin's lower affinity for oxygen secondary to increases in the partial pressure of carbon dioxide and/or decreased blood pH. This lower affinity, in turn, enhances the unloading of oxygen into tissues to meet the oxygen demand of the tissue. Phenomenon 1st described in 1904 by the Danish physiologist Christian Bohr.

   The Bohr effect is important because it enhances delivery of oxygen to the muscles and tissues where metabolism is occurring and carbon dioxide is being produced. This helps deliver oxygen where it is most needed. So, as CO2 increases in those muscles of respiration, oxygen delivery to those muscles also increases.

5. **Write the role of microvilli.**

   The microvilli play an important role in the digestion and absorption of intestinal contents by enlarging the absorbing surface approximately 25 times. They also secrete the enzymes disaccharidase and peptidase that hydrolyze disaccharides and polypeptides to monosaccharides and dipeptides to amino acids, respectively.

6. **Explain the role of bile salts in digestion.**

   Bile salts are a primary component of bile and are needed by the body to help break down fats, aid digestion, absorb important vitamins, and eliminate toxins. Bile salts are stored in your gallbladder when they're not being used.

7. **Define peristalsis.**

Peristalsis is a series of wave-like muscle contractions that move food through the digestive tract. It starts in the esophagus where strong wave-like motions of the smooth muscle move balls of swallowed food to the stomach.

Section B (1 x 5 = 5)

Answer any **ONE** question.

8. **Explain the structure of the digestive system.**

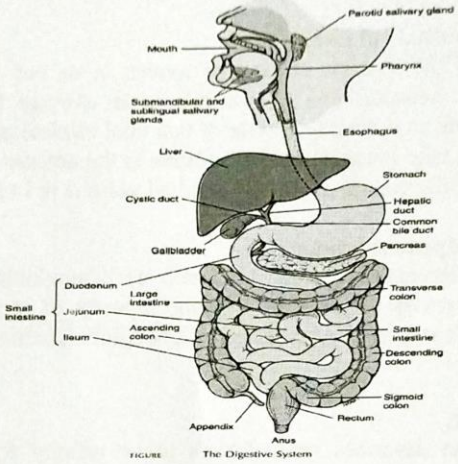
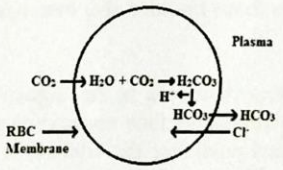


FIGURE The Digestive System

9. **Explain the chloride shift.**

Chloride shift also known as the Hamburger shift or Hamburger phenomenon, named after Hartog Jakob Hamburger. It is a process which occurs in a cardiovascular system and refers to the exchange of bicarbonate (HCO_3^-) and chloride (Cl^-) across the membrane of red blood cells.



Entry of chloride ions (Cl^-) into a red blood cell from the surrounding plasma. CO_2 is carried into the cell from respiring tissues.

CO2 is generated in tissues as a by-product of normal metabolism. It dissolves in blood plasma to form H2CO3 red blood cell carbonic anhydrase catalyses this reaction. Carbonic acid then spontaneously dissociates to form bicarbonate and hydrogen ion. In response to the decrease in intracellular pCO2 more passively diffuses into the cell. Cell

membrane are generally impermeable to RBC are able to exchange bicarbonate for chloride using the inion exchange protein band3. Thus the rise in intracellular bicarbonate leads to bicarbonate export and chloride intake. The term chloride shift refers to this exchange. Consequently, chloride concentration is lower in systemic venous blood than in systemic arterial blood high venous pCO2 leads to bicarbonate production in RBCs, which then leaves the RBC in exchange for chloride coming in.

Section C (1 x 10 = 10)

Answer any **ONE** question.

10. Describe the structure and function of nephrons.

Nephrons:

1. The nephron is the functional unit of the kidney.
2. It is composed of a renal corpuscle and a renal tubule.

Structure of nephrons:

1. Nephrons are basic filtering units of kidneys.
2. Each kidney possesses a large number of nephrons (approx. 1-1.5 million).
3. The components of the nephron:
    - Glomerulus,
    - Bowman's capsule
    - Long renal tubule.

Functions of nephron:

1. The blood enters the kidney through the renal artery (which branches into capillaries associated with the glomerulus).
2. Water and solute are transferred to Bowman's capsule.
3. In the proximal convoluted tubule, glucose and salts are selectively reabsorbed.
4. Now filtrate moves down into the loop of Henle.
5. And then move upward to the distal convoluted tubule and finally into the collecting duct.

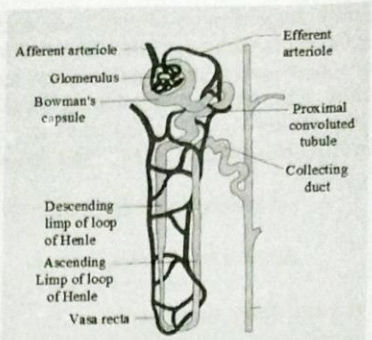


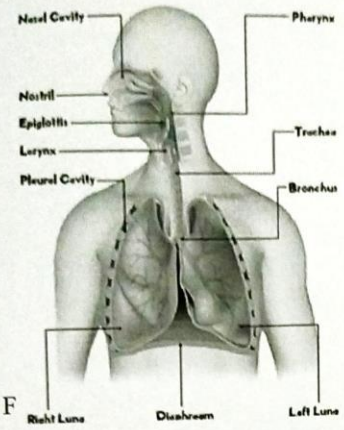
Figure : REPRESENTATION OF A NEPHRON

11. Describe in detail about the respiration process with a neat diagram.

Respiration is the process by which O_2 from the lungs is carried by the blood to the tissues and CO_2 formed in the tissues by metabolic activity is carried by the blood to the lungs and is exhausted. Process of respiration involves four stages:

- Ventilation: means the passage or air in and out of lungs during inspiration and expiration respectively.
- Intrapulmonary gas mixing: Distribution of O_2 rich inspired air with the air already present in the lungs.
- Diffusion: Gas transfer across the alveolar capillary membrane due to tension gradient.
- Perfusion: Means flow of adequate quantity of blood through the lungs so that the diffused gases are carried away.

· Upper respiratory tract: extends from the upper nares to the vocal cord. Lower respiratory tract: extends from the vocal cord to the alveoli. Trachea windpipe is a cartilaginous and membranous tube, about 10 or 11cm long. It is not quite cylindrical, being flattened posteriorly, its external diameter from side to side is about 2cm in adult male and 1.5cm in female. It is kept patent by incomplete C shaped ring of cartilage on its anterior lateral wall glands in the sub mucous coat innervated by the vagi. Mucous gland along with goblet cells traps dust in the inspired air and air is moistened by contact with moist lining of serous glands. The cilia beat spontaneously at the rate of 20times per minute and by their movement drive out mucus trapped foreign particle and bacteria towards the mouth from the respiratory passage ante velocity of movement being a24mm per minute. The ciliary movement is independent of nerves but dependent on the presence of atmospheric O_2 in the respiratory tubes.



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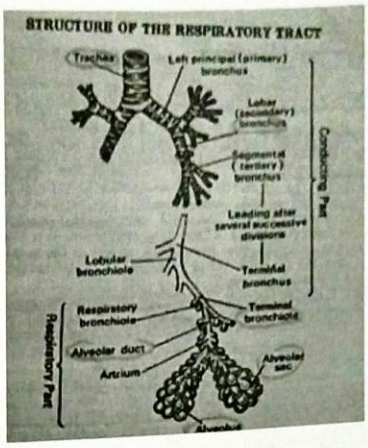

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DEPARTMENT OF BIOCHEMISTRY

UNIT TEST –I, AUGUST -2023

Class: III B.Sc., Biochemistry
Subject: Analytical Biochemistry
Subject Code: SB25C

Date: 09.08.2023
Time: 12.00pm to 1.00pm
Max. Mark: 25

Section A (5 x 2 =10)

Answer any **FIVE** questions.

CO 1 BL1 1.Define Buffer. Mention the various buffers of blood.

CO 1 BL1 2. Write about isotonic solution.

CO 1 BL1 3. What is Normality?

CO 1 BL1 4. What is the pH of blood and urine for a normal individual?

CO 3 BL1 5. Define Electrophoresis.

CO 3 BL1 6. Name the factors that affect the rate of migration of electrophoresis?

CO 3 BL1 7. State 2D PAGE?

Section B (1 x 5 = 5)

Answer any **ONE** question.

CO 1 BL 2 8. Explain the determination of PH using a glass electrode.

CO 3 BL 2 9. Describe an account on moving boundary electrophoresis.

Section C (1 x 10 = 10)

Answer any **ONE** question.

CO1 BL 4 10. Derive Henderson Hasselbalch equation. Add a note on its importance

CO 3 BL 2 11. Discuss the procedure and applications of agarose gel electrophoresis.

04/08/23

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Answer key

Section A (5 x 2 =10)

Answer any **FIVE** questions.

1. **Define Buffer. Mention the various buffers of blood.**

A buffer is an aqueous solution that resists changes in pH upon the addition of an acid or a base. Bicarbonate buffer system, phosphate buffer system and protein buffer system.

2. **Write about isotonic solution.**

Isotonic solutions are solutions having equal osmotic pressures

3. **What is Normality?**

Normality is described as the number of gram or mole equivalents of solute present in one litre of a solution.

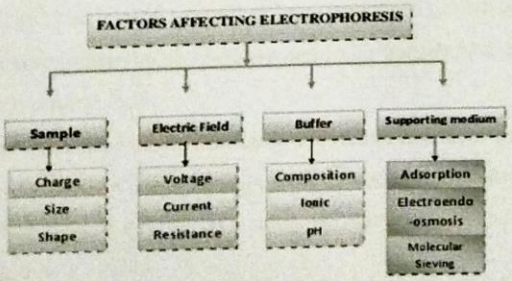
4. **What is the pH of blood and urine for a normal individual?**

Depending on the person's acid-base status, the pH of urine may range from 4.5 to 8 and blood pH between 7.35 and 7.45.

5. **Define Electrophoresis.**

Electrophoresis is a laboratory technique used to separate DNA, RNA or protein molecules based on their size and electrical charge. An electric current is used to move the molecules through a gel or other matrix. Pores in the gel or matrix work like a sieve, allowing smaller molecules to move faster than larger molecules.

6. **Name the factors that affect the rate of migration of electrophoresis?**



7. **State 2D PAGE.**

2D-PAGE. Two-dimensional gel electrophoresis or 2D-PAGE is the primary technique for proteomics work. It separates the complex mixture of samples using two different properties of the proteins. In the first dimension, proteins are separated by the pI value and in the second dimension by the relative molecular weight.

Section B (1 x 5 = 5)

Answer any **ONE** question.

8. **Explain the determination of PH using a glass electrode.**

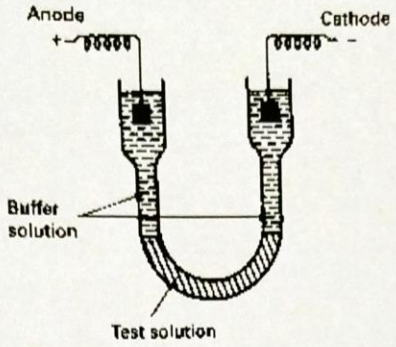
Glass electrode is a type of ion selective electrode used mainly for the measurement of the pH of a solution. It consists of two reference electrodes. When both electrodes are dipped into a sample, the resulting electro motive force (e.m.f) give the pH of the solution.

9. **Describe an account on moving boundary electrophoresis.**

TISELIUS MOVING BOUNDARY ELECTROPHORESIS

Moving boundary electrophoresis is the technique of separation of chemical compounds by electrophoresis in a free solution. Moving boundary electrophoresis was developed by Arne Tiselius in 1930. The moving boundary method was the first used by Tiselius to demonstrate the efficacy of the electrophoretic process. The principle of moving boundary electrophoresis is that there is motion of a charged particle through stationary liquid under the influence of an electric field.

- This method allows the charged species to migrate in a free moving solution in the absence of a supporting medium.
- Samples are fractionated in a U shaped tube that has been filled with an unstabilized buffer.
- An electric field is applied by means of electrodes at the end of the U tube.
- Separation takes place as a result of differences in mobilities.



Section C (1 x 10 = 10)

Answer any **ONE** question.

10. **Derive Henderson Hasselbalch equation. Add a note on its importance.**

The Henderson-Hasselbalch equation is an essential tool for understanding and calculating the pH of solutions containing weak acids and bases, determining the isoelectric point of amino acids, and understanding titration curves.

11. **Discuss the procedure and applications of agarose gel electrophoresis.**

• Agarose gel electrophoresis is a technique that involves the separation of nucleic acids or proteins in a gel matrix made of agarose.

• The matrix is placed in an electric field, and the charged molecules migrate through the matrix based on their size, shape, and charge.

Smaller molecules migrate faster than larger ones, leading to the separation of the sample into distinct bands that can be visualized and analysed.

Principle:

• The principle of agarose gel electrophoresis is based on the fact that DNA, RNA, and proteins are negatively charged molecules that can be separated based on their size and charge by applying an electric field.

• The gel matrix used in agarose gel electrophoresis is made of agarose, a polysaccharide extracted from seaweed that forms a porous structure when mixed with water.

• The agarose gel acts as a sieve, allowing smaller molecules to pass through more easily than larger ones.

The electric field is applied by placing the gel in a buffer solution and applying an electrical current across the gel using two electrodes

The DNA, RNA, or protein sample is mixed with a loading buffer, which contains a tracking dye that allows the progress of the electrophoresis to be monitored.

• The sample is loaded onto the gel, and the electric current is turned on. The negatively charged molecules in the sample migrate through the gel towards the positively charged electrode.

• The smaller molecules migrate more quickly through the gel and reach the end of the gel first, while the larger molecules take longer to migrate and form distinct bands on the gel.

• The bands can be visualized using a staining agent, such as ethidium bromide, which binds to the nucleic acid molecules and fluoresces under UV light.

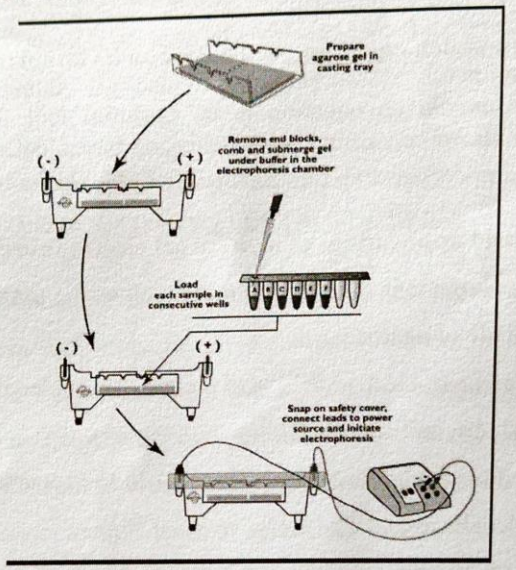


Figure: Agarose Gel Electrophoresis Protocols

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DEPARTMENT OF BIOCHEMISTRY

UNIT TEST –I, AUGUST -2023

Class: II M.Sc., Biochemistry
Subject: Clinical Biochemistry - I
Subject Code: -

Date: 07.08.2023
Time: 12.00pm to 1.00pm
Max. Mark: 25

Section A (5 x 1 =5)

Answer any **FIVE** questions.

CO 1 BL2 1. Discuss about the collection of plasma from blood samples.

CO 1 BL1 2. List the sources of error while analyzing samples.

CO 1 BL 6 3. Write any 2 disinfectants.

CO 2 BL 6 4. Write the normal level of calcium in blood.

CO 2 BL1 5. Define diabetes. List out the different types.

CO 2 BL1 6. Quote diabetes-related neuropathy.

CO 2 BL1 7. Define diabetes-related retinopathy.

Section B (2 x 5 = 10)

Answer any **TWO** questions.

CO 1 BL 2 8. Describe the collection and preservation of urine samples.

CO 4 BL 6 9. Write briefly on the role of calcium in bone formation.

CO 2 BL 2 10. Enumerate the causes of diabetes. List out the symptoms of diabetes.

CO 2 BL 2 11. Summarize the diabetes-related nephropathy.List out the stages of diabetes-related nephropathy.

Section C (1 x 10 = 10)

Answer any **ONE** question.

CO 5 BL 5 12. Summarize the principles of quality management for a clinical biochemistry laboratory.

CO 2 BL 4 13. Explain in detail about the diagnosis method for diabetes. Illustrate management and treatment for diabetes.

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Answer key

Section A (5 x 1 =5)

Answer any **FIVE** questions.

1. **Discuss about the collection of plasma from blood samples.**

Plasma is collected from blood samples through a process called centrifugation. After obtaining a blood sample from a donor, an anticoagulant like EDTA, heparin, etc., is added to prevent clotting. The sample is then placed in a centrifuge, where it is spun at high speeds. This centrifugal force separates the blood into its components: plasma, red blood cells, white blood cells, and platelets. The plasma, which is the liquid portion of the blood, rises to the top of the tube, and it can be carefully extracted for various medical purposes, such as transfusions, diagnostic tests, or the production of plasma-derived products.

2. **List the sources of error while analyzing samples.**

Human Error: Mistakes during sample handling, labeling, and data recording. Contamination: External substances or cross-sample contamination. Equipment Malfunction: Faulty or uncalibrated instruments. Sampling Errors: Non-representative or mishandled samples. Matrix Effects: Interference from sample matrix components. Methodology Errors: Inappropriate or outdated analytical methods. Endogenous Interference: Presence of natural substances affecting analysis. Temperature and Environmental Factors: Impact on sample stability. Storage and Transportation: Improper handling leading to sample degradation. Sample Size: Insufficient or excessive volumes affecting concentration. Batch Variability: Inconsistent reagents or materials between batches. Data Entry Errors: Mistakes during data recording or transcription.

3. **Write any 2 disinfectants.**

Chlorine-based disinfectants: Chlorine-based disinfectants, such as bleach (sodium hypochlorite) and chloramine, are effective in killing a broad spectrum of microorganisms. They are widely used for disinfecting surfaces, water, and medical

equipment. Isopropyl Alcohol (Rubbing Alcohol): Isopropyl alcohol is a common disinfectant used for sanitizing skin and surfaces. It is effective against many bacteria and viruses when used in the appropriate concentration (usually 70% isopropyl alcohol).

4. **Write the normal level of calcium in blood.**

The normal level of calcium in the blood, which is often referred to as "serum calcium," typically ranges from 8.5 to 10.5 milligrams per deciliter (mg/dL) or 2.2 to 2.7 millimoles per liter (mmol/L). It's essential for various bodily functions, including bone health, muscle function, nerve transmission, and blood clotting. Both low (hypocalcemia) and high (hypercalcemia) levels of calcium can have significant health implications.

5. **Define diabetes. List out the different types.**

Diabetes is a condition that happens when your blood sugar (glucose) is too high. It develops when your pancreas doesn't make enough insulin or any at all, or when your body isn't responding to the effects of insulin properly. There are several forms of diabetes. The most common forms include Type 2, Prediabetes, Type 1 diabetes, and Gestational diabetes.

6. **Quote diabetes-related neuropathy.**

Diabetes-related neuropathy is a type of nerve damage that affects people with elevated blood sugar for a long period. The most common diabetes-related neuropathy affects the legs and feet. There is no cure for diabetes-related neuropathy.

7. **Define diabetes-related retinopathy.**

Diabetes retinopathy is an eye condition that weakens the blood vessels of retina. This condition can happen to anyone with diabetes. Without treatment, diabetes-related retinopathy can lead to vision loss or blindness. But with the right care, can prevent vision loss and stop the progression of this disease.

Section B (2 x 5 = 10)

Answer any **TWO** questions.

8. **Describe the collection and preservation of urine samples.**

Preparing for Collection (1M)

Midstream Clean-Catch Method (1M)

24-Hour Urine Collection (1M)

Special Instructions (1M)

Transporting the Sample (1M)

9. **Write briefly on the role of calcium in bone formation.**

Essential Structural Component (1M)

Bone Mineralization (1M)

Osteoblastic Activity (1M)

Bone Remodeling (1M)

Calcium Homeostasis (1M)

10. **Enumerate the causes of diabetes. List out the symptoms of diabetes.**

Insulin resistance, Autoimmune disease, Hormonal imbalance, Pancreatic damage and Genetic mutations.

Symptoms of diabetes include: Increased thirst (polydipsia) and dry mouth. Frequent urination, Fatigue, Blurred vision, Unexplained weight loss., Numbness or tingling in your hands or feet, Slow-healing sores or cuts and Frequent skin infections.

11. **Summarize the diabetes-related nephropathy.List out the stages of diabetes-related nephropathy.**

Long standing diabetes causes diabetes-related nephropathy, it is a progressive disease that affects the kidneys. Another name for diabetes-related nephropathy is diabetes-related kidney disease (DKD). Symptoms may not appear in later stages, but may include bloating, frequent urination, foamy urine, nausea and fatigue. Treatment includes managing diabetes and blood pressure.**Stage I:** GFR is 90 or higher. At this stage, the kidneys have mild damage but still have normal function.**Stage II**: GFR may be as low as 60 or as high as 89. At this stage, the kidney has more damage, but they still

function well.**Stage III**: GFR may be as low as 30 or as high as 59. At this stage the kidney has mild or severe loss of its function.**Stage IV:** GFR may be as low as 15 or as high as 29. At this stage the kidney has severe loss of its function.**Stage V:** GFR is below 15. At this stage the kidneys are nearing or at complete failure.

Section C (1 x 10 = 10)

Answer any **ONE** question.

12. **Summarize the principles of quality management for a clinical biochemistry laboratory.**

Standardization and Calibration (2M)

Competency and Training (2M)

Quality control (2M)

Standard Operating Procedures (SOPs) (2M)

Data Security and Confidentiality (2M)

13. **Explain in detail about the diagnosis method for diabetes. Illustrate management and treatment for diabetes.**

Diagnosis: Checking your glucose level in a blood test, Fasting blood glucose test, Random blood glucose test, Glycated hemoglobin test, Screen for and diagnose gestational diabetes, providers order an oral glucose tolerance test.

Management and treatment: Blood sugar monitoring, Oral diabetes, Medications Insulin, Diet, and Exercise.

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function well.**Stage III**: GFR may be as low as 30 or as high as 59. At this stage the kidney has mild or severe loss of its function.**Stage IV:** GFR may be as low as 15 or as high as 29. At this stage the kidney has severe loss of its function.**Stage V:** GFR is below 15. At this stage the kidneys are nearing or at complete failure.

Section C (1 x 10 = 10)

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Diagnosis: Checking your glucose level in a blood test, Fasting blood glucose test, Random blood glucose test, Glycated hemoglobin test, Screen for and diagnose gestational diabetes, providers order an oral glucose tolerance test.

Management and treatment: Blood sugar monitoring, Oral diabetes, Medications Insulin, Diet, and Exercise.

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DEPARTMENT OF BIOCHEMISTRY

UNIT TEST –I, AUGUST -2023

Class: II M.Sc., Biochemistry
Subject: Molecular Biology
Subject Code:

Date: 08.08.2023
Time: 12.00pm to 1.00pm
Max. Mark: 25

Section A (5 x 1 =5)

Answer any **FIVE** questions.

CO 2 BL 1 1. Identify the sequence of RNA transcript derived from DNA antisense strand:
3'-GACTTACAGTC-5'

CO 2 BL 6 2. Write notes on the Pribnow box.

CO 2 BL 1 3. List START and STOP codons.

CO 1 BL1 4. Define dominant and recessive alleles

CO 1 BL1 5. Define Inheritance.

CO 2 BL2 6. Explain the incomplete Dominance

CO 1 BL1 7. Define Codominance

Section B (2 x 5 = 10)

Answer any **TWO** questions.

CO 2 BL 2 8. Explain the features of genetic code.

CO 5 BL 6 9. Write the inhibitors of protein synthesis.

CO 1 BL 2 10. Explain in detail about Mendel laws of inheritance.

CO 1 BL 2 11. Explain about Monohybrid cross and Test cross with respect to height of a plant

Section C (1 x 10 = 10)

Answer any **ONE** question.

CO 2 BL 5 12. Summarize the important events in the process of transcription.

CO 1 BL 6 13. Write in detail about Dihybrid Cross or law of independent assortment

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Answer key

Section A (5 x 1 =5)

Answer any **FIVE** questions.

1. **Identify the sequence of RNA transcript derived from DNA antisense strand:**

   3'-GACTTACAGTC-5'

   Antisense Strand (Template Strand): The antisense strand is complementary to the sense strand and serves as the template during transcription. The RNA polymerase reads the antisense strand and synthesizes an RNA molecule with a sequence complementary to the antisense strand and identical to the sense strand (except with uracil in place of thymine).

   5'- CUGAAUGUCAG-3'

2. **Write notes on the Pribnow box.**

   Promoter Recognition:

   The Pribnow box is a short DNA sequence located around 10 base pairs upstream of the transcription start site in bacterial genes. It plays a crucial role in promoting the binding of RNA polymerase to the promoter region during the initiation of transcription.

   Transcription Initiation:

   When RNA polymerase recognizes the Pribnow box, it positions itself correctly for transcription initiation. This interaction facilitates the beginning of mRNA synthesis from the DNA template, making the Pribnow box a key element in bacterial gene expression.

3. **List START and STOP codons.**

   The START codon is a specific nucleotide sequence in mRNA that signals the beginning of protein synthesis during translation. In most cases, the START codon is represented by the triplet AUG (adenine-uracil-guanine), which codes for the amino acid methionine. The presence of the START codon instructs the ribosome to initiate translation and begin building the polypeptide chain.

   The STOP codon is a particular nucleotide sequence in mRNA that marks the end of protein synthesis during translation. There are three STOP codons in the genetic code: UAA,

UAG, and UGA. These codons do not code for any amino acids but instead signal the ribosome to terminate translation and release the newly synthesized polypeptide chain. The presence of a STOP codon ensures that the polypeptide is correctly formed, and the protein synthesis process concludes.

4. Define dominant and recessive alleles

The most common interaction between alleles is a dominant/recessive relationship. An allele of a gene is said to be dominant when it effectively overrules the other (recessive) allele. Eye colour and blood groups are both examples of dominant/recessive gene relationships.

Eye colour

The allele for brown eyes (B) is dominant over the allele for blue eyes (b). So, if you have one allele for brown eyes and one allele for blue eyes (Bb), your eyes will be brown. (This is also the case if you have two alleles for brown eyes, BB.) However, if both alleles are for the recessive trait (in this case, blue eyes, bb) you will inherit blue eyes.

5. **Define Inheritance.**

Inheritance is defined as transfer of parental character or disease from one generation to another is called as inheritance. It is purely depend upon genetic transfer. (DNA dependent)

6. **Explain the incomplete Dominance.**

Incomplete dominance is a form of Gene interaction in which both alleles of a gene at a locus are partially expressed, often resulting in an intermediate or different phenotype. It is also known as partial dominance.

7. **Define Codominance**

Codominance, as it relates to genetics, refers to a type of inheritance in which two versions (alleles) of the same gene are expressed separately to yield different traits in an individual.

Section B (2 x 5 = 10)

Answer any **TWO** questions.

8. **Explain the features of genetic code.**

Features of genetic code (2M)

Example (1M)

Explanation (2M)

9. **Write the inhibitors of protein synthesis.**

Mechanism of action of inhibitors (2M)

Example of inhibitors (2M)

Diagram (1M)

10. **Explain in detail about Mendel laws of inheritance.**

Introduction (2M)

Laws (2M)

Explanation (2M)

11. **Explain about Monohybrid cross and Test cross with respect to height of a plant.**

Introduction (1M)

Monohybrid Cross (2M)

Test Cross (2M)

Section C (1 x 10 = 10)

Answer any **ONE** question.

12. **Summarize the important events in the process of transcription.**

RNA Polymerase (2M)

Initiation (2M)

Elongation (2M)

Termination (2M)

Diagram (2M)

13. **Write in detail about Dihybrid Cross or law of independent assortment**

Introduction	(2M)
Punnet Square	(5M)
Explanation	(3M)

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DEPARTMENT OF BIOCHEMISTRY

UNIT TEST –I, AUGUST -2023

Class: II M.Sc., Biochemistry
Subject: Applied Biotechnology
Subject Code:

Date: 09.08.2023
Time: 12.00pm to 1.00pm
Max. Mark: 25

Section A (5 x 1 =5)

Answer any **FIVE** questions.

CO 1 BL1	1. Define Adaptor DNA
CO 1 BL1	2. Define Linker DNA
CO 3 BL1	3. List out the different methods for transferring rDNA into host cells.
CO 5 BL1	4. Quote the restriction cutting with suitable examples.
CO 1 BL1	5. Enumerate Homopolymer tail.
CO 3 BL2	6. Explain the term IPR.
CO 3 BL1	7. List out the types of IPR.

Section B (2 x 5 = 10)

Answer any **TWO** questions.

CO 5 BL6	8. Write short notes on restriction endonuclease. Illustrate the different types.
CO 2 BL5	9. Enumerate the mechanism of DNA Ligase.
CO 2 BL 4	10. Summarize the applications of recombinant DNA technologies.
CO 5 BL 6	11. Compile the scope of biotechnology.

Section C (1 x 10 = 10)

Answer any **ONE** question.

CO 2 BL4	12.Explain in detail about recombinant DNA technologies.
CO 3 BL5	13.Summarize in detail about the IPR.

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Answer key

Section A (5 x 1 =5)

Answer any **FIVE** questions.

1. Define Adaptor DNA.

Adaptor is a short, chemically synthesized, double stranded DNA molecule which is used to link the ends or two other DNA molecules. The adaptor molecule has one blunt end bearing 5' phosphate group and a cohesive end which is not phosphorylated.

2. Define Linker DNA

Linker DNA is a synthetic, short and known double stranded, oligonucleotides sequence. Having blunted ends on both sides and restriction sites. E.coli DNA ligase will not catalyze blunt end ligation except under special conditions. Linker can be ligated to both ends of the foreign DNA.

3. List out the different methods for transferring rDNA into host cells.

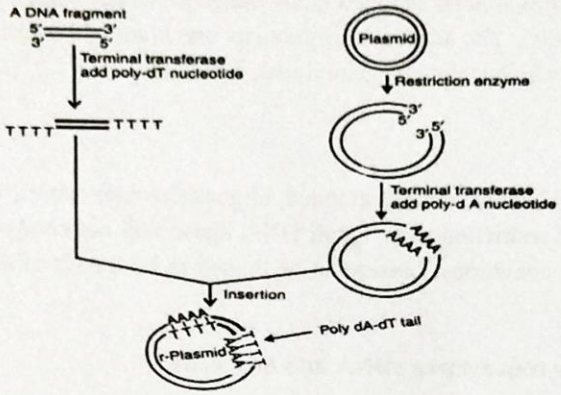
Under natural conditions, the host *E.coli* cells are unable to up-take the chimeric plasmid or recombinant DNA, thus bacterial cells require some special type of treatment namely. Transformation (Treatment of cells with CaCl2 makes pores in the cell membrane thereby accepting foreign DNA). Electroporation (Application of electric charge or low voltage current). Protoplast fusion (Yeast, plants and algal cells).Microinjection (using micro needle, microscope).Gene gun methods (using microscope).

4. Quote the restriction cutting with suitable examples.

Escherichia coli	*ECoR1*	Stagged cutting	G|AATTC CTTAA|G
Haemophilus infuenzse	Hpa I / Hind II	Stagged cutting	A|AGCTT TTCGA|A
Haemophilus para influensa	Hpa I	Blend cutting	GTT|AAC CAA|TTG
Haemophilus aegyptus	Hae II	Blend cutting	GG|CC CC|GG
Bacillus amyloliquefaciens	BamH I	Blend cutting	G|GATCC C|CTAGG
Klebsiella pneumoniae	KpnII	Blend cutting	GGTAC|C CCATG|G

5. Enumerate Homopolymer tail.

Methods for joining DNA molecules make use of the annealing of complementary homopolymer sequences. Addition of oligo (dA) sequences to the 3' ends of one DNA molecule and oligo (dT) blocks to the 3' end of another population. The enzyme terminal deoxynucleotidyl transferase will catalyze the addition of a string of nucleotides to the 3' end of a DNA fragment. One can add a string of G's to the 3' ends of the other fragment.



6. Explain the term IPR

Intellectual property rights (IPR) refers to the legal rights given to the inventor or creator to protect his invention or creation for a certain period of time.[1] These legal rights confer an exclusive right to the inventor/creator or his assignee to fully utilize his invention/creation for a given period of time.

7. List out the types of IPR.

There are four main types of intellectual property rights, including patents, trademarks, copyrights and trade secrets.

Section B (2 x 5 = 10)

Answer any **TWO** questions.

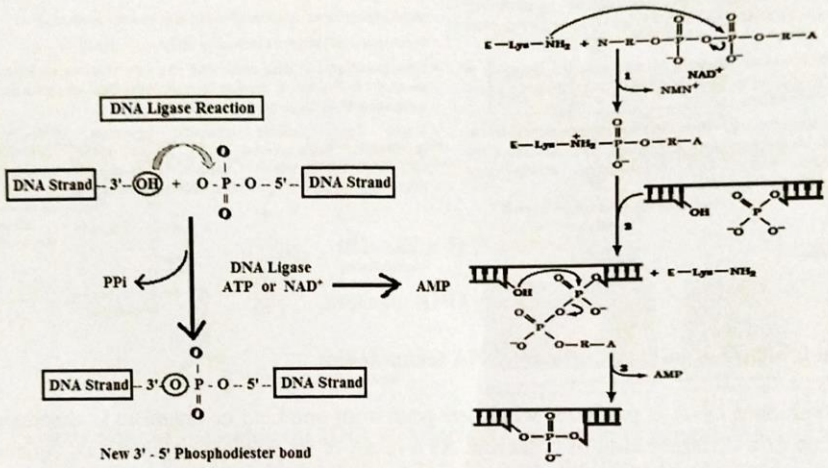
8. Write short notes on restriction endonuclease.

It is an endonuclease that cuts the DNA molecule at a limited number of specific nucleotide sequences at specific points. Hence it is also called molecular scissors. It was named by Leaderberg and Meselsons in 1964, after various studies of bacterial phage plating

on different strains of *E.coli*.Classification based on methylation, cleavage site, structure of protein and recognition of nucleotides sequence. There are 3 types of restriction endonuclease enzyme namely type I, type II and type II.

9. Enumerate the mechanism of DNA Ligase.

In molecular biology DNA ligase catalyzes the formation of phosphodiester bond between 3' hydroxyl ends of one nucleotide (acceptor) of one strand of DNA or RNA with the 5'phosphate end of another (donor) strand of DNA or RNA.



ATP is required for the ligase reaction, which proceeds in three steps: 1.Adenylyl group of NAD is transferred to the ε-amino group of an enzyme Lys residue to form an unusual phosphoamide that is readily isolated. 2.Adenylyl group of this activated enzyme is transferred to the 5'-phosphoryl terminus of the nick to form an adenylylated DNA. Here, AMP is linked to the 5'-nucleotide via a pyrophosphate rather than the usual phosphodiester bond. 3.DNA ligase catalyzes the formation of a phosphodiester bond by attack of the 3'-OH on the 5'-phosphoryl group, thereby sealing the nick and releasing AMP.

10. Summarize the applications of recombinant DNA technologies.

Applications: rDNA technology can be used for DNA fingerprinting and identification victim and forensic science analysis. Genomics map the human genome through the Human Genome Project. Diagnose genetic disease. **Enzyme**: Amylase, protease, glucose isomerase. **Amino acids**: Lysine, glutamic acids. **Organic acids:** Citric acid, lactic acid. **Human proteins:** Hormones and enzymes such as Insulin, hGH, INFα, INFβ and INFγ. **Vitamins:** Carotene, Riboflavin, Vitamin C and B_{12}. Single cell protein.

Diagnostic Tests, Nanotechnology, Gene silencing (RNA interference - siRNA or microRNA), Gene therapy, Pharmacogenomics, Antibiotic or Vaccines production, Agricultural field (resistance to herbicide , Nif gene transfer, Improvement in photosynthesis efficiency in C_3 and C_4 plants, Golden Rice, Weed killer resistant crops, Vitamin A in Rice etc.,

11. Compile the scope of biotechnology.

- ✓The origin of biotechnology is as old as human civilization. As a science it is little more than 100 years old.
- ✓Fermentation is the oldest biotechnological process discovered by the people by prolonged soaking of grains or by sorting juices of fruits or palms.
- ✓Other early processes practiced by man included leavening of bread, production of alcoholic beverages, production of vinegar, production of curd, etc.
- ✓Nowadays biotechnology has achieved greatest advancement in the filed of Recombinant DNA technology, PCR, Cell-culture and fusion, gene cloning, DNA fingerprinting, environmental engineering, Immunology etc.

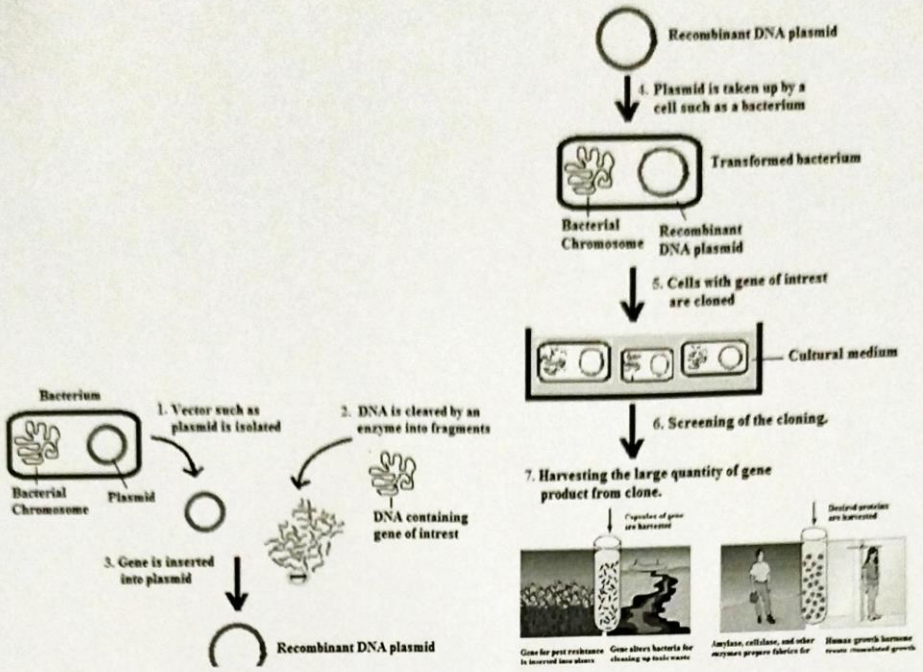
- Production of wide range of food products, fertilisers, pesticides and beverages.
- Waste treatment, bioremediation and energy production.
- Production of reagents including enzymes, DNA/RNA, etc.
- Biotechnology has also enhanced the sale of many biological products in the world market by improving their varieties and increasing their large scale production.
- These items include alcoholic beverage, antibiotics (penicillins, tetracyclines etc.), amino acids, enzymes, vaccines, steroids, vitamins, insulin, human growth hormones, microbial pesticides, citric acid, improved variety seeds, etc.

Section C (1 x 10 = 10)

Answer any **ONE** question.

12. Explain in detail about recombinant DNA technologies.

Recombinant DNA is produced when one gene from one kind or organism is introduced into a gene of a different kind of organism. As a result of recombination, the DNA contains information from 2 different species of organisms. If these genes integrate permanently into the egg or sperm cells, such that it can be transferred to offspring, the resulting organism is called transgenic or recombinant. These processes were 1st carried out in 1972 by Paul Berg and A.D Kaiser who inserted other prokaryotic DNA into bacterial cells. S.N Cohen and Herbert Bayer who inserted eukaryotic DNA into bacterial cells.



Various steps of recombinant DNA technology: 1.Selection of gene (DNA) of interest and its isolation. 2.Selection of suitable vectors to carry the gene of interest. 3.Selection of suitable restriction endonuclease enzymes. 4.Insertion of foreign gene into plasmid and ligation. 5.Introduction of recombinant DNA into a suitable host cell. Screening of host cells for identification of recombinant DNA

13. Summarize in detail about the IPR.

Intellectual property rights are the rights given to persons over the creations of their minds. They usually give the creator an exclusive right over the use of his/her creation for a certain period of time.There are five main types of intellectual property rights, including

a. Patents
b. Trademarks
c. Copyrights
d. Trade secrets
e. Geographical Indication

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DEPARTMENT OF BIOCHEMISTRY

UNIT TEST –I, AUGUST -2023

Class: II M.Sc., Biochemistry
Subject: Disease and Prevention
Subject Code:

Date: 11.08.2023
Time: 12.00pm to 1.00pm
Max. Mark: 25

Section A (5 x 1 =5)

Answer any **FIVE** questions.

CO 1 BL1 1. State Obesity.

CO 3 BL1 2. Tell about the type of cancer.

CO 3 BL1 3. Name any two treatments of cancer.

CO 3 BL1 4. State Breast cancer.

CO 3 BL1 5. Define cancer

CO 3 BL1 6. Name any two diagnostics methods of cancer.

CO 3 BL1 7. Define chemotherapy.

Section B (2 x 5 = 10)

Answer any **TWO** questions.

CO 1 BL 2 8. Explain briefly obesity.

CO 3 BL 2 9. Interpret chemotherapy for lung cancer.

CO 3 BL 2 10. Discuss cervical cancer.

CO 3 BL 2 11. Explain about endocrine therapies for cancer.

Section C (1 x 10 = 10)

Answer any **ONE** question.

CO 1 BL 2 12. Describe Type II Diabetes Mellitus.

CO 3 BL 2 13. Discuss about cigarette smoking and symptoms, diagnostics and treatment.

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Answer key

Section A (5 x 1 =5)

Answer any **FIVE** questions.

1. **State Obesity.**

Overweight and obesity are defined as abnormal or excessive fat accumulation that may impair health.

Body mass index (BMI) is a simple index of weight-for-height that is commonly used to classify overweight and obesity in adults. It is defined as a person's weight in kilograms divided by the square of his height in meters (kg/m^2).

2. Tell about the type of cancer.

Types of cancer

Carcinoma is a cancer that starts in the skin or the tissues that line other organs. Sarcoma is a cancer of connective tissues such as bones, muscles, cartilage, and blood vessels. Leukemia is a cancer of the bone marrow, which creates blood cells. Lymphoma and myeloma are cancers of the immune system.

3. Name any two treatments of cancer.

Common Types of Cancer Treatment

- Surgery: An operation where doctors cut out tissue with cancer cells.
- Chemotherapy: Special medicines that shrink or kill cancer cells that we cannot see.
- Radiation therapy: Using high-energy rays (similar to X-rays) to kill cancer cells.

4. State Breast cancer.

Signs of breast cancer can include feeling a lump in your breast, experiencing a change in the size of your breast and seeing changes to the skin on your breasts. Mammograms can help with early detection.

5. Define cancer

Cancer is a disease caused when cells divide uncontrollably and spread into surrounding tissues. Cancer is caused by changes to DNA. Most cancer-causing DNA changes occur in sections of DNA called genes.

6. Name any two diagnostics methods of cancer.

Diagnosing cancer at its earliest stages often provides the best chance for a cure. With this in mind, talk with your doctor about what types of cancer screening may be appropriate for you.

For a few cancers, studies show that screening tests can save lives by diagnosing cancer early. For other cancers, screening tests are recommended only for people with increased risk.

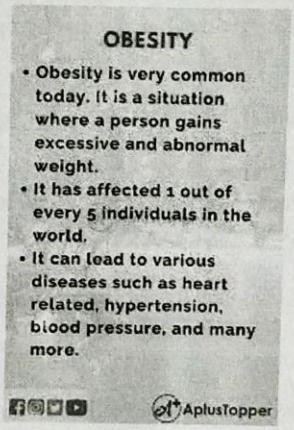
7. Define chemotherapy.

Chemotherapy is a cancer treatment where medicine is used to kill cancer cells. There are many different types of chemotherapy medicine, but they all work in a similar way. They stop cancer cells reproducing, which prevents them from growing and spreading in the body.

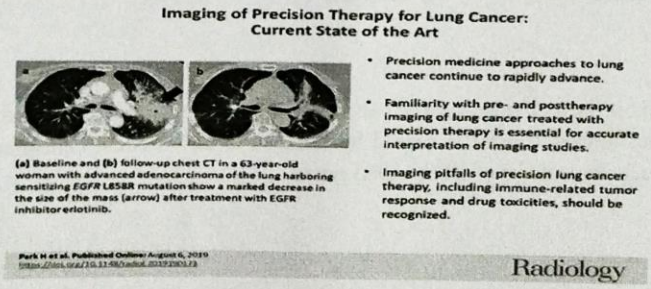
Section B (2 x 5 = 10)

Answer any **TWO** questions.

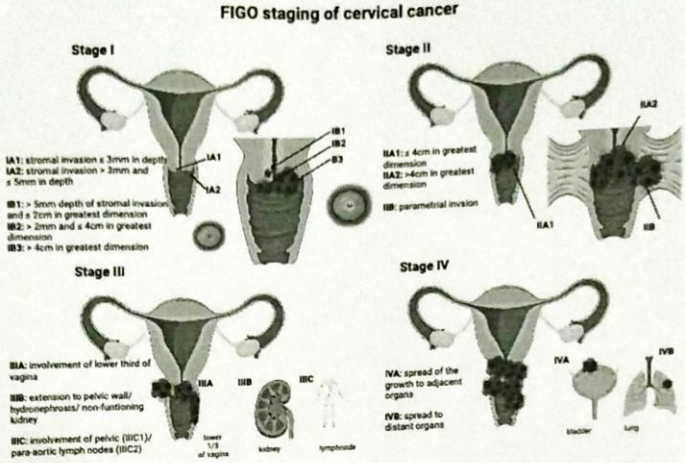
8. **Explain briefly obesity.**



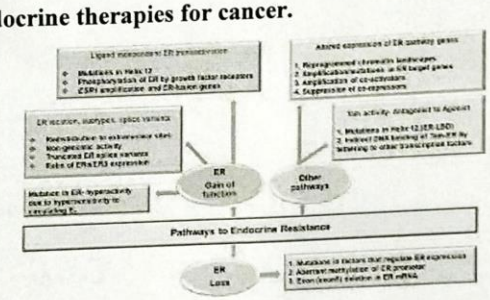
9. Interpret chemotherapy for lung cancer.



10. Discuss cervical cancer.



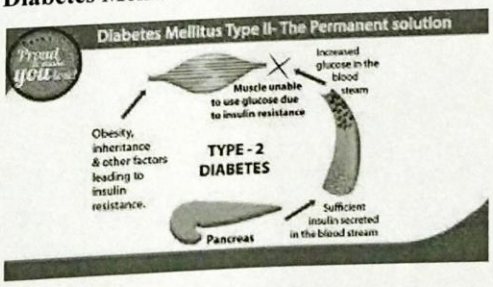
11. Explain about endocrine therapies for cancer.



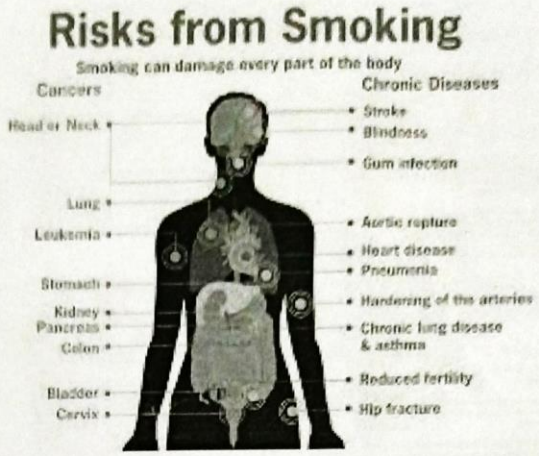
Section C (1 x 10 = 10)

Answer any **ONE** question.

12. **Describe Type II Diabetes Mellitus.**



13. Discuss about cigarette smoking and symptoms, diagnostics and treatment.



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SRM ARTS AND SCIENCE COLLEGE

DEPARTMENT of BIOCHEMISTRY

Question & Answer Key

2022-2023

Odd Semester

ANSWER KEY

PART A

1. **Define DNA sequence analysing.**
   - DNA Sequencing. Analyze the entire genome, focus on regions of interest with whole-exome and targeted sequencing, or study DNA-protein interactions.
   - Long-read sequencing methods
     - Single molecule real time (SMRT) sequencing.
     - Nanopore DNA sequencing.
     - Massively parallel signature sequencing (MPSS)
     - Polony sequencing.
     - 454 pyrosequencing.
     - Illumina (Solexa) sequencing.
     - Combinatorial probe anchor synthesis (cPAS)
     - SOLiD sequencing.
2. **Quote the applications of Proteomics.**
   - Protein sample identification/confirmation.
   - Protein sample purity determination.
   - Detection of post-translational modifications.
   - Detection of amino acids substitution.
   - Mass fingerprint identification of proteins.
   - Nutrition Research.
   - To identify unknown protein of interest.
   - Quantify protein and peptide.
   - Protein Biomarker.
3. **Write notes on Genomics.**
   - Study of entire or whole gene present in an organism. Study of a complete set of genes and other genetic materials in an organism.
   - All the genomic information stored in the species and very - very compact. Studying whole genomes (set of DNA) of species.
   - Genomics is an area within genetics that concerns the sequencing and analysis of an organism's genome.
   - It involves the study of all genes at the DNA, mRNA, and proteome level as well as the cellular or tissue level.
   - It can be defined as *A discipline in genetics that applies recombinant DNA. DNA sequencing methods and bioinformatics to sequence assemble and analyze the structure and function of genomes.*
   - It includes studies of intragenomic phenomena such as heterosis, epistasis, pleiotropy and other interactions between loci and alleles with in the genomes.
   - 46 chromosomes [22 pairs of autosomes and 1 pair of sex chromosome (XX female or XY male)]. Example 3.2 billion base pairs in humans (A, G, C, and T are mix together).
4. **Interpret the techniques for separation and identification of proteins.**
   - Sample collection, handling, and storage.
   - Separation of individual proteins by 2-D electrophoresis.
   - Protein characterization.
   - Identification by mass spectrometry or other methods.
   - Storage, manipulation, and comparison of the data using bioinformatics.
5. **Write about SV40.**

SRM ARTS AND SCIENCE COLLEGE, KATTANKULATHUR

DEPARTMENT OF BIOCHEMISTRY

UNIT TEST II, OCTOBER 2022

Class: I M.Sc., Biochemistry

Subject: Biomolecules

Subject Code: MG21A

Date: 31.10.2022

Time: 12 to 1.00 PM

Max. Mark: 25

PART A – (5 X 1 = 5)

Answer any FIVE questions

CO.1 BL: 3 1. Illustrate mutarotation

CO.1 BL: 6 2. Write a note on anomers.

CO.6 BL: 6 3. Write the glycosidic linkage of starch

CO.1 BL: 2 4. Discuss about epimer?

CO.3 BL: 2 5. Describe the method to identify amino acids

CO.3 BL: 1 6. Define salting out precipitation?

CO.3 BL: 4 7. Explain whether glycine is an optical isomer. Give reason

PART B – (2X5= 10)

Answer any TWO questions

CO.1 BL: 4 8. Explain in detail about the classification of monosaccharides.

CO.6 BL: 5 9. Comment on the structure, biological importance, and type of glycosidic bond present in sucrose and lactose.

CO.3 BL: 4 10. Explain in detail about the physical properties of amino acids.

CO.3 BL: 5 11. Summarize the reactions of amino acids due to amino group and Carboxyl group

PART C – (1 X 10 = 10)

Answer any ONE question

CO.1 BL: 6 12. Write any five structures and functions of various homopolysaccharides?

CO.3 BL: 5 13. Discuss about the classified proteins.

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27/10/22

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UNIT TEST II, OCTOBER 2022

Class : I M.Sc., Biochemistry Time : 12 to 1.00 PM

Subject Name : Biomolecules Answer Key

PART A – (5 X 1 = 5)

Answer any FIVE questions

1. Illustrate mutarotation?

Mutarotation is a chemical phenomenon, commonly used in carbohydrate chemistry. Mutarotation was discovered by Dubrunfaut, a French chemist in 1844. He noticed that there was a change in the specific rotation of sugar, in an aqueous solution, with time. Based on the orientation of the sugar molecule D and L forms of the carbohydrates were determined.

2. Write a note on anomers.

Anomers are cyclic monosaccharides or glycosides that are epimers, differing from each other in the configuration of C-1 if they are aldoses or in the configuration at C-2 if they are ketoses. The epimeric carbon in anomers are known as anomeric carbon or anomeric center.

3. Write the glycosidic linkage of starch.

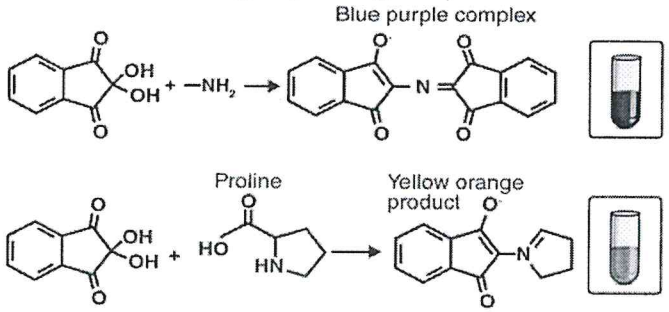
Starch has 2 forms such as amylose and amylopectin. Amylose has alpha 1-4 glycosidic linkage and it is linear thread like molecules. But in the case of amylopectin has alpha 1-6 glycosidic linkage, it is a branched polymer.

4. Discuss about epimer.

Two sugars differing in configuration at a single asymmetric carbon atom are known as epimers. Glucose and mannose are C2 epimers, Glucose and galactose are also C3 epimers. Changing the position of H and OH on the same carbon atom (epimeric) of one sugar gives rise to the other sugar.

5. Describe the method to identify amino acids.

The ninhydrin test is a chemical test which is used to identify amino acid .It gives purple colour with α-amino group and gives yellow colour with α-imino group.



6. Define salting out precipitation

- Salting-out is defined as the phenomenon when the solubility of a nonelectrolyte substance in water decreases with increasing salt concentration.

- Salting out is a purification technique that utilizes the reduced solubility of certain molecules in a solution of very high ionic strength.
- Salting out is typically used to precipitate large biomolecules, such as proteins or DNA.

7. Explain whether glycine is an optical isomer. Give reason

No, Glycine is not an optical isomer. Because it does not have asymmetric carbon atom. Molecule with asymmetric carbon atom only be an optical isomer and possess optical activity.

PART B – (5X2 = 10)

Answer any TWO question

8. Explain in detail about the classification of monosaccharides.

Monosaccharides (from Greek monos: single, sacchar: sugar), also called **simple sugars**, are the simplest forms of sugar and the most basic units (monomers) from which all carbohydrates are built.

They are usually colorless, water-soluble, and crystalline solids. Contrary to their name (sugars), only some monosaccharides have a sweet taste. Most monosaccharides have the formula $C_nH_{2n}O_n$ (though not all molecules with this formula are monosaccharides). Monosaccharides are also classified as aldoses or ketoses. Those monosaccharides that contain an aldehyde functional group are called aldoses; those containing a ketone functional group on the second carbon atom are ketoses. Combining these classification systems gives general names that indicate both the type of carbonyl group *and* the number of carbon atoms in a molecule. Thus, monosaccharides are described as aldotetroses, aldopentoses, ketopentoses, ketoheptoses, and so forth. Glucose and fructose are specific examples of an aldohexose and a ketohexose, respectively.

Classification of Monosaccharides

No. of Carbon	Type of sugar	Aldoses	Ketoses
3	TRIOSES	Glyceraldehydes	Dihydroxyacetone
4	TETROSES	Erythrose	Erythrulose
5	PENTOSES	Ribose, Xylose	Ribulose, xylulose
6	HEXOSES	Glucose, Galactose	Fructose
7	HEPTOSES	Glucoheptose	Sedoheptulose

9. Summarize the structure, biological importance, and type of glycosidic bond present in sucrose and lactose.

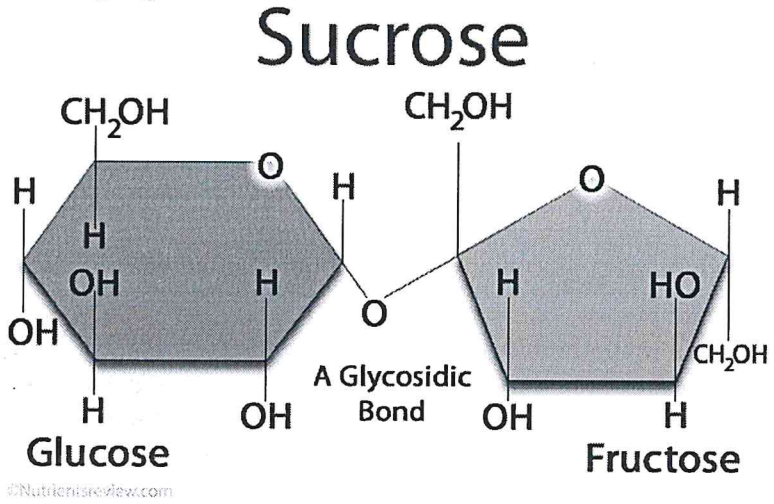
Sucrose is a molecule composed of two monosaccharides, namely glucose and fructose. This non-reducing disaccharide has a chemical formula of $C_{12}H_{22}O_{11}$.

Sucrose is ***commonly referred to as table sugar or cane sugar.***

In a $C_{12}H_{22}O_{11}$ molecule, the fructose and glucose molecules are connected via a glycosidic bond. This type of linking of two monosaccharides called glycosidic linkage. Sucrose has a monoclinic crystal structure and is quite soluble in water. It is characterized by its sweet taste.

William Miller, an English chemist, coined the word sucrose in the year 1857. It is widely used as a sweetener in food. $C_{12}H_{22}O_{11}$ can be obtained from sugar beets or sugar canes, but it must be refined to be fit for human consumption. Refined sucrose (or sugar) is a popular ingredient in many food recipes because of its sweet taste.

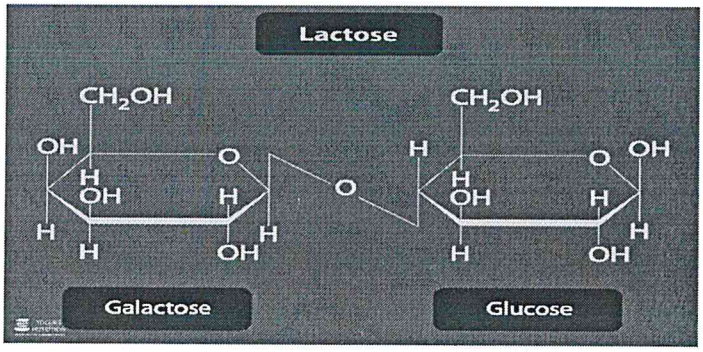
Sucrose is a disaccharide which is made up of two monosaccharides. The structure of a sucrose molecule is illustrated below. The glycosidic linkage that connects the two carbohydrate groups can be observed in the illustration provided above. There are no anomeric hydroxyl groups in a sucrose molecule. It can, therefore, be classified as a non-reducing sugar



α-1,β-2-glycosidic linkage

Lactose:

The lactose is a carbohydrate ("sugar") exclusively found in milk and dairy products. It is a disaccharide, composed of galactose and glucose.



β-1,4-glycosidic linkage

The lactose is the **main sugar of milk and dairy products**:

- Regular milk (sheep, cow or goat) contains almost 12g of lactose per 1 cup of 250ml
- Yogurt contains 5 g of lactose per 1 portion of yogurt (125g or 4,4oz)
- In cheeses, there are only traces of lactose.

Breast milk has the highest concentration of lactose (main carbohydrate of breast milk) and is essential for brain growth and development of all mammals.

This is why, from birth, the baby produces, a specific enzyme in the small intestine, the **lactase, which is able to digest the lactose** and split it into two molecules: the glucose and the galactose.
Glucose, which can be also found in many types of foods, is the main source of energy for the body.
Galactose, which is only available naturally, in the lactose, will be metabolized and be the component of several molecules, such as cerebrosides, gangliosides and mucoproteins, serving various biological functions (neurological, muscular or immunological, among others). The galactose will be also one of the component of the molecules that determine ABO blood types in blood cells

Lactose is an essential nutrient during childhood (that can be tolerated even during adulthood). Lactose is an essential carbohydrates during early childhood and it provides the main energy for child development during the first months of life.
Some elements of comparison:

- human milk contains 7.2% lactose (= 50% of the infant's energy requirements)
- cow's milk contains only 4.7% lactose (= 30% of the infant's energy requirements).

The lactase activity is therefore maximum at birth but it decreases over the years and notably, it decreases progressively after weaning to reach less than 10% of level before weaning.
This is a normal phenomenon, called lactase non-persistence. However, the level of decline may vary among individuals.

In some populations, the decline of the lactase activity is more pronounced. It is the case among people of Asian, African, South American, Southern European and Australian Aboriginal descent.

However, in some populations who consume regularly dairy products even during adulthood, the lactase activity remains. It is mostly the case in Northern Europe.

Note that due to lactase non-persistence, adults can have difficulties to digest milk beyond a certain amount (a bowl) but can continue to take milk in small amounts or included in recipes. On the other hand, cheeses and fermented milks (yogurts) are very well tolerated.
Summarize the structure, biological importance, and type of glycosidic bond present in sucrose and lactose.
10. Explain in detail about the physical properties of amino acids.

Physical Properties of Amino Acids

Solubility: Amino acids are most commonly soluble in water and insoluble in organic solvents.

Melting points: Most of the amino acids are generally melt at higher temperatures, often above 200°.

Taste: Gly, Ala, Val – sweet, Leu- tasteless, Arg lle- bitter.

In various food industries Monosodium glutamate (MSG) and azinomoto is used as flavoring agent and widely used in Chinese foods to increase taste and flavor.

Optical properties of amino acids

- All amino acids except glycine, the alpha carbon atom is bonded to four different groups (a carboxyl group, an amino group, an R group and a hydrogen atom). Thus, the alpha carbon atom is a chiral center.

- All amino acids, which have a chiral center, are optically active which means they rotate the plane polarized light. An optically active compounds can rotate the plane polarized light either to the right (clockwise) or to the left (anticlockwise).
- Compounds that rotate the plane polarized light in clockwise direction are termed as dextrorotatory and designated by plus sign (+), while the compounds that rotate the plane polarized light in anti or counterclockwise are termed as levorotatory and designated by minus sign (-).

Amino acids as ampholytes: The carboxyl and amino group of amino acids, along with ionizable R groups of some amino acids, are functions as weak acids and weak bases.

Zwitterion or dipolar ion: (German for "hybrid ion"), it is hybrid molecule contains both positive and negative ionic groups. When an amino acid lacking ionizable R group is dissolved in water at neutral pH, it can exist in solution as the dipolar ion, or zwitterion which can acts as either an acids or bases.

zwitterion

Substance having this dual acid-base nature are amphoteric and are often called ampholytes. It is most rare that amino acid are exists in neutral form with free amino groups and free carboxylic group. Each amino acid has a characteristics pH at which it carries both the charges and acts as a zwitterion.

11. Summarize the reactions of amino acids due to amino group and carboxyl group

Chemical properties of amino acids

The general reactions of amino acids are most commonly due to the presence of two functional group viz. amino and carboxyl group.

Reaction Due To -COOH Group (2.5 marks for explanation & 2.5 marks for reaction)

Amino acids commonly form esters (-COOR') with alcohols, and salts (-COONa) with bases.

Amnio acids produces amines through the process of decarboxylation.

The carboxyl group of dicarboxylic amino acids reacts with amnio acids reacts with ammonia to form amide.

Aspartic acid + NH_3 ——-> asparagine

Glutamic acid + NH_3 ——-> glutamine

Reaction Due To -NH_2 Group

Amino group behaves as bases and it reacts with acids and produces salts.

Reaction with Ninhydrin: The alpha amino acids react with ninhydrin and produces blue, pink or purple color complex.

Amino acid + Ninhydrin ——> keto acid + NH_3 + CO_2 + Hydrindantin.

Hydrindantin + NH_3+ Ninhydrin ——> Ruhemann's purple.

Color reactions with amino acids: They are generally identified by specific color reactions.

Transamination: One of the most important reaction in amino acids metabolism is transfer of amnio group from an amino acid to a keto acid to form a new amino acid.

Oxidative deamination: It liberates free ammonia by the process of oxidative deamination.

Peptide bond

The peptides and proteins are biologically occurring polypeptides that ranges from very small size to very large size, consisting of 2 or 3 to thousands of amino residues.

A substituted amide linkage, termed as peptide bond to yield a dipeptide, can covalently hold two amino acids together.

These peptide bonds are rather strong and generally serves as the cementing material between the individual amnio acids.

Formation of peptide bond

This type of bonds is formed when the amino group of one amino acid combines with the carboxyl group of another amino acid.
Such a linkages is formed by the removal; of elements of water or by dehydration from the alpha amino group of one amino acid and the alpha carboxyl group of another.
Formation of peptide bond is an example of condensation reaction, a common class of reactions in living cells.
Two amino acids can be joined by one peptide bond to form dipeptide.
Three amino acids can be joined by two peptide bonds to form a tripeptide; similarly, four amino acids can be joined by three peptide bonds to form tetrapeptide, five to form a pentapeptide, and so forth.
When few amino acids can be joined in this pattern, the structure is termed as oligopeptide while, many amino acids are joined, the product is called a polypeptide.

PART C – (1 X 10 = 10)

Answer any ONE question

12. Write any five structure and functions of various homopolysaccharides?

Polysaccharides (glycans) are long chains of monosaccharides. Each monosaccharide is connected together via glycosidic bonds to form the polymeric structure known as polysaccharide. Polysaccharides are the largest component of biomass. It is estimated that more than 90% of the carbohydrate mass in nature is in the form of polysaccharides.
Generalised functions of polysaccharides:

i) Polysaccharides plays vital role in energy storage and acts as cellular fuel source such as glycogen and starch.
ii) Polysaccharides help to maintain the structural integrity of the organisms such as cellulose helps to maintain structure in plants and chitin is chief component of animal exoskeleton.
iii) Polysaccharides are also present in extracellular space such as in animal tissue that helps in maintain shape, supports cells, tissue and organ.
iv) iv) Polysaccharides are an integral part of cell-to-cell communication and cellular recognition. There are two types of polysaccharides: Homopolysaccharides and heteropolysaccharides.

Some common homo polysaccharides are:
- Starch (homopolysaccharides)
- Glycogen (homopolysaccharides)
- Cellulose (homopolysaccharides)
- Chitin (homopolysaccharides)
- Dextran (homopolysaccharides) etc.,

1) Starch (homopolysaccharides):

Starch is a homopolysaccharide comprised of glucose monomer units joined by glycosidic linkage. Starch is the most important storage polysaccharide or nutritional reservoir of plant cells. The starch molecules are present inside the plant cells and exist as large cluster or granules. More than half of the carbohydrates ingested by humans are in the form of starch. • The starch molecules are heavily hydrated because they have many exposed hydroxyl groups available to make hydrogen bond with water molecule. • Starch exists in two forms (amylose and amylopectin), both are made up of glucose monomers.

A. Amylose (linear homopolysaccharides): It is a unbranched type of starch, consists of α-D-glucose monomers joined by α-1,4 glycosidic linkage. Amylose contain is single chain of several thousand D-Glucose residues and length of the chain can vary and hence the molecular weight of amylose can be from few thousand to more than a million Daltons (50-5000 units of glucose).

Structure needed

B. Amylopectin (Branched homopolysaccharides): It is the branched type of starch. The α-D-glucose monomer units are linked in a chain similar to amylose by glycosidic bond (α-1, 4). The branching is originated from the chain by (α-1, 6) glycosidic linkage on an average after every 24-30 residues. The molecular weight of amylopectin can be upto 200 million Daltons or contains upto 106 monosaccharide units of α-D-glucose.

Structure needed

2) Glycogen (Branched homopolysaccharides): Glycogen is main storage polysaccharide molecule of animal cells. • Structurally, glycogen is like amylopectin, the only difference between them is the extent of branching. The glycogen is extensively branched compared to amylopectin and with every 8-12 residue the new branch emerges from the glycogen chain. Glycogen is the polymer of α-D-glucose connected by glycosidic linkage (α-1, 4). The branching point has (α-1, 6) linkage.

Each glycogen molecule has one reducing end and many non-reducing ends.
• Glycogen is present in all cell types and functions as glucose reserve. Glycogen is abundantly present in liver and muscle cells and stored as large granules. These large granules are comprised of cluster of smaller granules containing glycogen molecules with an average molecular weight of several million Daltons. These granules also contain enzymes responsible for synthesis and degradation of glycogen.

3) Cellulose (linear homopolysaccharides): Cellulose is one of the most abundant biomaterials on the earth. It is generally synthesized by plants, but it is also produced by some bacteria. Cellulose is a tough, fibrous, and water insoluble polysaccharide, primarily found in cell walls of plants. It plays an integral role in keeping the structure of plant cell walls stable. • Cellulose is a homopolymer of β-D-glucose joined by β-1,4 linkages. Like amylose, cellulose molecule is linear, unbranched homopolysaccharide, consists of 10,000- 15,000 thousand β-D-glucose units joined by glycosidic linkage.

The β configurations of cellulose allow the formation of very long, straight chains which is optimal for construction of fibers having high tensile strength. • Most animal cannot use cellulose as a fuel source because they lack an enzyme (cellulase) to hydrolyse the β-1,4 linkages. However, cellulose is still an important constituent of our diet as a component of dietary fibers. • Termites readily digest cellulose (and therefore wood), because their intestinal tract harbours a symbiotic microorganism (Trichonympha), that secretes cellulase, which hydrolyses the β-1,4 linkages.

4) Chitin (linear homopolysaccharides): Chitin is one of the most important biopolymers in nature. It is mainly produced by fungi, arthropods and nematodes. Chitin is the principle component of the hard exoskeletons of nearly a million species of arthropods, insects, lobsters and crabs. It is the second most abundant polysaccharides

next to cellulose present in the biosphere. In insects, it functions as scaffold material, supporting the cuticles of the epidermis and trachea.

• Chemically, chitin is a linear homopolysaccharide polymer composed of N-acetyl-β D glucosamine residues as monomer linked by glycosidic bond (β-1,4 linkages).

• The only chemical difference from cellulose is the replacement of the hydroxyl group at C2 position with an acetylated amino group.

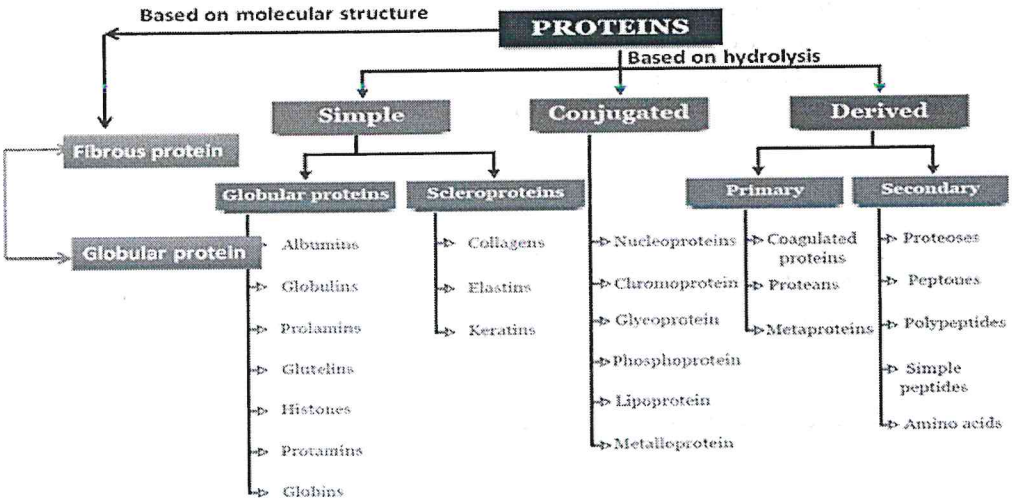
• Chitin polymers tend to form microfibrils (also referred to as rods or crystallites) of 3 nm in diameter that are stabilized by hydrogen bonds formed between the amine and carbonyl groups.

Chitin forms extended fibers similar to that of cellulose and like cellulose cannot be digested by vertebrates.

• Insect growth and morphogenesis are strictly dependent on the capability to remodel chitin-containing structures by combined action of chitin synthases and chitinolytic enzymes in different tissues.

5) Dextrans (Branched homopolysaccharides) Dextran, a bacterial homopolysaccharide, was first isolated in 1861, utilizing a bacterial culture of the genus Leuconostoc. Several microorganisms produce dextrans with ranges of molecular weights and with structures varying from slightly to highly branched. The dental plaques, formed by bacteria growing on the surface of teeth are rich in dextrans. • Dextran is a polysaccharide comprised of α-D-glucose repeating units linked through glycosidic linkages. The backbone of the linear polymer (dextran) is comprised of mainly α-1,6 linkages. Dextran also possesses side-chains, stemming mainly from α1, 3 and occasionally from α-1,4 or α-1,2 branched linkages. • The molecular weight of dextran ranging from 3 to 2000kDa. Synthetic dextrans are used in several commercial products (such as sephadex) are widely used for separation and purification of various products like proteins in research and industry. • In food industry it is being used as thickener for jam and ice cream as it prevents crystallization of sugar, improves moisture retention, and maintains flavour and appearance of the food stuffs

13. Discuss about the classification of proteins based on composition and solubility.
(Flow 3 marks & explanation 7 marks)



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DEPARTMENT OF BIOCHEMISTRY

UNIT TEST II, OCTOBER 2022

Class: I M.Sc Biochemistry **Date:** 01.11.2022

Subject Name: Biochemical techniques **Time:** 12 to 1.00 PM

Subject Code: MG21B **Max. Mark:** 25

Section A-(5 x 1 = 5)

Answer any FIVE questions

CO2 BL1 1.Define Rf value.

CO2 BL6 2. Write the principle of chromatography.

CO2 BL6 3.Write about the ligands used for specific adsorbent for macromolecules in affinity chromatography.

CO2 BL1 4.Quote the superiority of TLC over paper chromatography.

CO5 BL1 5. Define biological effects of radiation.

CO5 BL1 6. List any two commonly used isotopes for treatment of cancer.

CO5 BL6 7.Write short note on chronic radiation dose.

Section B-(2 x 5 = 10)

Answer any TWO questions

CO2 BL4 8.Explain the principle and applications of affinity chromatography.

CO2 BL6 9.Write short notes on thin layer chromatography. Give its application.

CO5 BL2 10.Discribe about the biological hazards of radiation.

CO5 BL2 11.Discuss about the safety measures in handling radioactive isotopes.

Section C-(1 x 10 = 10)

Answer any ONE question

CO2 BL4 12. Explain a detailabout the principle and techniques of Gas liquid chromatography. Give its application.

CO5 BL2 13. Explain about the applications of radioactive isotopes.

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ANSWER KEY

PART A

1. **Define Rf value.**
   - Defined as the ratio of the distance travelled by the solute relative to the distance travelled by the solvent front from the stationary phase.
   - This ratio reflects the distribution coefficient of the given solute and is known as the retardation factor or relative flow (Rf). Rf is a constant for a given compound under standard conditions.
   - The R_f value of any solute is always below 1 because the distance moved by the solvent front is always higher than the distance moved by the solute.

$$Rf = \frac{\text{Distance travel by the solute front}}{\text{Distance traveled by solvent front}}$$

2. **Quote the principle of chromatography.**
   - All forms of chromatography is based on partition or distribution co-efficient (Kd), which describes the way in which a compound distributes itself between the two immiscible phase.
   - For two such immiscible phases is A and B, the value for the Co-efficient A is constant to B at a given temperature, and it is given by

$$\frac{\text{Concentration in phase A}}{\text{Concentration in phase B}} = Kd$$

   - The term effective distribution coefficient is defined as the total amount of concentration of substance present in one phase divided by the total amount of concentration of substance present in the other phase.
   - It is in fact that the distribution coefficient is multiplied by the ratio of the volume of the two phases present.
   - If the distribution coefficient of a compound between the two phases A and B is 1.
   - If this compound is distributed between 10 cm^3 of A and 1cm^3 of B, then the concentration the two phases will be the same but the total amount of the compound in phase A will be 10 times the amount in phase B.

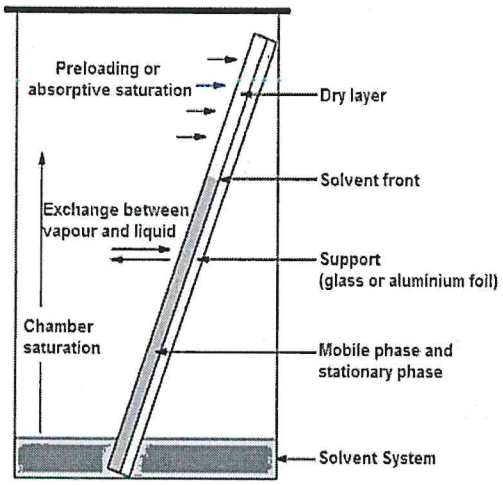
3. **Write about the ligands used for specific adsorbent for macromolecules in affinity chromatography.**

Ligand/group specific adsorbent	:	Affinity for macromolecule
1. Tryptophan	:	α-Chymotrypsin
2. Lysine-Sepharose	:	Nucleic acid / RNA plasminogen.
3. Heparine-Sepharose	:	Coagulation factor, Steroid receptors, Lipase, Lipoprotein, Restriction-endonulease, Malic acid binding proteins.
4. 5' AMP-Agarose	:	Enzymes that have NAD cofactor, ATP-dependent-kinase, NAD^+-dehydrogenase, Creatine kinase.
5. 2'5' ADP	:	$NADP^+$- dependent-dehydrogenase
6. Poly (A)-Agarose	:	Ribonucleic acid contain poly (U) sequence, RNA-specific protein (Nucleic acid polymerase)
7. Poly (U)-Aagarose	:	mRNA containing poly (A) tail.
8. Protein (A)-Agarose	:	IgG and molecule which contain the Fc of IgG.
9. Avidin	:	Biotin containing enzyme
10. Con-canavalin A-Agrarose	:	Glycoprotein and glycolipids.

4. **Quote the superiority of TLC over paper chromatography.**
   - TLC has high resolving power.
   - TLC is less time consuming.
   - Low cost effectively.
   - Sharpness of separation is better than paper chromatography.
   - TLC requires less amount of substance than paper chromatography.
   - In TLC, strong acids can be used as spraying agents where as they destroy in case of paper chromatography.
   - Hence TLC is considered to more superior than paper chromatography.
   - The only limitation of TLC is that it can be used only for small scale separation.
   - No source of electricity is available.
   - Large number of samples must be analyzed simultaneously.
5. **Define biological effects of radiation.**
   - Exposure to very high levels of radiation, such as being close to an atomic blast, can cause acute health effects such as **skin burns and acute radiation syndrome**.
6. **Write any two commonly used isotopes for treatment of cancer.**
   - Rhenium-186-Bone cancer
   - Phosphorus-32-Brain tumour
7. **Write short note on chronic radiation dose.**
   - A dose of ionizing radiation received either continuously or intermittently over a prolonged period of time. A chronic radiation dose may be high enough to c ause radiation sickness and death but, if received at a low dose rate, a significa nt portion of the acute cellular damage may be repaired. See also acute radiatio n dose; radiation dose; radiation dose rate.

PART B

8. **Explain the principle and applications of affinity chromatography.**
   - Used for the purification of a wide range of enzyme, protein, including receptor protein, immunoglobulin and nucleic acids etc.
   - (1) Lectin Sepharose: Normally they can recognize a specific sequence of sugar and denature them. Used for the separation of different lymphocyte, a variety of polysaccharides and glycoprotein.
   - (2) 5'-AMP and 2' 5'-ADP – Sepharose:Used for isolation and purification of glycoprotein, NAD^+, NADP, ATP-dependent-dehydrogenase and creatinekinase.
   - (3) Protein A – agarose:Derived from cell wall of *staphylococcus aureus,* very high affinity to binding fc region of IgG. Used for purification of antibody (IgG) from serum and cell extract.
   - (4) Heparin:Used for isolation and purification of cell extracts, bone collagenase hepatitis-B surface antigen, uterus estridiol receptor, serum antigen receptors, DNA polymerase, adrenal tyrosine hydroxylase and brain myeloma protein.
   - (5) Lysine agarose: Does not bind to a large number of substances. Used for purification of ribosomal RNA and plasminogen protein.
9. **Write short notes on thin layer chromatography. Give its application.**



1. TLC has been used to identify
   - Strongly polar,
   - Non-volatile or low volatile substance,
   - Non-polar or ionic substance,
   - Drugs,
   - Contaminants
   - Adulterants.
2. In cosmetology TLC has been used to identify
   - Dye raw materials and end products,
   - Preservatives,
   - Surfactants,
   - Fatty acids,
   - Constituents of perfumes.
3. It has also been widely used to resolve plant extracts and many other biochemical preparations.
4. In environmental TLC has been used to
   - Analysis ground water,
   - Determination of pollutants from abandoned in soils and surface waters,
   - Decomposition products from azo-dyes used in textiles.
5. Analysis of inorganic substance like metals.
6. In food analysis TLC has been used for determination of pesticides and fungicides in drinking water, residues in vegetables salads and meat, vitamins in soft drinks and margarine.

Examples:
- Sandalwood extract in fish and meat products,
- Polycyclic compounds in drinking water,
- Aflatoxins in milk and milk products.

10. Describe about the biological hazards of radiation.

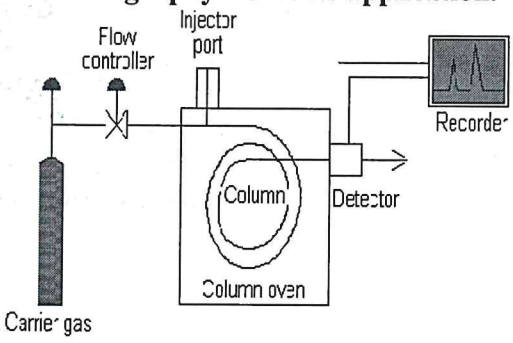
- High doses tend to kill cells, while low doses tend to damage or change them. High doses can kill so many cells that tissues and organs are damaged. This in turn may cause a rapid whole body response often called the Acute Radiation Syndrome (ARS).

11. Discuss about the safety measures in handling radioactive isotopes.

- Use spill trays and absorbent covering.
- Use fume hoods for handling potentially volatile material.
- Use glove box for handling large quantities of volatile material.
- Wear laboratory coat, disposable gloves, and laboratory safety glasses.
- Use gloves appropriate for the chemicals to be handled.

PART C

12. Explain a detail about the principle and techniques of Gas liquid chromatography. Give its application.



Column is made up of glass or metal tube. Column is narrow coiled glass or steel column.Choice may depend on the compound under investigation.

Inside the column microscope layer of liquid or polymer is coated on an inert solid support and packed.

Concentration coated on the solid supporting material varies from 1% to 25% loading.

Mobile phase is also called carrier gas most commonly. Helium, Argon, Nitrogen, Hydrogen and Carbon dioxide. Mixture of any **two** of them is used.

- A detector is a device which monitors the outlet stream from the column.
- That is the amount of that each component and the time at which each component reaches the outlet can be determined. There are several types of detectors are

available, to detect to the substance, they are as follows. Flame ionization detector, Thermal conductive cell, Argon ionization detector, Nitrogen phosphorus detector, Electron capture detector and etc

- Widely used for the Qualitative and quantitative analysis of a large number of compounds. Sample has to be able to be vaporized without decomposition Based on boiling point/vapor pressure
- Typical used for Testing purity of samples, Separation of components from mixture, prepare pure compounds from a mixture, Relative amounts can be determined.
- GLC can used for, Separating thousands of volatile compounds. Separating nonvolatile compounds, if they are converted into volatile compounds (by oxidation, acetylating, alkylation's etc.)
- Identify and determined the functional groups and position of double bonds in the biological sample. Functional groups can also be identified for example: alkaloid groups are detected by iodination to form alkyl iodine which is easily identified.
- Concentration of individual's elements such as carbon and hydrogen can be determined very accurately.
- Ozonolysis these products are identified by this chromatography. Alcohols, esters, fatty acids and amines present in biological samples are often separated.
- Alkaloids, drugs, pesticides, halogenated &cyclohepto-carbon compound can be separated.

13. Explain about the applications of radioactive isotopes.

- Used to locate leaks in industrial pipe lines…and in oil well studies. Used in nuclear medicine for nuclear cardiology and tumor detection. Used to study bone formation and metabolism. Measures the dust and pollutant levels on filter paper…and gauges the thickness of plastics, sheet metal, rubber, textiles and paper.

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DEPARTMENT OF BIOCHEMISTRY

UNIT TEST II, OCTOBER 2022

Class: I MSc Biochemistry | **Date:** 02.11.2022

Subject: Physiology and Cell biology | **Time:** 12 to 1.00 PM

Subject Code: MG21C | **Max. Mark:** 25

PART A – (5 X 1 = 5 Marks)

Answer any FIVE questions

CO.1 BL:1 1. Define Leptotene

CO.1 BL:1 2. Name the functions of centriols

CO.1 BL:1. 3. Define cytokinesis

CO.3 BL:1 4. List the functions of bilesalts

CO.3 BL:1 5. Tell about ptyalin? Mention its functions.

CO.4 BL:1 6.Define Bhor effect.

CO5 BL:1 7.State the respiratory acidosis.

PART B – (2 X 5 = 10 Marks)

Answer any TWO questions

CO.1 BL: 2 8. Explain the stages of Mitosis

CO.1 BL:5 9. Summarize about second meiotic division.

CO.3 BL:6 10. Compile the digestion and absorption of carbohydrate

CO.4 BL:2 11. Describe the mechanism of the movement of O2 and Co2 through lungs

PART C – (1 X 10 = 10 Marks)

Answer any ONE question

CO.1 BL: 2 12.Explain cell cycle with neat diagram.

CO.3 BL: 2 13. Explain the mechanism of Hcl Foramtion in stomach and the factors that influence Hcl secretion

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DEPARTMENT OF BIOCHEMISTRY
UNIT TEST II, NOVEMBER 2022

Class: I MSc Biochemistry **Answer** **Date:** 03.11.2022
Subject: Physiology and Cell biology **Time:** 12 to 1.00 PM
Subject Code: **Max. Mark:** 25

PART A – (5 X 1 = 5 Marks)

Answer any FIVE questions

CO.1 BL:1 1. **Define Leptotene**

Leptotene is **the first stage of meiosis prophase-1**. Meiosis one is the reduction division of cells where chromosomes are halved in the daughter cells. In the leptotene stage, chromosomes become visible in the form of thread-like structures (leptos = thin threads).

CO.1 BL:1 2. **Name the functions of centriols**

Centrioles play a role in organizing microtubules that serve as the cell's skeletal system. They help determine the locations of the nucleus and other organelles within the cell.

CO.1 BL:1. 3. **Define cytokinesis**

Cytokinesis, in biology, the process by which one cell physically divides into two cells. Cytokinesis represents the major reproductive procedure of unicellular organisms, and it occurs in the process of embryonic development and tissue growth and repair of higher plants and animals

CO.3 BL:1 4. **List the functions of bilesalts**

The function of bile salts in the duodenum is to solubilize ingested fat and fat-soluble vitamins, facilitating their digestion and absorption. From the liver, bile flows from the intrahepatic collecting system into the right or left hepatic duct, then into the common hepatic duct.

CO.3 BL:1 5. **Tell about ptyalin? Mention its functions.**

This is a kind of amylase enzyme that is secreted by the salivary glands in the buccal cavity. It begins the digestion process and breaks down carbohydrates into simple sugars. This enzyme is necessary for the conversion of starch in our food into maltose and dextrin.

CO.4 BL:1 6.**Define Bhor effect.**

The Bohr effect explains red blood cells' ability to adjust to changes in their biochemical climate, maximizing haemoglobin-oxygen binding potential in the lungs while enhancing oxygen delivery to the most demanding tissues.

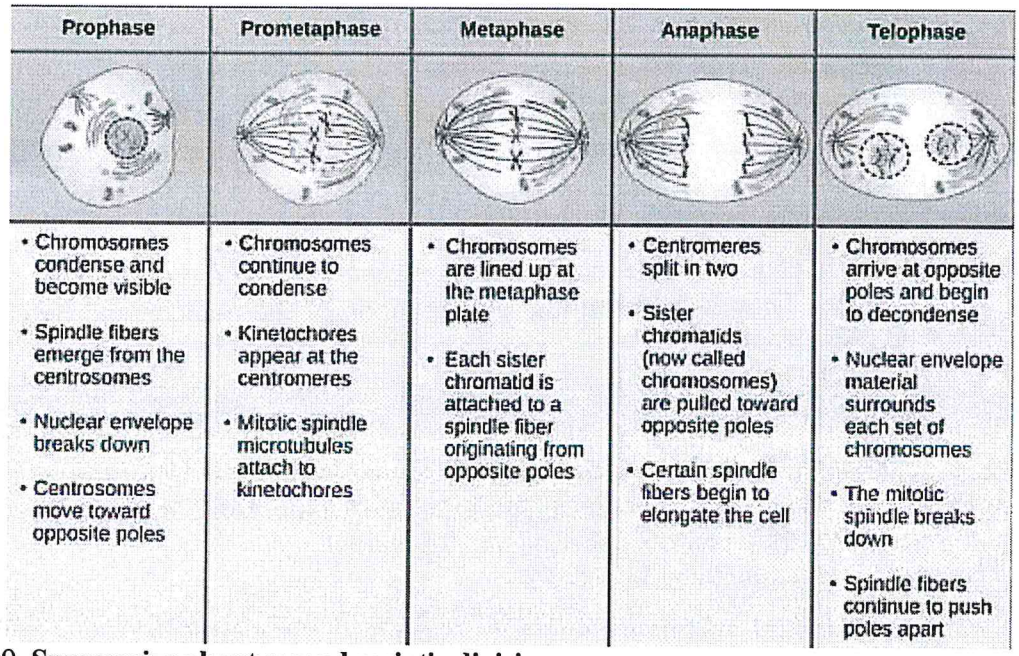
CO5 BL:1 7.State the respiratory acidosis.

PART B – (2 X 5 = 10 Marks)

Answer any ONE question

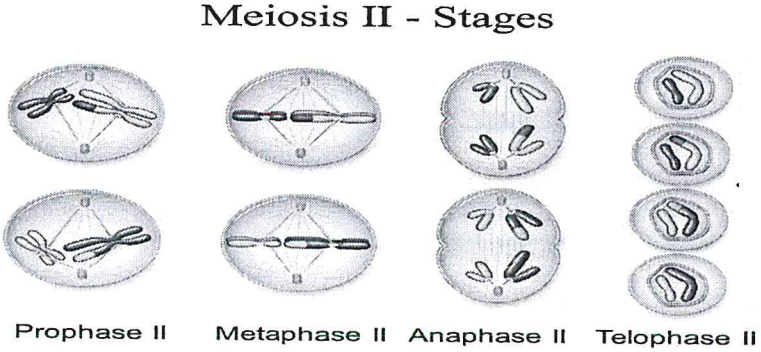
CO.1 BL: 2 **8. Explain the stages of Mitosis**

The stages of Mitosis are: Prophase – The chromosomes shorten and thicken. Metaphase – Chromosomes line up in the middle of the cell. Anaphase – Chromatids break apart at the centromere and move to opposite poles. Telophase – Two nuclei formed after nuclear envelopes reform around each group of chromosomes.



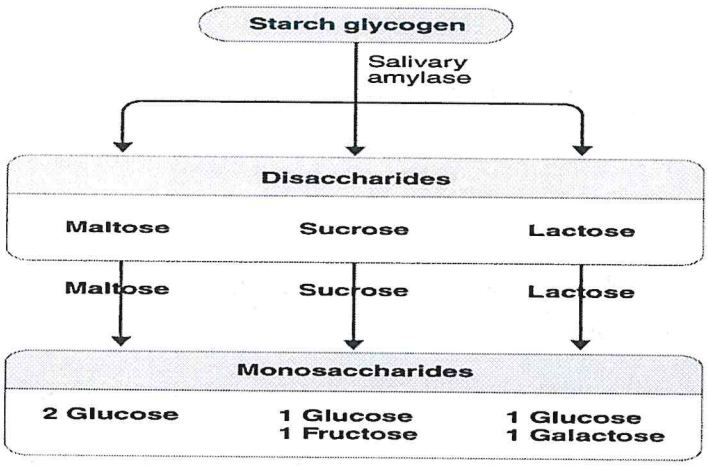
CO.1 BL:5 **9. Summarize about second meiotic division.**

In meiosis II, the sister chromatids separate, making haploid cells with non-duplicated chromosomes. Prophase II: Starting cells are the haploid cells made in meiosis I. Chromosomes condense. Metaphase II: Chromosomes line up at the metaphase plate. Anaphase II: Sister chromatids separate to opposite ends of the cell.



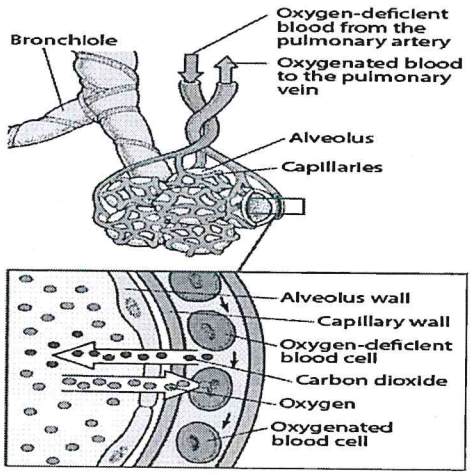
CO.3 BL:6 10. **Compile the digestion and absorption of carbohydrate**

Digestion of both starch and protein is done by the pancreatic juice. The pancreatic enzymes include lipase, which breaks down triglycerides into fatty acids and monoglycerides. Trypsin, chymotrypsin, and elastase all break down proteins. Amylase breaks down the excess complex carbohydrates into monosaccharides.



CO.4 BL:2 11. Describe the mechanism of the movement of O2 and Co2 through lungs

During gas exchange oxygen moves from the lungs to the bloodstream. At the same time carbon dioxide passes from the blood to the lungs. This happens in the lungs between the alveoli and a network of tiny blood vessels called capillaries, which are located in the walls of the alveoli.



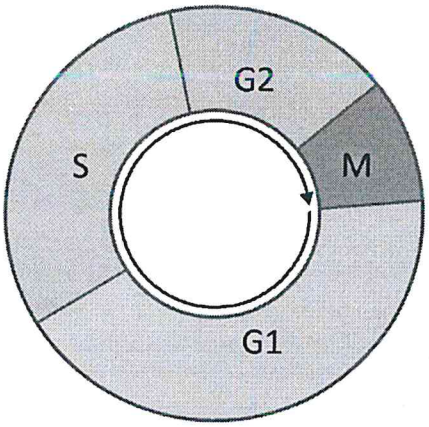
PART C – (1 X 10 = 10 Marks)

Answer any ONE question

CO.1 BL: 2 12.**Explain cell cycle with neat diagram.**

A cell cycle is an ordered sequence of events by which a cell duplicates its genome, synthesizes the other constituents of the cell and eventually divides to form two daughter cells. It has four stages- G1, S, G2 and M phase.

The interphase is the longest phase as it includes G1, S and G2 phases of the cell cycle.



G1 - Growth

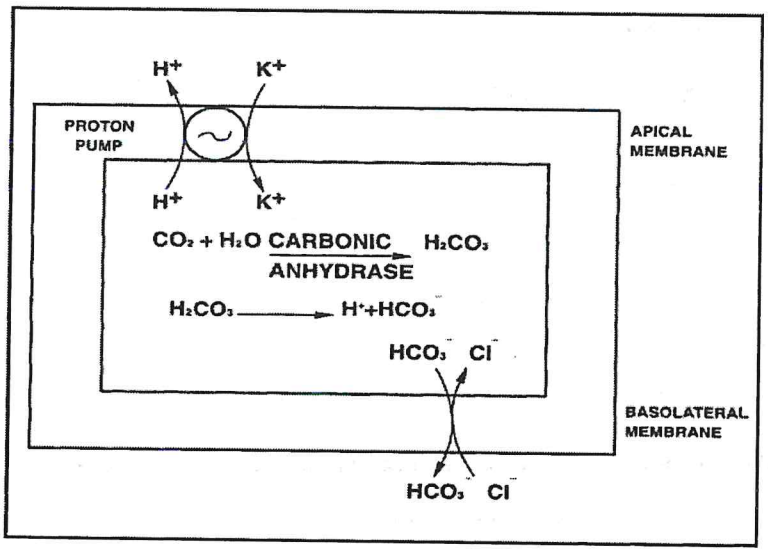
S - DNA synthesis

G2 - Growth and preparation for mitosis

M - Mitosis (cell division)

CO.3 BL: 2 13. **Explain the mechanism of Hcl Foramtion in stomach and the factors that influence Hcl secretion**

The tight regulation of parietal cells ensures the proper secretion of HCl. The H^+-K^+-ATPase enzyme expressed in parietal cells regulates the exchange of cytoplasmic H^+ for extracellular K^+. The H^+ secreted into the gastric lumen by the H^+-K^+-ATPase combines with luminal Cl^- to form gastric acid, HCl.



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DEPARTMENT OF BIOCHEMISTRY

UNIT TEST II, OCTOBER 2022

Class: IM.Sc., Biochemistry | **Date:** 03.11.2022

Subject: Microbiology | **Time:** 12 to 1.00 PM

Subject Code: MG41A | **Max. Mark:** 25

PART A – (5 X 1 = 5 Marks)

Answer any FIVE questions

CO1 BL:1 1. Define complex media.

CO1 BL:2 2. Discuss about lysogenic cycle.

CO1 BL:1 3. Define enrichment media with an example.

CO 1 BL:1 4. Define differential media with an example.

CO 4 BL:1 5. Define food infection.

CO 4 BL:2 6. Describe food intoxication.

CO 3 BL:2 7. Discuss about aflatoxicosis.

PART B – (2 X 5 = 10 Marks)

Answer any TWO questions

CO1 BL: 4 8. Explain the lytic cycle.

CO1 BL: 2 9. Classify the methods to isolate pure culture.

CO 3 BL:5 10.Summarize the microbial contamination in meat and meat products.

CO 1 BL:1 11. Define food poisoning. Explain how you will prevent the food poison.

PART C – (1 X 10 = 10 Marks)

Answer any ONE question

CO1 BL: 2 12. Describe the four phases of the growth curve and discuss the causes of each.

CO 4 BL:6 13. Write an account on botulism, the causative agent, symptom, and toxigenic types.

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DEPARTMENT OF BIOCHEMISTRY

UNIT TEST II, November 2022

Class: IM.Sc., Biochemistry

Subject: Microbiology **Subject Code:** MENAA

Answer key

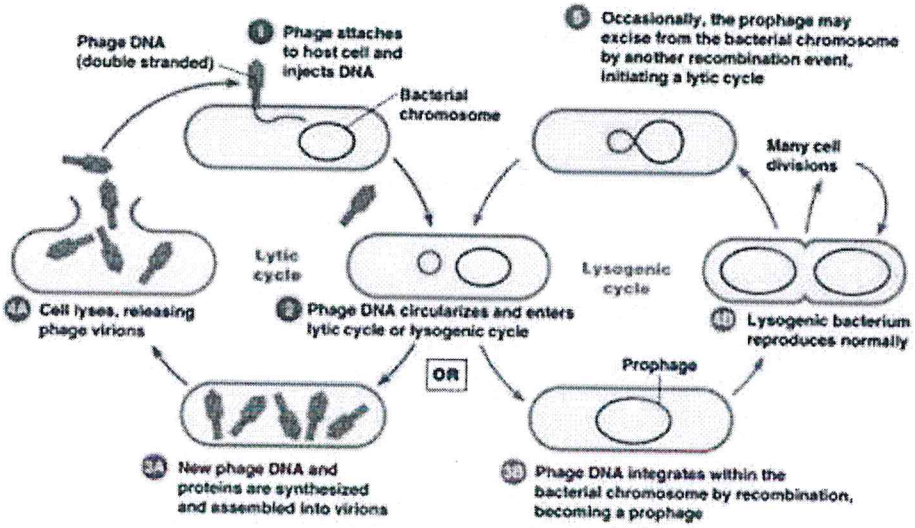
PART A – (5 X 2 = 10 Marks)

Answer any FIVE questions

1. Define complex media.

When some extra nutritional substance is added to simple media it becomes complex media. Example for nutritional substances blood, egg, serum, etc., Example for complex media blood agar, Lowenstein-jensen media, Loffeler serum slope.

2. Discuss about lysogenic cycle.



3. Define enrichment media with an example.

Enrichment media are liquid in nature called as liquid selective media. This media favour the growth of particular bacteria either by adding enrichment substance or by adding inhibitory substance which slows down the growth of unwanted bacteria. Tetrathionate broth contains inhibitory substance such as bile salts. Bile salts inhibit growth of coliform and gram negative bacteria. But it does not inhibit Salmonella. Selenite f broth: Selenite inhibit gram +ve and gram -ve bacteria. Except Salmonella and Shigella.

4. Define differential media with an example.

It is a medium which helps to distinguish between bacteria. Mac Conkey's Agar – distinguish based on lactose fermentation. Lactose fermenting bacteria – Pink colour. Non-lactose fermenting bacteria – colourless.

5. Define food infection.

Presence of bacteria or other microbes like virus or parasite in food which infect the body after consumption is called food infection.A foodborne infection is an inflammation of the stomach and bowels. Often the inflammation leads to diarrhoea, nausea, vomiting, abdominal pain, abdominal cramps and sometimes fever.It's not usually serious and most people get better within a few days without treatment. In most cases of food poisoning, the food is contaminated by bacteria, such as salmonella or Escherichia coli (E. coli), or a virus, such as the norovirus.

6. Describe food intoxication.

Food intoxication results when a person eats food containing toxins that cause illness.Toxins are produced by harmful microorganisms, the result of chemical contamination or are naturally part of a plant or sea food. Some bacteria cause an intoxication.Viruses and parasites do not cause foodborne intoxication.

- Eg., *Clostridium botulinum, Staphylococcus aureus, Clostridium perfrigence, Bacillus cereus*
- Chemicals that can cause food intoxication are cleaning products, sanitizers, pesticides& metals-Lead, copper, brass, zinc,cadmium, antimony.
- Seafood toxins-sellfishtoxin& some mushrooms

. These respective toxins result in variety of illness of the consumers. These toxins are not visible to naked eye but will change the chemical properties of the food.

SYMPOTOMS

Symptoms begin 30 minutes to 8 hours after exposure: Nausea, vomiting, stomach cramps, diarrhea.

7. Discuss about aflatoxicosis.

Aflatoxicosis is caused by aflatoxins produced by the fungi, e.g. *Aspergillus flavus* is found in peanuts, *Aspergillus parasiticus & Aspergillus columnaris* are found in barely, rice, rye, wheat, millet, oats,corn, chickpeas and yam. Four types of aflatoxins have been described i.e., aflatoxin B1, B2, G1 and G2. Large doses of aflatoxins can lead to acute poisoning (aflatoxicosis) and can be life threatening, usually through damage to the liver. Aflatoxins have also been shown to be genotoxic, can damage DNA and cause cancer in animal species & cause liver cancer in humans.

Signs and symptoms

Nausea, Yellowing of skin and sclera (icterus), Itching, Vomiting, Bleeding,Abdominal pain.

PART B – (1 X 5 = 5 Marks)

Answer any ONE question

8. Explain the lytic cycle.

Diagram (2M)

Six steps of lytic cycle (3M)

9. Classify the methods to isolate pure culture.

Dilution method (1M)

Pour plate method (1M)

Spread plate method (1M)

Streak plate method (1M)

Diagram (1M)

10. Summarize the microbial contamination in meat and meat products

- Bovine carcasses can be contaminated during the slaughter process through contact with the animal's skin and hair, limbs, blood, stomach, gut contents, bile, and other excretions, facilities, equipment, and hands and worker's clothes.
- **Chicken:** Chicken tends to be responsible for the most foodborne illnesses, but that is likely because it's the kind of meat we eat the most. Many cases of food contamination come from the mishandling of meats and cross-contamination in our own kitchens.

Causes of meat spoilage (2 marks)

- Microbial growth, oxidation and enzymatic autolysis are the three basic mechanisms responsible for the spoilage of meat. In addition to lipid oxidation and enzyme reactions, meat spoilage is almost always caused by microbial growth.
- The shelf-life of meat and meat products is the period of time during which storage is possible and food retains its qualitative characteristics until the arrival of spoilage phenomena. The shelf-life of products is strongly linked to their deterioration, creating a borderline between an acceptable and an unacceptable bacterial concentration, which determines off-odours, off-flavours and an undesirable appearance.
- These sensorial modifications are related to the number and types of microorganisms initially present and their subsequent growth. For meat products, the starting total microbiota is approximately 102-103 cfugr-1, consisting of a huge variety of species

Factors influencing shelf-life and spoilage of meat and meat products (2 marks)

- The micro-organisms' ability to grow in food is closely related to many factors, some of which are **intrinsic in the substratum.**
- Others are **extrinsic**, but all of them influence the development of the ecological environment.

- The main factors, which affect the shelf-life of meat products and favour some bacterial strains rather than others, are: packaging (aerobically, vacuum or modified atmosphere), storage temperature, the composition of the products (presence of fat, NaCl content, nitrites, pH) and
- other factors, such as antibacterial substances or bio preservatives

Intrinsic factors

Composition and antimicrobial hurdles

- Meat represents a natural ecosystem in which the advantageous or disadvantageous conditions determine the survival and growth of some specific strains.
- Micro-organisms need energy for their metabolism, essential substances which they cannot synthesize and components for the constitution of cells; all these necessary elements are collected from the surrounding food environment and their presence allow the effective survival of food-borne strains during the lag phase
- . In general, meat is rich in protein, lipids, minerals, and vitamins, but poor in carbohydrates; this composition provides an opportunity for some species instead of others with different nutrient requirements.
- After microbial death, intracellular enzymes can catalyse some food nutrients to simpler forms, which can be exploited by other species.
- The presence of growth factors and natural or chemical inhibitors (additives such as nitrite) further select specific strains. All food substances which do not occur naturally or are environmental contaminants are generally regarded as added. There are several categories within the broad class of added food constituents. However, a practical definition considers all the substances deliberately put into foods as intentional substances and those which may get in by accident during processing as incidental. Among the first category of additives, antimicrobial agents are added to prevent bacterial contamination of food, thus avoiding spoilage and poisoning processes caused by pathogens or their toxins.

Buffer capacity and pH

- Meat pH also affects the selection of bacteria; each species has an optimum and a range of pH for growth. During post slaughtering, muscle pH, normally decreases to 5.4-5.8, while pH is >6 in meat coming from stressed animals (defined as dark, firm, dry meat) and in cooked meat products, such as sliced ham. The presence of adipose tissue and a high pH in meat determines a more rapid spoilage process due to a more rapid bacterial growth and consumption of nutrient.

Redox potential

- The oxidation-reduction potential is a function of the pH, gaseous atmosphere and presence of reductants. It measures the potential difference, in a system generated by a coupled reaction, in which one substance is oxidized and a second substance is reduced simultaneously, in electrical units of millvolts (mV). The redox potential of a food is related to its chemical composition, processing treatments and storage.
- Raw meat has an Eh (i.e., redox potential) of -200 mV, ground raw meat has an Eh of +225 mV and cooked meat a range of +90mV to -50mV.

Water activity

- Water activity (aw) is the measure of the amount of water in a food which is available for the growth of micro-organisms, including pathogens. It identifies the water available for carrying out enzymatic reactions, synthesizes cellular materials and takes part in other biochemical reactions.
- Raw meat has aw values of 0.98-0.99 and cooked meat approximately 0.94; those values allow the growth of most microorganisms.
- Dried products are usually considered shelf stable and are, therefore, often stored and distributed unrefrigerated. The characteristic of dried foods which makes them shelf stable is their low water activity.

- A water activity of 0.85 or below will prevent the growth and toxin production of pathogens, including **Staphylococcus aureus and Clostridium botulinum. S. aureus** grows at a lower water activity than other pathogens.
- Control of the drying process to prevent the growth and toxin production of pathogens, including **S. aureus**, in the finished product is critical to product safety if the product is distributed or stored unrefrigerated.
- Similarly, drying may not be critical for the safety of dried stored, refrigerated products, since refrigeration may be sufficient to prevent pathogen growth.
- Controlling pathogen growth and toxin formation by drying is best accomplished by: i) scientifically establishing a drying process that reduces the water activity to 0.85 or below; ii) designing and operating the drying equipment, so that every unit of product receives at least the established minimum process .

Extrinsic factors

✓ **Packaging and gaseous atmosphere**

- Packaging conditions and the gaseous composition of the atmosphere surrounding the meat greatly influence the composition of spoilage flora.
- Aerobic storage conditions promote, above all, the growth of **Pseudomonads. Pseudomonas spp., Acinetobacter spp., Moraxella spp.** are considered the major source of meat deterioration in aerobically stored meat products at different temperatures from -1 to 25°C.
- Members of the **P. fluorescens group**, together with the **psychrotrophic P. fragi, P. ludensis and P. putida,** are the most commonly isolates in aerobically packed, spoiled meat. The population of Pseudomonads at the arbitrary level of 107 CFU g-1, has been attributed to the formation of slime and off-odours, especially when the metabolism of nitrogenous compounds prevails over the fermentation of carbohydrates.
- **Shewanella spp**. is a genus closely related to Pseudomonas spp. and contributes significantly to spoiling food: **S. putrefaciens** is one of the predominant spoilers in chill-stored, vacuum-packed (VP) meat and high pH VP meat.
- Packaging of meat under vacuum or CO2 modified atmosphere has resulted in extended shelf-life compared to traditional packaging conditions. The use of CO2 and N2 extends the lag phase of aerobic microorganisms and promotes the growth of facultative and strict anaerobic species. This change in packaging conditions determines a shift from aerobic bacteria, such as **Pseudomonas spp.**, to **facultative anaerobic species**, such as **Brochotrixthermosphacta** and lactic acid bacteria.
- Lactic acid bacteria are the predominant microflora of vacuum or CO2-modified atmosphere packed products, representing dominant spoilage-causing bacteria. In fact, the combination of micro-aerophilic conditions and a reduced aw inhibits gram-negative spoilage flora and favours the proliferation of LAB.

Storage temperature

- Storage temperature affects the duration of the lag phase, the maximum specific growth rate and the final cell number .
- **Lower refrigeration temperatures decrease bacterial growth and modify the composition of the microbiota present on meat**: psychrotrophic bacteria could grow, either Gram-positive, such as LAB, or Gram-negative, such as Pseudomonas spp, at chill temperature. In MAP and vacuum-packed meat products, the dominance of lactic acid bacteria is also maintained under refrigerated conditions. However, the growth rate is affected: Carnobacterium spp. prevails in a vacuum at -1.5°C, whereas homofermentative Lactobacillus spp. dominate at 4°C and 7°C . Among the Enterobacteriaceae, Hafnia alvei dominates at 4°C, and S. liquefaciens predominates at 1.5°C. Psychrophilic Clostridium spp. could be detected in vacuum-packed, chilled meat . Storage temperatures above 10°C are not unusual and a shift in microbial populations can be observed. Temperature abuse determines the growth of **Enterobacteriaceae, Pseudomonas spp. and Acinetobacter spp.**

- It is evident how important an accurate management of time/temperature can be to control not only pathogen growth and toxin formation, but also spoilage micro-organisms.

- Unwanted bacteria growth and toxin formation because of the time/temperature abuse of food products can cause consumer illness.

- Temperature abuse occurs when the product is allowed to remain a sufficient length of time at temperatures favorable to pathogen growth resulting in unsafe levels of pathogens or their toxins in the product.

Alterations associated with spoilage

- Since microbial survival follows different pathways depending on the many factors which occur, the detectable effects are multiple: visible growth (slime, colonies), textural changes (degradation of polymers) or off-odours and off-flavours.
- The characteristics of meat deteriorations depend on the availability of variable substrates: glucose, lactic acid, nitrogenous compounds and free amino acids present in meat, as the principal precursors of microbial metabolites responsible for spoilage.

Off odours and off flavours

- The volatilome, the volatile fraction of the microbial catabolites, includessulphur compounds, ketones, aldehydes, organic acids, volatile fatty acids, ethyl esters, alcohols, ammonia and other metabolites. Depending on their olfactory thresholds and the interaction between the volatile and non-volatile compounds, these molecules will affect the sensory quality of both fresh and cooked meat.

Colour alteration

- The presence of bacterial patina on the surface of meat products is appreciable when the microbiota are between 107.5-108CFU cm-2.
- Hydrogen sulphide, produced by **L. sakei, H. alvei, S. putrefaciens**, converts the muscle pigment to green sulphomyoglobin and its appearance is a consequence of glucose consumption. Sulphomyoglobin is not formed in anaerobic atmosphere.
- Leuconostoc spp. and Leuconostoc- like microorganisms, such as Weissellaviridescens, may cause meat products to turn green, due to the formation of hydrogen peroxide, which oxidizes nitrosomyochromogen as the consequence of the exposure of meat to O2 .
- S. putrefaciens may determine green discolouration in vacuum-packed meat.

Gas production

- **Clostridium spp.** is responsible for the production of a large amount of gases (H2 and CO2): vacuum-packed meat could be affected by blown pack spoilage, characterized by deformation of the pack due to the accumulation of a large amount of gases, putrid odours, the presence of exudates, extensive proteolysis, changes in pH and colour.
- This type of deterioration can occur in chilled, vacuum-packed meat, caused by **psychrophilic and psychrotrophic bacteria.**
- CO2 concentration during the storage of packages is attributed to metabolic by-products of the heterofermentative **lactobacilli and leuconostocs.**

Filaments and ropy slime

- Ropy slime formation is found in vacuum-packed, cooked meat products, caused by the homofermentative **Lactobacillus spp. and Leuconostoc spp.**
- The stretchy, ropy slime are long, undesirable, polysaccharide ropes between the surface of the products and the casing or between the slices (

Lactic acid bacteria associated with meat spoilage

- Lactic acid bacteria are widespread in nature and in the environment of processing plants; they are unavoidably part of the contaminant flora of fresh meat after slaughter, and also of cooked meat. They are generally regarded as safe (GRAS) micro-organisms with many applications in the food industry; in fact, under specific conditions, they compete efficiently with other micro-

organisms for nutrients, and achieve substantial, viable counts .In food production, LAB are frequently used for their desired effects, such as their application as a starter in meat to manufacture safe, high quality, fermented sausages or cooked meat products

- Protective, bacteriocinogenic cultures establish a microbial ecosystem, typically associated with MAP and VP cooked meat, which prevents the multiplication of food-borne pathogens.

Products involved

- The main categories of cooked meat products showing these contaminations are:**grilled roast ham, cooked ham, classic cooked ham, roast turkey breast, roast loin of pork.**
- Even though the raw materials have different origins (pork or turkey), they follow a similar production process. Briefly, **the main steps are**: a careful selection of the meat, trimming, syringing after the preparation of the saline (a mix of water, spices, natural flavourings and additives), churning, cooking in controlled temperature ovens, where the temperature of the product must reach 70°C in the centre, cooling, vacuum-packaging process and pasteurization for several minutes at a temperature of 115°C. Once cooled, they are ready for distribution.

Sources of contamination

- Since none of the commonly detected LAB species is highly heat-resistant and cooked meat products are heated to a core temperature of 68°-72°C, the majority of the vegetative cells are killed at the processing plant . LAB contamination may occur after heat treatment.
- Post-cooking contamination takes place during **chilling, handling, slicing and packaging,** rather than via natural contaminants initially present on raw meat products determining MAP shelf-life .
- The potential contamination sources during the production process of MAP and VP cooked meat products are numerous: **salt, spices and raw materials, but also the rooms,** where products are stored before packaging.
- Not only materials collected from the surfaces of the processing rooms, but also air samples from the environment underlined the presence of lactic acid bacteria producing filaments .
- The origin of the contamination is also linked to the raw materials used, as confirmed by the isolation of lactic acid bacteria from cooked sausages and from samples taken from carcasses and raw meat establishments
- It highlights the fact that lactic acid bacteria can be transmitted through the air, by staff and via tool

Prevention(1 mark)

- In order to prevent the presence and growth of ropy slime-producers, the rooms and equipment of meat processing plants act as sources of bacterial contamination and disinfection is a necessary procedure to minimize contamination of products with bacteria.
- Therefore, temporal and spatial separation between raw meat and cooked products decreases the risk of cross-contamination .
- Not all detergents and sanitizers are effective in eliminating environmental contamination: the use of detergents and sanitizers with a low concentration of hypochlorite is not recommended due to their proved inefficacy towards ropy slime-producing bacteria.
- Concerning the use of appropriate products for the in-depth hygiene of meat processing plants, cleaning and sanitizing have to be considered as fundamental procedures not only for avoiding pathogens contaminations but also for limiting the spoilage due to ropy slime producers.
- In food industry, detergent and sanitizer are used separately or in association.
- Detergents contain surfactants that reduce surface tensions between the soil and the surface while sanitizers are made of antimicrobial compounds able to reduce the microbiological contamination to an acceptable level.
- Detergent-sanitizer (DS) products with different antimicrobial compounds (Na-dichloroisocyanurate at 0.06%, Na-hypoclorite at 0.017%, cocobenzyldimethyl ammonium

chloride at 0.027% and Dimethylcoco ammonium betaine at 0.27%) were less effective against ropy-slime producers than sanitizer (S) products used separately.

11. Define food poisoning. Explain how you will prevent the food poison

Food poisoning (2 marks)

Any illness resulting from ingestion of water and wide variety of food contaminated with pathogenic microorganisms (bacteria, viruses, protozoa, fungi), their toxins and chemicals. Food poisoning must be suspected when an acute illness with gastrointestinal or neurological manifestation affects two or more persons, who have shared a meal during the previous 72 hours.

Types of food poisoning

A.Bacterial Food poisoning

B.Non- Bacterial Food poisoning

Food infection refers to the presence of bacteria or othemicrobes which infect the body after consumption.

Food intoxication refers to the ingestion of toxin contained within food including bacterially produced exotoxins.

Symptoms:

Nausea, Abdominal pain, Vomiting, Diarrhea, Gastroenteritis, Fever, Headache and Fatigue

The golden rules for prevention of food poisoning(3 marks)

1-Choose foods processed for safety. 2-Cook food thoroughly.
3-Eat cooked food immediately. 4-Store cooked food carefully.
5- Reheat cooked food thoroughly
6-Avoid contact between cooked and raw food.
7-Wash hands repeatedly. using lots of friction.
8-Keep all kitchen surfaces always clean.
9-Wash dishes and cutting board after contact with raw meat or eggs.
10-protect foods from insects , rodents and other animals.

PART C – (1 X 10 = 10 Marks)

Answer any ONE question

12.Describe the four phases of the growth curve and discuss the causes of each.

Lag phase (2M)
Log phase (2M)
Stationary phase (2M)
Death phase (2M)
Reason for different phases (2M)

13.Write an account on botulism, the causative agent, symptom, and toxigenic types.

Botulism: Causative organism Clostridium botulinum.It is a gram positive anaerobic spore bearing bacilli that is widely distributed in soil, sediments of lakes and ponds, and decaying vegetation.(1 mark)

Pathogenesis/Symptoms (4 marks)

- Not all strains of C.botulinum produce the botulinum toxin.
- Seven toxigenic types of the organism exist, each producing an immunologically distinct form of botulinum toxin. The toxins are designated A, B, C1, D, E, F, G.
- ood-borne botulism is not an infection but an intoxication since it results from the ingestion of foods that contain the preformed clostridial toxin.
- If contaminated food has been insufficiently sterilized or canned improperly, the spores may germinate and produce botulinum toxin.
- The toxin is released only after the death and lysis of cells. The toxin resists digestion and is absorbed by the upper part of the GI tract and then into the blood.

- It then reaches the peripheral neuromuscular synapses where the toxin binds to the presynaptic stimulatory terminals and blocks the release of the neurotransmitter acetylcholine. This results in flaccid paralysis.
- Even 1-2 µg of toxin can be lethal to humans.
- **Symptoms** include nausea, vomiting, fatigue, dizziness, headache, dryness of skin, mouth and throat, constipation, lack of fever, nerve paralysis and great muscular weakness, double vision, respiratory failure and Death may occur due to respiratory paralysis within 7 days.

Laboratory diagnosis:

Spoilage of food or swelling of cans or presence of bubbles inside the can indicate clostridial growth. Food is homogenized in broth and inoculated in Robertson cooked meat medium and blood agar or egg-yolk agar, which is incubated anareobically for 3-5 days at 37oC. The toxin can be demonstrated by injecting intraperitoneally the extract of food or culture into mice or guinea pig.

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DEPARTMENT OF BIOCHEMISTRY

UNIT TEST II, OCTOBER 2022

Class: II M.Sc Biochemistry | **Date:** 31.10.2022

Subject: Biotechnology | **Time:** 12 to 1.00 PM

Subject Code: MEN3A | **Max. Mark:** 25

Section A-(5 x 1 = 5)

Answer any FIVE questions

CO5 BL1 1.Define DNA sequence analysing.

CO5 BL1 2.Quote the applications of Proteomics.

CO5 BL6 3.Write notes on Genomics.

CO5 BL3 4.Interpret the techniques for separation and identification of proteins.

CO3 BL6 5. Write about SV40.

CO3 BL1 6. Define patents.

CO3 BL6 7. Write short note on safety aspects in biotechnology.

Section B - (2 x 5 = 10)

Answer any TWO questions

CO6 BL6 8.Write short notes applications of recombinant DNA technology.

CO5 BL2 9.Summarize about the construction of a phylogenetic tree.

CO3 BL2 10. Explain about baculo virus and retro virus.

CO2 BL2 11. Discuss about the genomic DNA library.

Section C–(1 x 10 = 10)

Answer any ONE question

CO6 BL4 12. Explain a detail account on goals, results, potential benefits, and risks of the human genome project.

CO2 BL2 13. Discuss about the site directed mutagenesis and its applications.

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- SV40 is a potent DNA tumor virus that induces tumors in rodents and transforms many types of cells in culture, including those of human origin. This virus has been a favored laboratory model for mechanistic studies of molecular processes in eukaryotic cells and of cellular transformation.

6. **Define patents.**
   - A patent is an exclusive right granted for an invention. In other words, a patent is an exclusive right to a product or a process that generally provides a new way of doing something, or offers a new technical solution to a problem.

7. **Write short note on safety aspects in biotechnology.**
   - Biotechnology can be safe, but potential risks exist. The continued safe use of biotechnology requires constant vigilance on a case-by-case basis. Scientists are responsible for careful preparation of recombinant organisms involved in research or product development.

PART B

8. **Write short notes applications of recombinant DNA technology.**
   - Can be used for DNA fingerprinting and identification victim and forensic science analysis.
   - Genomic map the human genome through the Human Genome Project. Diagnose genetic disease.
   - Production of Enzyme: Amylase, protease, glucose isomerase. Amino acids: Lysine, glutamic acids. Organic acids: Citric acid, lactic acid. Human proteins: Hormones and enzymes such as Insulin, hGH, INFα, INFβ and INFγ. Vitamins: Carotene, Riboflavin, Vitamin C and B_{12}. Single cell protein.
   - Nanotechnology: Bacteria can make molecule-sized particles *Bacillus* cells growing on selenium form chains of elemental selenium.
   - Gene therapy: Gene therapy can be used to cure genetic diseases by replacing the defective or missing gene. Introduce gene into embryo or fertilized egg through micro injection or virus. It involves modifying human DNA either to repair it or to replace a faulty gene. The idea of gene therapy is to overcome the effects of a mutation which causes a genetic disease. Cystic fibrosis is the best-known disease where gene therapy has been tried.

9. **Summarize about the construction of a phylogenetic tree.**
   - A phylogenetic tree, also known as a phylogeny. It is a branching diagram that showing the inferred lines of evolutionary relationships among various biological species, organisms, or genes from a common ancestor.
   - Based upon similarities and differences in their physical or genetic characteristics. Each node with descendants represents the inferred most recent common ancestor of the descendants. They are also known as Evolutionary tree.
   - Building a phylogenetic tree requires four distinct steps: (Step 1) identify and acquire a set of homologous DNA or protein sequences, (Step 2) align those sequences, (Step 3) estimate a tree from the aligned sequences, and (Step 4) present that tree in such a way as to clearly convey the relevant information to others.

- Applications of Phylogenetic tree:Find out, what trends they've undergone in their history. how our species spread geographically in their evolution. The evolutionary history.
- To tell us when taxa originated and where. Guide our search for new species.
- Search for natural products. Trace their evolutionary histories of infectious bacteria and viruses. Measure phylogenetic diversity using phylogenetic tree.

10. Explain about baculo virus and retro virus.

- Baculoviruses are insect pathogenic viruses that are used for pest insect control and as tools to produce recombinant proteins. Numerous studies show that both natural baculoviruses and genetically modified (GM) baculoviruses hold clear and substantial benefits for crop protection.
- Retroviruses differ from other viruses in that each virion contains two complete copies of the single-stranded RNA genome.

11. Discuss about the genomic DNA library.

- A genomic library is a collection of DNA fragments contained within self-replicating vectors that represent the entire genome of the individual from which the DNA was made. The cDNA library represents a collection of only those DNA fragments that were transcribed into mRNA in the cell from which the mRNA was isolated.

PART C

12. Explain a detail account on goals, results, potential benefits, and risks of the Human Genome Project.

- The Human genome project or HGP began in 1990 and was completed in 2003, and was coordinated by the US Department of Energy and the US National Institute of Health. The project was headed by James D. Watson. It was set to determine the complete sequence of base pairs of DNA inside the human genome, because the sequence of DNA bases determines our genetic information.
- A human genome has about 3 x 109 base pairs and the HGP aimed to identify approximately 20,000-25,000 genes in human DNA, and the average gene consists of three thousand bases. 99.9 per cent of all nucleotide bases are exactly the same in all people. It was identified that we differ from each other, in our DNA sequences at about 1.4 million locations with single-base DNA differences, also known as SNPs or single nucleotide polymorphism.
- The repetitive sequences in DNA shed light on the chromosome structure and evolution. DNA sequences that are repeated many times, sometimes a hundred to a thousand times, in the human genome are called repetitive sequences or microsatellites, but have no coding functions. In fact, less than two per cent of genomes code for proteins. With the advent of advanced genetic engineering methods, it was now possible to isolate and clone a piece of DNA to determine its sequence. Since the HGP aimed to store the entire genome information in databases, it required high-speed computational devices for data storage and retrieval.
- In addition, the HGP required improved tools for data analysis. Thus, the HGP is credited with contributing to the rapid development of bioinformatics, which involves the application of statistics and computer sciences to the field of molecular biology.

- Apart from understanding the genetic make-up of the human species, HGP also aimed at non-human species to offer solutions in various sectors such as health, agriculture and energy production.

13. Discuss about the site directed mutagenesis and its applications.

- Site-directed mutagenesis was found to be an efficient process to create targeted mutation on cereal crops, horticultural crops, oilseed crops, and others. Agronomic traits such as yield, quality, and stress tolerance have been improved using site-directed mutagenesis.

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DEPARTMENT OF BIOCHEMISTRY

UNIT TEST-II, OCTOBER 2022

Class : II M.Sc., Biochemistry **Time:** 12 to 1.00 PM

Subject Name : Clinical Biochemistry-I **Date:**01-11-2022

Sub Code : MEN3B **Max. Marks:25**

Section A (5 x 1 = 5)

Answer any FIVE questions

CO4 BL:1 1. Name any two types of porphyrias.

CO6 BL:2 2.Interpret the functions of lipoproteins in relation with cardiac health

CO4 BL:1 3.Define Leucopoenia

CO1 BL: 2 4. Brief about thrombocytopenia.

CO5 BL: 3 5.Illustrate the effects of parathyroid hormone on bone.

CO5 BL:2 6. Describe the biological function of calcitoni.

CO5 BL:4 7. Write a brief note on the role of osteoblast in bone metabolism.

Section B (2 x 5 = 10)

Answer any TWO questions

CO 4 BL:4 8.Write a note on haemophilia A and B

CO6BL:2 9. Describe the clinical manifestations in various types of hypo lipoproteinemia

CO3BL:5 10. Summarize GTT and its interpretation.

CO4 BL:3 11.Illustrate Von Wille brand's disease

Section C (1 x 10 = 10)

Answer any ONE question

CO4 BL:5 12.Summarize the causes, types, symptoms and diagnosis of Leukaemia

CO5 BL:4 13.Explain the mechanism of regulation of calcium concentration in plasma and associated abnormalities

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UNIT TEST-II, NOVEMBER 2022
Class: II M.Sc Biochemistry
Subject: Clinical Biochemistry-I Sub Code: MEN3B

ANSWER KEY

Section A **(5 x 1 = 5)**

Answer any FIVE questions

1. Name any two types of porphyrias
   - Acute intermittent porphyria
   - Porphyria cutanea tarda

2.Interpret the functions of lipoproteins in relation with cardiac health
   - **LDL:** carry cholesterol to tissues- Bad cholesterol-leads to cardiovascular disease
   - **HDL:** Scavenge excess cholesterol esters-"Good cholesterol"-reduces CVD

3.Define Leucopoenia
   - A low white blood cell count (leukopenia) is a decrease in disease-fighting cells leukocytes blood.
   - People may develop leukopenia due to certain medications or have malnutrition and/or don't get enough of certain vitamins.
   - Medical conditions include Bone marrow disorders: Multiple myeloma and aplastic anemia cause leukopenia.
   - Leukopenia is almost always related to a decrease in a certain type of white blood cell (neutrophil).

4. Explain about thrombocytopenia?

Deficiency of platelets in the blood.
   - This causes bleeding into the tissues, bruising, and slow blood clotting after injury.
   - Factors that can decrease platelet production include:
   - Leukemia and other cancers.
   - Some types of anemia
   - Viral infections, such as hepatitis C or HIV.
   - Chemotherapy drugs and radiation therapy.
   - Heavy alcohol consumption.

5. Illustrate the effects of parathyroid hormone on bone
   - Parathyroid hormone (PTH)
   - Provides powerful mechanism for controlling extracellular

- calcium and phosphate concentrations.
- PTH regulates Ca ion concentration
- **By stimulating bone resorption**
- **By stimulating activation of vitamin D -Ca reabsorption**

6. Describe the biological function of calcitonin
   - Calcitonin, a peptide hormone secreted by the thyroid gland.
   - Tends to decrease plasma calcium concentration.
   - In general, has effects opposite to PTH

7. Write a brief note on the role of osteoblast in bone metabolism?
   - Osteoblasts (bone forming cells) synthesize new bone to replace the resorbed bone.
   - Found on the outer surfaces of the bones and in the bone cavities.

Section B **(2 x 5 = 10)**

Answer any TWO questions

8. Write a note on haemophilia A and B

   Deficiency and inheritance (2 marks)

   - Hemophilia A (HA) is more common than hemophilia B (HB), with a prevalence of one in 5,000 male live births compared to one in 30,000, respectively.
   - Hemophilia A and B are rare X-linked bleeding disorders caused by mutations in the genes encoding coagulation factor VIII (FVIII) and factor IX (FIX) , the blood cannot clot properly to control bleeding. The CDC estimates about 10 in 100,000 people have hemophilia A.ia.
   - Both hemophilia A and B are inherited in the same way, because both the genes for factor VIII and factor IX are located on the X chromosome, an inherited X-linked recessive trait, with the defective gene located on the X chromosome. Females have two copies of the X chromosome. If the factor IX gene on one chromosome does not work, the gene on the other chromosome can do the job of making enough factor IX

Symptoms (2 marks)

- Bleeding: Babies and toddlers may bleed from their mouths after minor injuries, like bumping their mouths on a toy.
- Swollen lumps on their heads: Babies and toddlers who bump their heads often develop goose eggs — large round lumps on their heads.
- Fussiness, irritability or refusing to crawl or walk
- Hematomas: A hematoma is a mass of congealed blood that gathers under babies' or toddlers' skin. Babies and toddlers may develop hematomas after receiving an injection.
- Breathing difficulties: Sometimes, bleeding may cause your child's tongue to swell so much that it blocks their airway.**Tests to diagnose(1 mark)** Complete blood count,Prothrombin time (PT) test, Activated partial thromboplastin time test,Fibrinogen test: This is a blood test to

2. Test is usually done after a overnight fast-ing. (It may be done 5 hours after fasting)
3. Fasting blood and urine samples are collected.
4. Patient should take 75 grams of glucose dissolved in 200 ml of distilled water.
5. Blood is taken every 30 minutes up to 2½ hour (5 samples are taken).
6. Urine is collected after taking glucose at the end of 1 hour and at the end of 2 hours (3 samples).
7. Blood sugar is estimated by blood sample and urine is examined in the presence of sugar; there is a graphical representation wherein time (in hours) is along base line and blood glucose or sugar (mg/dl) along vertical line.

Different Types of Curves in Glucose Tolerance Test:

A. Normal Response

B. Abnormal Response

A. Normal Response:

(a) Initial rise of blood sugar is normal, and it never crosses renal thresh-hold.

(b) It returns to normal within 1 hours usu-ally, and almost always within 2 hours.

B. Abnormal Response:

(i) Diminished glucose tolerance.

(ii) Increased glucose tolerance.

(iii) Lag curve.

(iv) Decreased renal threshold.

(v) Increased renal threshold.

(i) Diminished glucose tolerance:

In this condition blood sugar is increased more than in normal patient, fasting blood sugar may be high and return to normal level is delayed. Urine shows glycosuria in most sample.

Two types of curves:

(a) Curve for true diabetes.

(b) Curve for potential diabetes.

(ii) Increased glucose tolerance:

(a) Blood sugar level is not very much in-creased and never crosses renal threshold.

(b) No glycosuria is found. This type of curve is found in hypofunction of pituitary, thyroid, adrenal, and also in malabsorption syndrome, coeliac disease, and sprue.

(c) In the above-mentioned curve, fasting blood sugar is normal. Increase of blood sugar is not very much, always below re-nal threshold, and comes back to normal within half an hour. This curve is called flat type curve.

(iii) Log curve:

(a) Some apparently normal people are found to have tolerance curve in which return of blood sugar is normal but with certain ex-aggeration of blood sugar level. The re-turn to normal value is sharp and rapid. (b) So peak rise is always above renal thresh-old and sugar is absent in fasting sample.

measure the amount of blood protein fibrinogen, which helps with clotting, Clotting factor test: This blood test shows the hemophilia type and severity.

9. Describe the clinical manifestations in various types of hypo lipoproteinemia

- Hypobetalipoproteinaemia (low levels of LDL cholesterol or apolipoprotein B)
- Causes: Malnutrition, Malabsorption, Wasting disease, Certain cancers, Hyperthyroidism, Liver disease

Diagnosis

- Diagnosed via blood study that identifies fat particles.
- The patient must fast overnight to prevent interference from fat in the blood due to food intake.
- The criteria for this (without the involvement of cholesterol-lowering drugs) are total cholesterol levels below 120 mg/dL and LDL cholesterol levels under 50 mg/dL.

Lipoprotein pattern	Major elevations in plasma				
	Lipoprotein			Lipid	
	HDL. mg. / dl.	LDL mg. / dl	VLDL. mg. / dl	Serum Cholesterol. mg. / 100 ml.	Serum Triglycerides. mg. / 100 ml.
Type I	15	15 -30	150 -400	200 – 500	2000
Type II a	Normal	Increased	Increased	Increased	Normal
Type II b	Normal	Increased	Increased	Increased	140-400
Type III	Normal	150	Increased	Increased	200-1000
Type IV	Normal	150	Increased	200-400	200-500
Type V	40	130	Increased	200-800	200-4000

Treatment

Vitamin E supplements have shown to help children with the deficiency.

- Types -2 marks
- Clinical manifestation- (3marks)

10. Summarize GTT and its interpretation.

- Glucose Tolerance Test: Types, Utility and Procedure

Glucose Tolerance Test (GTT):- 1. Types of Glucose Tolerance Test 2. Utility of Glucose Tolerance Test **(2.5 marks)**3. Procedure 4. Different Types of Curves. **(2.5 marks)**

Types of Glucose Tolerance Test:

1. Oral glucose tolerance.
2. Intravenous glucose tolerance.
3. Cortisone stress glucose tolerance test.
4. Multiple dose glucose tolerance tests.

Utility of Glucose Tolerance Test:

1. To detect the cause of abnormality of car-bohydrate metabolism.
2. To detect cause of asymptomatic glycosuria.

Procedure of Glucose Tolerance Test:

1. Patient should take normal meal or carbo-hydrate diet 3 or 4 days before the test.

- In Type 2N, the VWF attaches to the platelets normally. However, the VWF does not attach to another protein, Factor VIII, which is also needed for blood to clot. This causes the body to remove the Factor VIII (8) protein.

Type 3

- This is the most severe form of VWD, in which a person has very little or no VWF and low levels of factor VIII. This is the rarest type of VWD. Only 3% of people with VWD have Type 3.

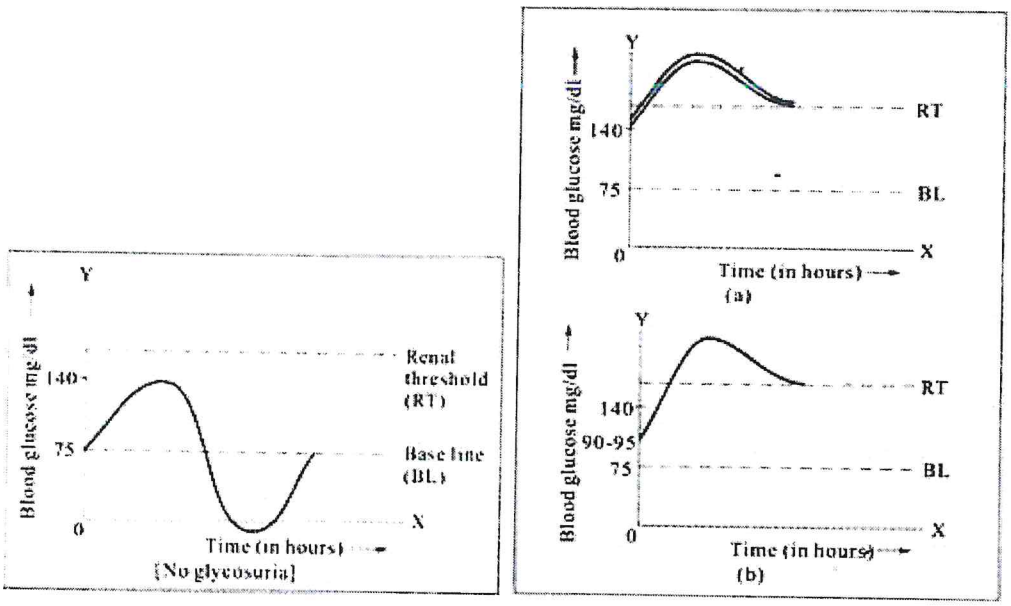
Causes:

- **It** almost always is inherited, or passed down, from a parent to a child. VWD can be passed down from either the mother or the father, or both, to the child.
- While rare, it is possible for a person to get VWD without a family history of the disease. This can happen if a spontaneous mutation occurs. That means there has been a change in the person's gene. Whether a child receives the affected gene from a parent or because of a mutation, once the child has it, the child can later pass it along to his or her children.
- Also, it is rare, but possible, for a person to get or acquire VWD (they didn't receive the affected gene from their parent or because of a mutation) later in life because of an underlying medical condition. This can happen when a person's own immune system (which controls the body's ability to fight germs and sickness) destroys his or her VWF, often because of the use of a medication or because of another disease. If VWD is acquired in this way, it cannot be passed along to any children.

Section C **(1 x 10 = 10)**

Answer any ONE question

12. Summarize the causes, types, symptoms, and diagnosis of Leukaemia
    - Causes- 2 marks
    - Types and clinical significance- 5 marks
    - Symptoms-2marks ;Diagnosis-1 mark
13. Explain the mechanism of regulation of calcium concentration in plasma and associated abnormalities



11. Illustrate Von Wille brand's disease

The most severe form of the condition is "**autosomal recessive**," which means both parents must pass a mutated gene.

Types of VWD

Type 1

- This is the most common and mildest form of VWD, in which a person has lower-than-normal levels of VWF. A person with Type 1 VWD also might have low levels of factor VIII (8), another type of blood-clotting protein. About 85% of people treated for VWD have Type 1.

Type 2

- With this type of VWD, although the body makes normal amounts of the VWF, the factor does not work the way it should. Type 2 is further broken down into four subtypes—2A, 2B, 2M, and 2N—depending on the specific problem with the person's VWF. Because the treatment is different for each type, it's important that a person know which subtype he or she has.
- In Type 2A, the VWF is not the right size and doesn't help the platelets attach in order to form a clot.
- In Type 2B, the VWF attaches to platelets at the wrong time (when there is no injury). The body removes the platelets attached to VWF, causing a reduced amount of both platelets and VWF in the blood when needed to form a clot.
- In Type 2M, the VWF does not attach to the platelets as it should, which decreases the platelets' ability to form a clot when an injury occurs.

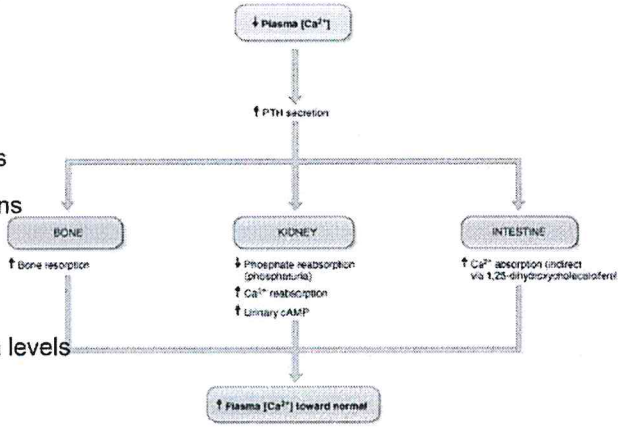
Calcium regulation:

Blood calcium is tightly regulated by:

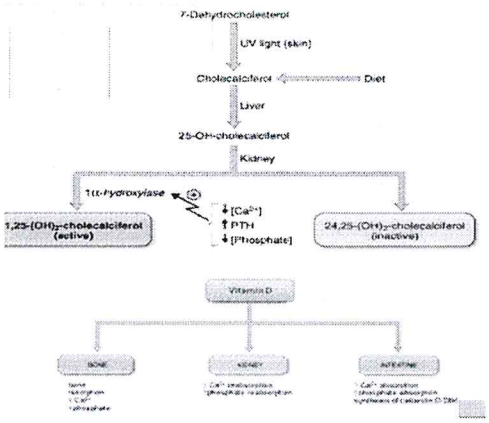
1) Principle organ systems:
   - Intestine
   - Bone
   - Kidney
2) Hormones:
   - Parathyroid hormone (PTH)
   - Vitamin D
   - Calcitonin

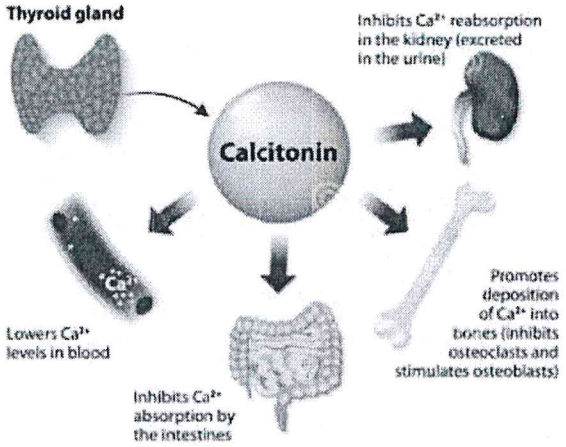
Parathyroid hormone PTH:

- PTH is secreted by chief cells of parathyroid glands
- It is the major factor of Ca2+ homeostasis in humans
- The dominant regulator of PTH is plasma Ca2+
- When Ca2+ falls, cAMP rises and PTH is secreted
- The overall action of PTH is to increase plasma Ca levels and decrease plasma phosphate levels



VITAMIN D





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DEPARTMENT OF BIOCHEMISTRY

UNIT TEST II, OCTOBER 2022

Class	: II M.Sc.,Biochemistry	Time	: 12 to 1.00 PM
Subject Name	: Molecular Biology	Subject Code	: MEN3C
Date	: 02.11.2022	Max. Marks	: 25

PART A – (5 X 1 = 5)

Answer any FIVE questions

CO.4 BL: 1 1. Definepribnow box?
CO.4 BL: 1 2. Define Spliceosome.
CO.1 BL: 4 3. Explain bacterial conjugation?
CO.4 BL: 1 4. Define nascent RNA.
CO.4 BL: 6 5. Write notes on DNA sequence at 30 nm.
CO.5BL: 6 6. Writeany two inhibitors of translation process.
CO.5 BL: 6 7.Write notes on Start and stop codons.

PART B – (5 X2 = 10)

Answer any TWOquestions

CO.4 BL: 4 8. Explain the regulation of lac operon.
CO.2 BL: 2 9. Describe the post transcription modification of mRNA.
CO.5 BL: 2 10.Describe the structure, composition and functions of ribosomes.
CO.5 BL: 4 11.Explain the degeneracy of genetic code.

PART C – (1 X 10 = 10)

Answer any ONE question

CO.4 BL: 3 12. Illustrate transcription? Summarize the important events in the process of transcription.
CO.5 BL: 6 13. Write an account on Eukaryotic translation with suitable diagram.

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UNIT TEST II, OCTOBER 2022

Class : II M.Sc.,Biochemistry Subject Name : Molecular Biology

Subject Code : MEN3C Answer Key

PART A – (5 X 1 = 5)

Answer any FIVE questions

1. Define pribnow box?

The **Pribnow box** (also known as the **Pribnow-Schaller box**) is a sequence of *TATAAT* of six nucleotides (thymine, adenine, thymine, etc.) that is an essential part of a promoter site on DNA for transcription to occur in bacteria. It is an idealized or consensus sequencethat is, it shows the most frequently occurring base at each position in many promoters analyzed; individual promoters often vary from the consensus at one or more positions. It is also commonly called the **-10 sequence**, because it is centered roughly ten base pairs upstream from the site of initiation of transcription.

2. Define Spliceosome.

Spliceosomes are the large ribonucleoprotein complexes that catalyse splicing in pre-mRNA or hnRNA. They remove introns from the pre-mRNA transcript. They are found in the eukaryotic nuclei.

mRNA or messenger RNA is a single-stranded RNA molecule. It is complementary to the DNA and provides the template for protein synthesis. In eukaryotes, mRNA is synthesised in the nucleus from DNA by a process called transcription. RNA polymerase II catalyses the transcription of pre-mRNA.The pre-mRNA is called hnRNA or heterogeneous nuclear RNA. The hnRNA undergoes processing to form the mature mRNA, which is then transported out of the nucleus. The translation or protein synthesis takes place in the cytoplasm.The hnRNA undergoes post-transcriptional processing to produce mature mRNA. It contains both exons and introns, which are coding and non-coding regions respectively. The pre-mRNA undergoes splicing, capping and tailing to produce functional mRNA.

3. Explain bacterial conjugation?

Bacterial conjugation is the transfer of genetic material between bacterial cells by direct cell-to-cell contact or by a bridge-like connection between two cells.

This takes place through a pilus. It is a **parasexual mode of reproduction in bacteria.**

4. Define nascent RNA.

The nascent or newly formed RNA synthesized by RNA polymerase II is called hnRNA or primary transcript. It contains both unwanted base sequence (introns) alternated with useful base sequences or exons. The primary transcript is converted into functional mRNA after post transcriptional processes which involves capping ,tailing and splicing.Here introns are removed and hnRNA becomes the functional mRNA.

5. Write notes on DNA sequence at 30 nm.

Chromatin is a genetic material or a macromolecule comprising DNA, RNA, and associated proteins, which constitute chromosomes in the nucleus of a eukaryotic cell.

Chromatin is located within the cell nucleus. The main functions of this genetic material include:

1. Preventing DNA damage.
2. Tightly packing the DNA to fit into the cell.
3. Control the DNA replication and gene expression.
4. Support the DNA molecule to permit the process of the cell cycle – meiosis and mitosis.

The structure of chromatin or the so-called nucleosomes resembles the arrangement of string on beads when observed under the light microscope in its elongated method. Each nucleosome comprises DNA, which is wrapped with eight proteins termed histones. Later, these nucleosomes are enfolded to a 30 nm coiled named solenoid. Therefore the presence of histone proteins helps in supporting the chromatin structure.

6. Write any two inhibitors of translation process.

Streptomycin and puromycin

7. Comment on Start and stop codons.

AUG, as the start codon, is in green and codes for methionine. The three stop codons are UAA, UAG, and UGA. Stop codons encode a release factor, rather than an amino acid, that causes translation to cease. Many scientists worked to decipher the genetic code.

PART B – (1 X 5 = 5)

Answer any ONE question

8. Explain the regulation of lac operon.

The control of gene expression

• Each cell in the human contains all the genetic material for the growth and development of a human
• Some of these genes will be need to be expressed all the time
• These are the genes that are involved in of vital biochemical processes such as respiration
• Other genes are not expressed all the time • They are switched on an off at need.

Operons

• An operon is a group of genes that are transcribed at the same time.
• They usually control an important biochemical process.

• They are only found in prokaryotes.

The lac Operon

• The lac operon consists of three genes each

involved in processing the sugar lactose
• One of them is the gene for the enzyme β- galactosidase

• This enzyme hydrolyses lactose into glucose and galactose.

Figure : 2 mark
Explanation : 2 mark
Regulation : 1 Mark

9. Describe the post transcription modification of mRNA.

Mechanism : 2 mark
Figure : 2 mark
Explanation : 1 Mark

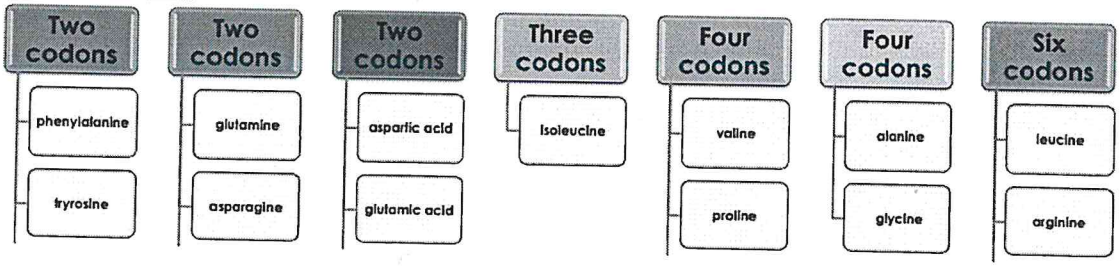
10. Describe the structure, composition and functions of ribosomes.
Structure (1M)
Composition (1M)
Subunits in prokaryotes and eukaryotes (1M)
Function (2M)

11. Comment on degeneracy of genetic code.

More than one codon may specify the same amino acid; this is called degeneracy of the code

18 amino acids have more than one codon.

Amino acid tryptophan and methionine have a single codon each.



PART C – (1 X 10 = 10)

Answer any ONE question

12. Illustrate transcription? Summarize the important events in the process of transcription.

Transcription initiation	: 3 mark
Elongation	: 1 mark
Rho-dependent termination	: 2 mark
Rho independent termination	: 2 mark
Explanation	: 2 mark

13. Write an account on Eukaryotic translation with suitable diagram.
    Diagram (2M)
    Activation of amino acids (2M)
    Initiation (2M)
    Elongation (2M)
    Termination (2M)

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DEPARTMENT OF BIOCHEMISTRY

UNIT TEST II, OCTOBER 2022

Class: II MSc Biochemistry **Date:** 04.11.2022

Subject: Environmental Biotechnology **Time:** 12 to 1.00

PM**Subject Code:** MDTBB **Max. Mark:** 25

PART A – (5 X 1 = 05 Marks)

Answer any FIVE questions

CO.1 BL:6 1. Write about Stirred tank reactor

CO.1 BL:1 2. Tell about biofilm

CO.1 BL:1. 3. Quotes about an impeller

CO.1 BL:5 4.Comment on Freons.

CO.1 BL:6 5. Write notes on coliform bacteria.

CO.2 BL:5 6.Define Pycoremidiation

CO.2 BL:3 7.Tell about sludge

PART B – (2 X 5 = 10 Marks)

Answer any ONE question

CO.1 BL: 6 8. Explain air lift Bioreactor anf Fluidized bed reactor.

CO.2 BL:6 9. Write note on Denitrification.

CO.2 BL:6 10. Write short notes on the chemical treatment of drinking water.

CO.2 BL:4 11. Describe methanogenesis

PART C – (1 X 10 = 10 Marks)

Answer any ONE question

CO.1 BL: 6 12.Write a short note on trickling filter and Imhoff tank

CO.2 BL: 6 13. Explain solids removal in waste water treatment.

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DEPARTMENT OF BIOCHEMISTRY

UNIT TEST II, NOVEMBER 2022

Class: II MSc Biochemistry

Subject: Environmental Biotechnology

Subject Code: MDTBB

Date: 04.11.2022

Time: 12 to 1.00 PM

Max. Mark: 25

PART A – (5 X 1 = 05 Marks)

Answer any FIVE questions

CO.1 BL:6 1. **Write about Stirred tank reactor**

A continuous stirred tank reactor (CSTR) is a batch reactor equipped with an impeller or other mixing device to provide efficient mixing. In chemical engineering the name CSTR is often used to refer to an idealised agitated tank reactor used to model operation variables required to attain a specified output.

CO.1 BL:1 2. **Tell about biofilm**

The ability to form biofilms is a universal attribute of bacteria. Biofilms are multicellular communities held together by a self-produced extracellular matrix. The mechanisms that different bacteria employ to form biofilms vary, frequently depending on environmental conditions and specific strain attributes.

CO.1 BL:1. 3. **Quotes about an impeller**

The impeller, also known as agitator, is a key component of the bioreactor. It performs the important tasks of mixing, aeration, heat and mass transfer within the vessel. Learn about the different characteristics of various types of impeller and the importance of their designs.

CO.1 BL:5 4. **Comment on Freons**

Freon is a registered trademark of the Chemours Company and generic descriptor for a number of halocarbon products. They are stable, nonflammable, low toxicitygases or liquids which have generally been used as refrigerants and as aerosol propellants. These include the chlorofluorocarbons (CFCs) that cause ozone depletion and HCFCs (such as chlorodifluoromethane).

CO.1 BL:6 5. **Write notes on coliform bacteria**

Coliform bacteria are organisms that are present in the environment and in the feces of all warm-blooded animals and humans. Coliform bacteria will not likely cause illness. However, their presence in drinking water indicates that disease-causing organisms (pathogens) could be in the water system.

CO.3 BL:1 6.**Define Pycoremidiation**

Phycoremediation is the use of macro- or microalgae for the reduction or biotransformation of pollutants, including nutrients and harmful chemicals from wastewater.

CO.3 BL:3 7.**Tell about sludge**

Semi-solids such as faeces that settle down during wastewater treatment are called sludge

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UNIT TEST II, NOVEMBER 2022

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Subject: Environmental Biotechnology | **Time:** 12 to 1.00 PM

Subject Code: MDTBB | **Max. Mark:** 25

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hydrogenotrophicmethanogenesis, H_2 is oxidized to H^+, and CO_2 is reduced to CH_4

SUBSTRATES UTILIZED

Complex organic compounds cannot be utilised by methanogens.

They use only C1 compounds and the only C2 compound: Acetate.

There are two nutritional groups of methanogens.

- Obligate chemolithotrophic methanogens that grow with CO_2 plus H_2 according to the equation:-

$$CO_2 + 4H_2 \longrightarrow CH_4 + 2H_2O$$

- Some of these organisms live with the **Quasi-chemolithotrophic** substrates HCOOH and CO

$$4HCOOH \longrightarrow 4CO_2 + 4H_2$$

$$CO_2 + 4H_2 \longrightarrow CH_4 + 2H_2O$$

PART C – (1 X 10 = 10 Marks)

Answer any ONE question

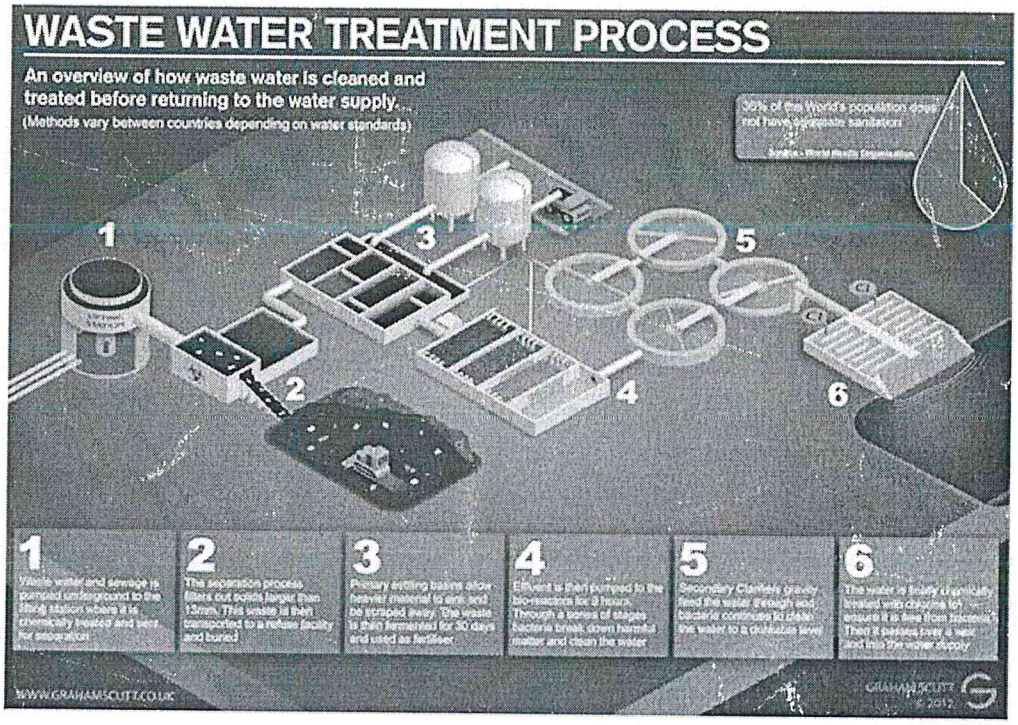
CO.1 BL: 4 12.**Write a short note on trickling filter and Imhoff tank**

A trickling filter is a type of wastewater treatment system. It consists of a fixed bed of rocks, coke, gravel, slag, polyurethane foam, sphagnum peat moss, ceramic, or plastic media over which sewage or other wastewater flows downward and causes a layer of microbial slime (biofilm) to grow, covering the bed of media. Aerobic conditions are maintained by splashing, diffusion, and either by forced-air flowing through the bed or natural convection of air if the filter medium is porous. The treatment of sewage or other wastewater with trickling filters is among the oldest and most well characterized treatment technologies.

The fundamental components of a complete trickling filter system are:

- a bed of filter medium upon which a layer of microbial slime is promoted and developed;
- an enclosure or a container which houses the bed of filter medium;
- a system for distributing the flow of wastewater over the filter medium; and
- a system for removing and disposing of any sludge from the treated effluent.

CO.3 BL: 6 13. **Explain solids removal in waste water treatment.**



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Question & Answer Key

2022-2023

Odd Semester

SRM ARTS AND SCIENCE COLLEGE, KATTANKULATHUR
DEPARTMENT OF BIOCHEMISTRY
UNIT TEST I, NOVEMBER 2022

Class	:	I M.Sc., Biochemistry	Date	:	29-11-2022
Subject	:	Biomolecules	Time	:	2.30 to 3.30 PM
Subject Code	:	MG21A	Max. Mark	:	25

PART A – (5 X 1 = 5)
Answer any FIVE questions

CO.3 BL: 6 1. Write the biological importance of haemoglobin.

CO.5 BL: 2 2. Differentiate DNA and RNA regarding their composition.

CO.3 BL: 2 3. Describe the structural characteristics of collagen.

CO.5 BL: 1 4. List the different types of major and minor RNA.

CO.2 BL: 2 5. Explain the structure of cholesterol and add a note on its function.

CO.2 BL: 1 6. Define good cholesterol and bad cholesterol.

CO.2 BL: 6 7. Write any two functions of sphingolipids.

PART B – (2 X 5= 10)
Answer any TWO questions

CO.3 BL: 5 8. Summarize about the Ramachandran plot and its salient features.

CO.3 BL: 3 9. Illustrate the different forms of DNA.

CO.2 BL: 2 10. Explain the lipoprotein classification and functions.

CO.2 BL: 6 11. Write a note on

a) Phospholipids.
b) Triglyceridesa.
c) Prostaglandins.

PART C – (1 X 10 = 10)
Answer any ONE question

CO.5 BL: 3 12. Illustrate the Sanger's and Maxam Gilbert method of DNA sequencing.

CO.2 BL: 2 13. Discuss in detail about the classification of lipids.

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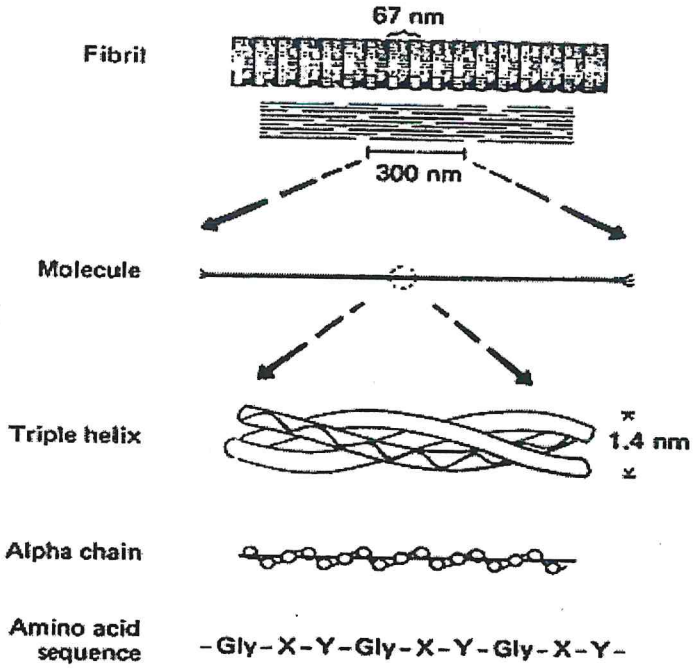
ANSWER KEY
PART A – (5 X 1 = 5)

Answer any FIVE questions

1. Write the biological importance of haemoglobin.
   - Hb is a transport protein.
   - It carries oxygen from lungs to tissues .and carbon dioxide from tissues to lungs.
2. Differentiate DNA and RNA regarding their composition.

DNA	RNA
Deoxyribo nucleic acid	Ribo nucleic acid
Pento sugars present-2- Deoxy ribose	Ribose
Nitrogenous bases- Adenine. Guanine/ cytosine and thymine,	Adenine. Guanine/ cytosine and uracil,

3. Describe the structural characteristics of collagen.
   - Collagen is almost unique among proteins in its use of **triple-helical secondary structure**.
   - The triple-helix is composed of three polypeptide chains, each with the repeating triplet Gly-X-Y, where X and Y are frequently (~22% occurrence of each in type I collagen) proline and 4-hydroxyproline, respectively.



4. List the different types of major and minor RNA.

Major RNA: i.messenger RNA (mRNA) – It is the RNA that carries information from DNA to the ribosomes (site of protein synthesis) in the cell. The mRNA code sequences determine the amino acid sequence in the protein that is produced.

ii. ribosomal RNA (rRNA) – It incorporates into the ribosomes.

iii.transfer RNA (tRNA) – It is used to transfer specific amino acids to growing polypeptide chains at the ribosomal site of protein synthesis during translation.

Minor RNA: small nuclear RNA (snRNA)

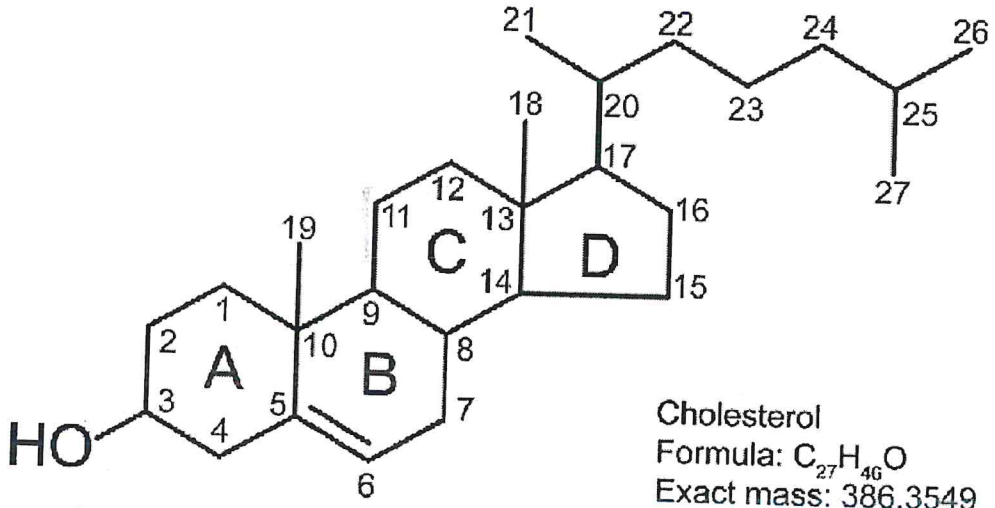
i.microRNA (miRNA) – They are used to regulate gene activity; They are tiny (~22 nucleotides) RNA molecules that regulate the expression of messenger RNA (mRNA) molecules.

ii.**small nucleolar RNA (snoRNA).**

iii.long non-coding RNA (lncRNA).

iv.catalytic RNA (ribozymes) which functions as an enzymatically active RNA molecule

5. Explain the structure of cholesterol and add a note on its function.



Cholesterol
Formula: $C_{27}H_{46}O$
Exact mass: 386.3549

- Cholesterol is a lipid with a unique structure consisting of four linked hydrocarbon rings forming the bulky steroid structure.
- There is a hydrocarbon tail linked to one end of the steroid and a hydroxyl group linked to the other end.

Functions of cholesterol-

- Cholesterol is an essential component of the cell membrane
- It is needed to maintain proper membrane permeability and fluidity.
- It is also needed for the synthesis of Steroid Hormones, Vitamin D and Bile Acids.

6. Define good cholesterol and bad cholesterol.

Two types of lipoproteins carry cholesterol to and from cells. One is low-density lipoprotein, or LDL. The other is high-density lipoprotein, or HDL. A test measures the amount of each type of cholesterol in your blood.

LDL (bad) cholesterol

LDL cholesterol is considered the "bad" cholesterol, because it contributes to fatty buildups in arteries (atherosclerosis). This narrows the arteries and increases the risk for heart attack, stroke and peripheral artery disease (PAD).

HDL (good) cholesterol

HDL cholesterol can be thought of as the "good" cholesterol because a healthy level may protect against heart attack and stroke.

HDL carries LDL (bad) cholesterol away from the arteries and back to the liver, where the LDL is broken down and passed from the body. But HDL cholesterol doesn't completely eliminate LDL cholesterol. Only one-third to one-fourth of blood cholesterol is carried by HDL.

Triglycerides

Triglycerides are the most common type of fat in the body. They store excess energy from your diet.

A high triglyceride level combined with high LDL (bad) cholesterol or low HDL (good) cholesterol is linked with fatty buildups within the artery walls, which increases the risk of heart attack and stroke.

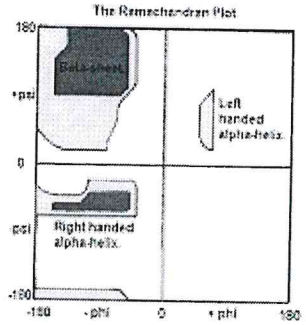
7. Write any two functions of sphingolipids.

Sphingolipids are enriched in the Central Nervous System (CNS) and display multiple biological functions. They participate in tissue development, cell recognition and adhesion, and act as receptors for toxins

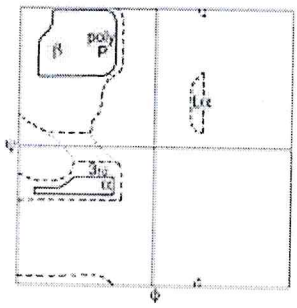
PART B – (2X5= 10)

Answer any TWO questions

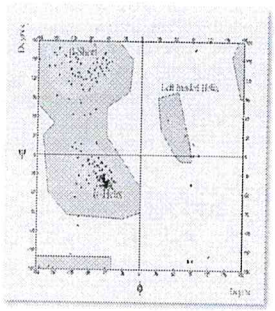
8. Summarize about the Ramachandran plot and its salient features.
(Diagram 2.5 marks& explanation 2.5 marks)
Ramachandran plot is a two-dimensional (2D) plot of the torsional angles of amino acids φ (phi) and ψ (psi) in a protein sequence. The φ represents the dihedral angle between N(i-1)-C(i)-CA(i)-N(i) and ψ is the backbone dihedral angle between C(i)-CA(i)-N(i)-C(i+1). The plot was developed by G.N. Ramachandran in 1963.



A.



B.



C.

A. In the diagram above the white areas correspond to conformations where atoms in the polypeptide come closer than the sum of their van der Waals radi. These regions are sterically

disallowed for all amino acids except glycine which is unique in that it lacks a side chain. The red regions correspond to conformations where there are no steric clashes, ie these are the allowed regions namely the alpha-helical and beta-sheet conformations. The yellow areas show the allowed regions if slightly shorter van der Waals radi are used in the calculation, ie the atoms are allowed to come a little closer together. This brings out an additional region which corresponds to the left-handed alpha-helix.

B. Original hard-sphere, reduced-radius, and relaxed-tau φ,ψ regions from Ramachandran, with updated labels and axes.

C. Distribution of the amino acid Phi/Psi angles in the orotidine 5′-monophosphate decarboxylase.

9. Illustrate the different forms of DNA.

Three different DNA types (Explanation 3marks, diagram 2 marks)

1. **A-DNA**

A-DNA is right-handed DNA. It has a double helix structure. The A form of this DNA type is mainly formed because it can protect the DNA while there are any occurrences of extreme conditions, namely desiccation. Mostly this type is obtained by dehydrated DNA. The protein binding around it helps remove the solvent from DNA. Therefore, because of this, it takes an A form.

2. **B-DNA**

B-type DNA is considered the most common form of DNA conformation. It consists of a right-handed helix structure. Moreover, under normal psychological conditions, it is very common to see that much DNA possesses a B-type conformation.

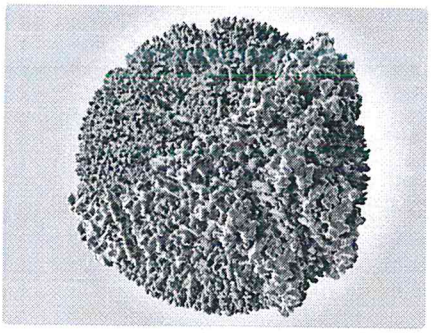
Z-DNA

This DNA type is left-handed DNA. Here, a double helix is present, with the wind in a zigzag pattern to the left. Alexander Rich and Andres Wang invented the Z-DNA. Multiple reports claim that the Z-type DNA was found during the start of the gene. Therefore, one can believe that it might have some crucial roles to play in regulating genes.

	A form	B form	Z form
Helical sense	Right handed	Right handed	Left handed
Diameter	~26 Å	~20 Å	~18 Å
Base pairs per helical turn	11	10.5	12
Helix rise per base pair	2.6 Å	3.4 Å	3.7 Å
Base tilt normal to the helix axis	20°	6°	7°
Sugar pucker conformation	C-3′ endo	C-2′ endo	C-2′ endo for pyrimidines; C-3′ endo for purines
Glycosyl bond conformation	Anti	Anti	Anti for pyrimidines; syn for purines

10. Explain the lipoprotein classification and functions.

Lipoproteins are classified based on their density, electrophoretic mobility, and nature of apoprotein content. Based on their density, lipoproteins can be classified into chylomicrons, very low-density lipoproteins (VLDL), intermediate density lipoproteins (IDL), low-density lipoproteins (LDL), and high-density lipoproteins (HDL).



Lipoproteins are complex particles that consist of a central core of cholesterol esters and triacylglycerols that are nonpolar in nature. To make lipoproteins hydrophilic, the central core is surrounded by amphipathic molecules such as apolipoproteins, free cholesterol, and phospholipids with the polar groups facing the aqueous medium.

Lipoproteins with a higher fat to protein ratio are larger and less dense. This allows lipoproteins of different sizes to be separated and identified through processes such as electrophoresis and ultracentrifugation. Upon centrifugation, lipoproteins with high protein content sediment easily due to their high density whereas lipoproteins with high lipid content have low density and will float on the surface.

Classifying lipoproteins based on density

High-Density Lipoproteins (HDL)

HDL has a density range between 1.063 and 1.121 g/mL and size between 5 and 12 nm. In a healthy individual, it is composed of approximately 33% protein, 29% phospholipid, and 8% triacylglycerol.

The role of HDL is to collect fat molecules such as phospholipids, cholesterol, and triglycerides in the cells of the body and transport it to the liver to be broken down. HDL is sometimes known as "good" cholesterol because high concentrations of this lipoprotein usually correspond to healthier blood vessels and lower risk of atherosclerosis.

Low-Density Lipoproteins (LDL)

The density of LDL is between 1.019 and 1.063 g/mL and ranges in diameter from 18 to 28 nm. In a healthy individual, it is composed of approximately 25% protein, 21% phospholipid, and 4% triacylglycerol.

LDL is important for the transport of fat molecules such as phospholipids, cholesterol, and triglycerides around the body. It is sometimes known as "bad" cholesterol because elevated concentrations of LDL are an indicator of an underlying disease such as atherosclerosis and other cardiac diseases.

Subtypes of LDL are large buoyant LDL (lb-LDL) and small dense LDL (sd-LDL).

Intermediate Density Lipoproteins (IDL)

The density of IDL is between 1.006 and 1.019 g/mL and ranges in diameter from 25 to 50 nm. In a healthy individual, it is composed of approximately 31% triacylglycerol, 22% phospholipid, and 18% protein. This type of lipoprotein is not usually present in the blood when fasting.

Very Low-Density Lipoproteins (VLDL)

VLDL has a density between 0.950 and 1.006 g/mL and ranges in diameter from 30 to 80 nm. In a healthy individual, it is composed of approximately 50% triacylglycerol, 18% phospholipid, and 10% protein.

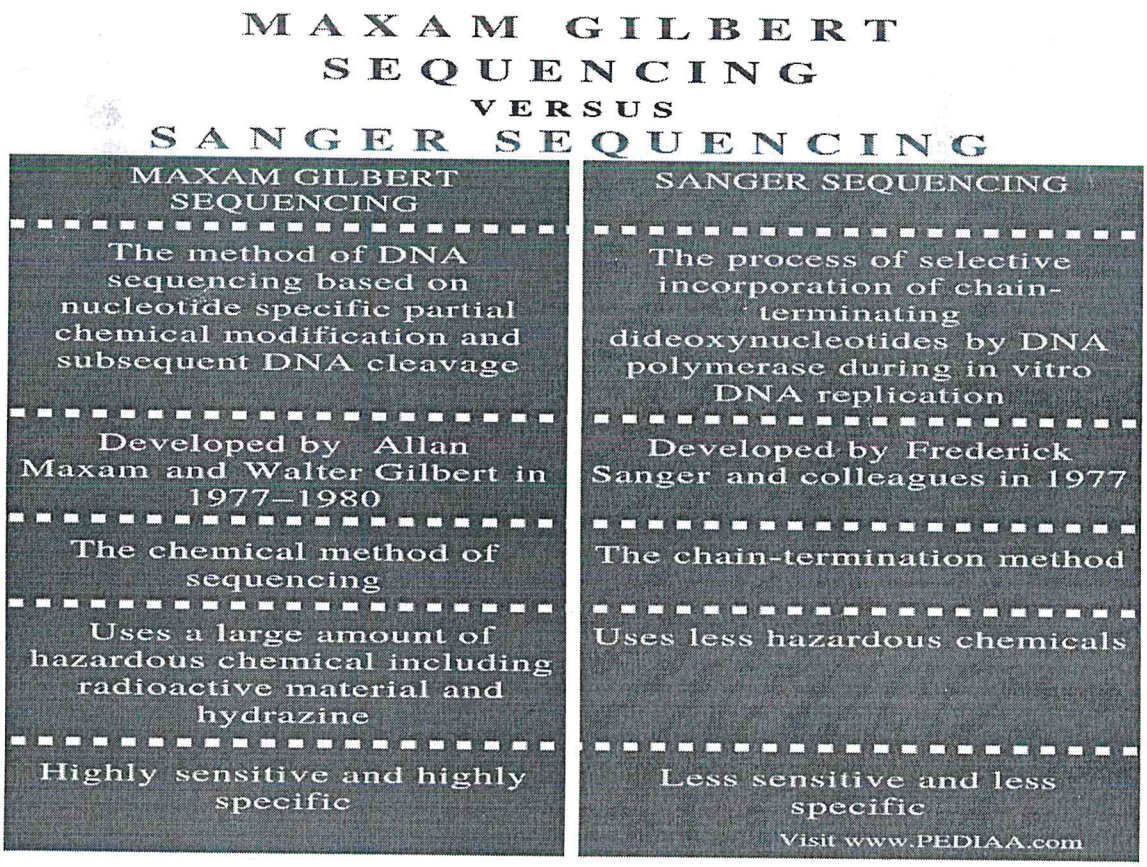
This lipoprotein is responsible for the transportation of synthesized triglyceride from the liver to the adipose tissue for storage.

If you regularly eat more calories than you burn, particularly from high-carbohydrate foods, you may have high triglycerides (hypertriglyceridemia).

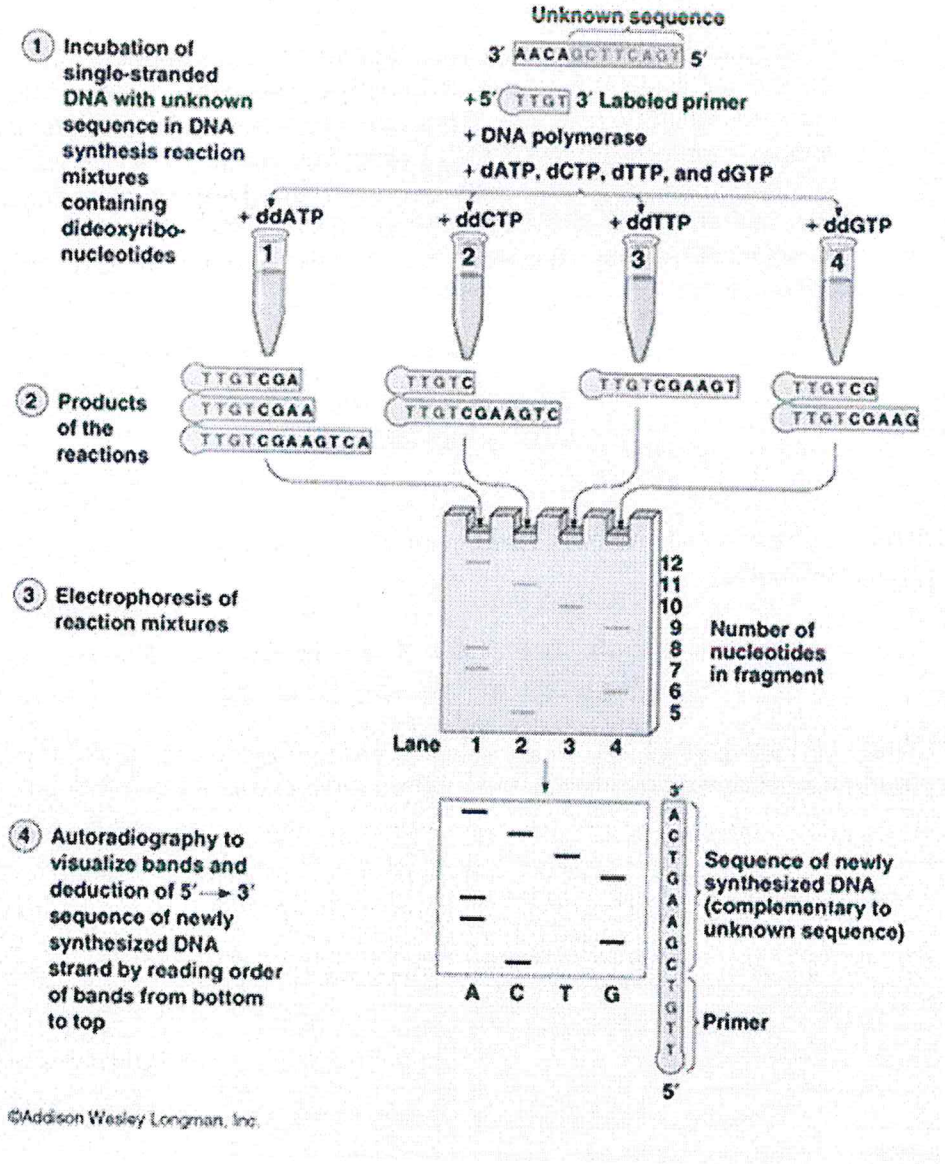
c. Prostaglandins are lipid autacoids derived from arachidonic acid. They both sustain homeostatic functions and mediate pathogenic mechanisms, including the inflammatory response. They are generated from arachidonate by the action of cyclooxygenase (COX) isoenzymes and their biosynthesis is blocked by nonsteroidal anti-inflammatory drugs (NSAIDs), including those selective for inhibition of COX-2. Despite the clinical efficacy of NSAIDs, prostaglandins may function in both the promotion and resolution of inflammation.

PART C – (1 X 10 = 10)
Answer any ONE question

12. Illustrate the sanger's and Maxam Gilbert method of DNA sequencing. (Explanation 5 marks, reactions 5 marks)



Maxam-Gilbert sequencing:
This is a chemical-degradation method allowing to sequence dsDNA without previous *in vivo* cloning steps. It relies on the specific modifications of the DNA nitrogenous bases (A, C, G & T) and subsequent cleavage of the ssDNA phosphate backbone at such specifically modified sites.



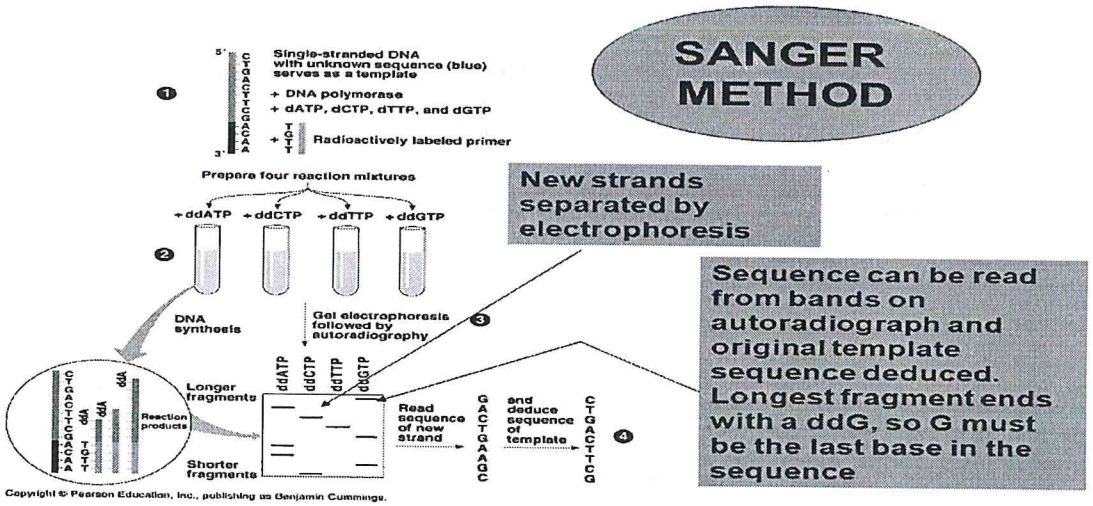
Sanger's method of gene sequencing

Sanger's method of gene sequencing is also known as dideoxy chain termination method

Principle

- DNA primer is attached by hybridization to the template strand and deoxynucleosides triphosphates (dNTPPs) are sequentially added to the primer strand by DNA polymerase.
- The primer is designed for the known sequences at 3' end of the template strand.
- M13 sequences is generally attached to 3' end and the primer of this M13 is made.
- The reaction mixture also contains dideoxynucleoside triphosphate (ddNTPs) along with usual dNTPs.
- If during replication ddNTPs is incorporated instead of usual dNTPs in thegrowing DNA strand then the replication stops at that nucleotide.

Diagrammatic representation of Sanger sequencing



13. Discuss in detail about the classification of lipids.

Lipids are generally the subject of biochemistry which is organic substances that are insoluble in water but soluble in non-polar solvents. Lipids are a large set of natural organic compounds. Lipids are soluble in chloroform, ether, benzene, and acetone. Lipids differ in their structural diversity. Lipids are made up of hydrocarbon chains which include hydrogen, oxygen, and carbon atoms. Lipids are essential for the human body. Lipids can be found in fatty substances.

Classification of lipids

Lipids can be classified based on their physical properties at room temperature on polarity levels, and importance in the human body. But the classification of lipids is done on their physical structure. Based on their physical structure they are classified into three segments.

- **Simple lipids:** Simple lipids consist of two types of structural components. They are: Glyceryl ester is an ester of glycerol and fatty acids. These are mono and diglycerides. Cholesterol esters are esters of cholesterol and fatty acids. Wax is an ester of long-chain alcohol and fatty acids hence the esters of vitamin A and D. Long-chain dye with 12-22 carbon atoms in carbon chain or atomic ceramide of fatty acids with three hydroxyl bases such as sphingosine. Simple lipids are made up of oil, waxes, and fats. These simple lipids are generated from similar lipid substances such as fatty acids. Fatty acids are nothing but a long chain carboxylic acid which is insoluble in water. Carboxylic acids have more than 12 carbons in their structure.
- **Compound/Complex lipids/Heterolipids:** Complex lipids consist of more than two types of structural components. Phospholipids are glycerol esters of fatty acids. Phosphoric acids and other compounds have nitrogen. Phosphatidic acid esterification of diacylglycerol to phosphoric acid. Phosphatidylcholine is a phosphatidic acid

connected to choline known as lecithin. Phosphatidyl acylglycerol so that multiple glycerol molecules bind to phosphoric acid such as cardiolipin. Glycoglycerolipids, that is 1,2-diacylglycerol, are attached to carbohydrate mitochondria by a glycosidic link via position sn-3. Compound lipids are fatty acids that are esterified with alcohol. Additionally, they contain other groups. Relying on these additional groups, they are subdivided into two groups Phospholipids having phosphoric acid and non-phosphorylated lipids.

- **Derived lipids:** Since hydrolysis is a component of simple and complex lipids they either occur as is or are released from another two major segments. Examples of derived lipids are alcohols, fatty acids, fat-soluble vitamins such as A, D, E, and K, sterols, and hydrocarbons.

Lipid profile

The lipid profile is also known as lipid panel. Lipid profile is referred to as a common blood test that is done by doctors and healthcare professionals for monitoring and screening for the possibility of cardiovascular disorder. Lipid profile is carried out through blood tests for screening of a particular fat molecule which is known as lipids. In most of the scenarios, four different types of cholesterol measurements and triglycerides have been performed for implementing lipid profiles. Accumulation of more lipids in blood can cause clots in blood vessels and arteries which further leads to damage to the heart and increases the rate of getting cardiovascular disorders. For this reason, healthcare professionals run lipid profiles for both children and adults to assess the risk of cardiovascular disorders such as stroke and other types of heart diseases. The common names for lipid profiles that are often used by healthcare providers are lipid panel, cholesterol panel, coronary risk panel, fasting, and non-fasting lipid profile.

Structure mandatory	5 marks
Explanation	5 marks

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DEPARTMENT OF BIOCHEMISTRY

UNIT TEST I, NOVEMBER 2022

Class	: I M. Sc Biochemistry	**Date**	: 30.11.2022
Subject	: Biochemical techniques	**Time**	: 12 to 1.00 PM
Subject Code	: MG21B	**Max. Mark**	: 25

Section A-(5 x 1 = 5)

Answer any FIVE questions

CO3	BL6	1.Write the principle of electrophoresis.
CO3	BL1	2. List the various factors affecting electrophoresis.
CO3	BL2	3.Discuss about microchip electrophoresis.Give its applications.
CO1	BL1	4.Enumerate Iso-electric focusing and give its applications.
CO1	BL6	5.Write the different types of supporting medium used for electrophoresis.
CO1	BL6	6. Compile the steps involved in specimen preparation of electron microscope.
CO1	BL6	7. Summarize the flow cytometry. Give its applications.

Section B - (2 x 5 = 10)

Answer any TWO questions

CO1	BL4	8.Explain the principle and differen ttypes of Bio sensors.Give its application.
CO3	BL1	9.Enumerate the principle and instrumentation of a) Phase contrast microscope. b) Fluorescent microscope.
CO3	BL4	10. Explain the principle and procedure for SDS PAGE. Give its applications.
CO3	BL2	11. Discuss the applications of radioactive isotopes.

Section C–(1 x 10 = 10)

Answer any ONE question

CO1	BL4	12. Explain indetailabout the principle and instrumentation of TEM and SEM. Give its applications.
CO3	BL2	13. Discuss about the biological hazards of radio activities.

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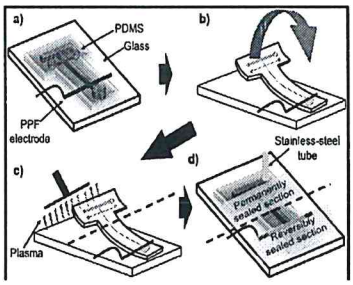
ANSWER KEY

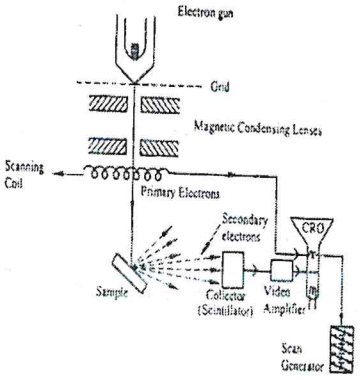
PART A

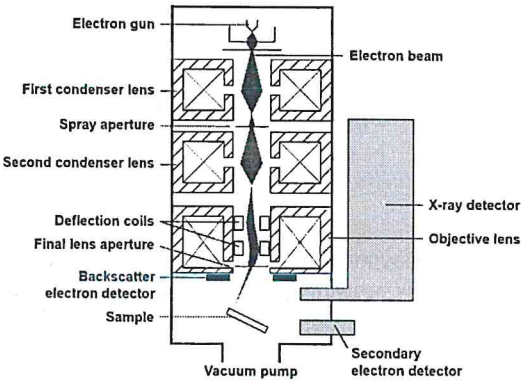
1. **Write the principle of electrophoresis.**
   - Thetermelectrophoresisis describing themigrationofchargedparticlesundertheinfluenceofanelectricfield.
   - Many important biological molecules such as amino acids, peptides,proteins,nucleic acids,nucleotides,enzymesetc, possess ionisablegroupandthereforeatanygivenpH,theyexistingsolutionaschargedspecieseither cation(+Ve)oranion(-Ve).
   - Undertheinfluenceofanelectricfieldthesechargedparticleswillmigrateeithertowarda nodeorcathodedependingonthenatureoftheirnetcharge.
2. **List the various factors affecting electrophoresis.**
   - Factorsaffectingelectrophorese isorelectrophoreticmigration:
   - Chargeofthesample
   - Sizeofthesample
   - Shapeofthesample
   - Electricfield
   - Molecularsievingnatureofsupportingmedium
   - Compositionofbuffer
   - Ionic strength
   - pHofBuffer
3. **Discuss about microchip electrophoresis. Give its applications.**
   - Microchip electrophoresis is miniaturized form of conventional capillary electrophoresis.In Microchip electrophoresis, the basic capillary configuration has been miniaturized and transferred to a chip format. With Microchip electrophoresis, it is possible to integrate injection, separation, and detection on a single microchip.



   - **Applications of microchip electrophoresis:**
     - Microchip electrophoresis has been a key technology to study proteomics, DNA sequencing, antibody-antigen Immuno-separations
     - **Different modes of microchip electrophoresis**
     - Microchip capillary zone electrophoresis - Separation of amino acids and proteins based on their size and charges. Used to quantify the carcinoembryonic antibody –antigen reaction for the detection of cancer disease in blood Serum samples.
     - Microchip gel electrophoresis, Microchip western blotting, Microchip isoelectric focusing. Microchip affinity capillary electrophoresis for enzyme assay.
     - MCE is the development of highly selective and sensitive on chip amperometry detection by means of chemically modified working electrode or using enzyme-catalyzed reactions.

- **Construction:** It consists of an electron gun to produce high energy electron beam. A **magnetic condensing lens** is used to condense the electron beam and a scanning coil is arranged in-between magnetic condensing lens and the sample.The **electron detector** (Scintillator) is used to collect the secondary electrons and can be converted into electrical signal. These signals can be fed into CRO through video amplifier as shown.
- **Working:** Stream of electrons are produced by the electron gun and these **primary electrons** are accelerated by the grid and anode. The electron beam travels through electromagnetic fields and lenses, which focus the beam down toward the sample. These accelerated primary electrons are made to be incident on the surface of the specimen sample rapidly through condensing lenses and scanning coil. A mechanism of deflection coils enables it to guide the beam so that it scans the surface of the sample in a rectangular frame. When the high speed primary electron beam touches or falling over the surface of the specimen, it produces different types of radiations. Secondary electrons (SE), Black scattered electrons (BSE),





- **Biological Applications of TEM**
  - **Biology and life science:**Drug research, Food science, Virology (investigations of virus structure).Toxicology.Cryobiology.
  - **3D Structure:3D Tissue imaging.** Helps to know how cells are organized in a 3D network,their organization determines how cells can interact.
  - **Renders detailed 3D images.** Extremely small microorganisms,Anatomical pictures of insect, worm, spore, or other organic structures.
  - **Forensic Science:**Reveals the presence of materials on evidences that is otherwise undetectable.
  - **Cryo-electron microscopy:**Images can be made of the surface of frozen materials.
  - **Material research:**Medical research.Nanometrology.Material Qualification.
  - **Industries:**Chemical/Petrochemical and mining.Macro sample to nanometer metrology.

13. ....

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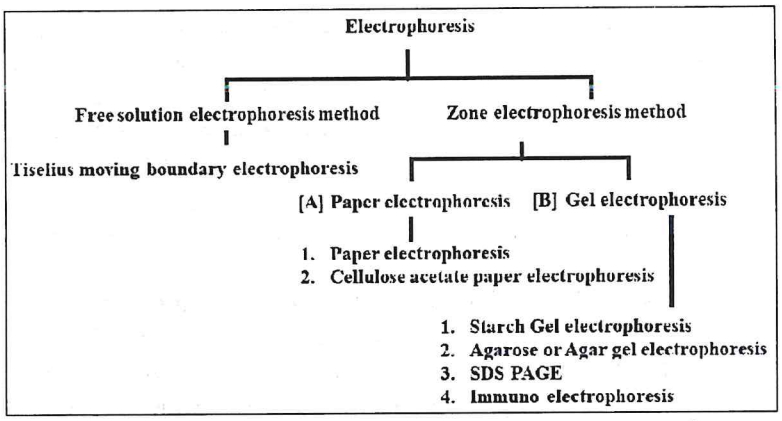
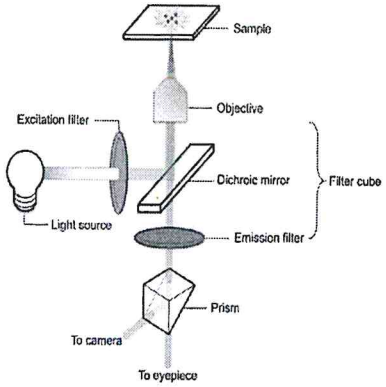


6. **Compile the steps involved in specimen preparation of electron microscope.**

SPECIMEN PREPARATION

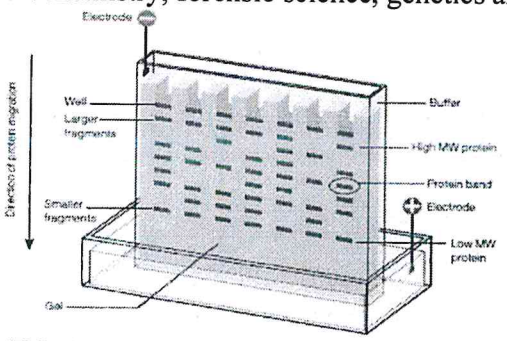
S NO	Steps	Electron Microscope
1	Fixation	Osmium tetroxide, potassium permanganate, formalin, gluatraldehyde.
2	Dehydration	Increasing concentration of ethanol (or acetone) Followed by propylene oxide.
3	Embedding	Araldite: Vestoplaw, Epan 812; Maraglas; Durcopan.
4	Sectioning	Usually 10-100 nm thick sections cut with a glass or diamond knife on an ultramicrotome
5	Mounting	On a perforated metal disc (grid) usually covered with formvar or paralodian.
6	Staining	With salts of heavy metals such as lead acetate, lead citrate, lead hydroxide, uranyl acetate; phosphotungstic acid.
7	Viewing	Grid is placed between the condenser and objective lenses in a vacuum and image is viewed on a phosphorescent screen.

7. **Summarize the flow cytometry. Give its applications.**
   - Flow Cytometry is an extremely powerful technique that can provide a large amount of information at once, and cell can be analyses each cell individually. Flow cytometry is an ideal quantification method for multiplex immunoassays. It is a highly informative method, and is the most precise cell sorting technique, but it is also very expensive. The machine itself is often prohibitively expensive, and requires a trained operator.
   - Many institutions have a flow cytometry research core facility that charges by the hour for use of their machines, and these rates can also be quite high. For this reason many laboratories are turning back toward magneticsorting techniques. Magnetic separation is specific, rapid, and efficient when care is taken to develop and finely tune a sorting strategy.

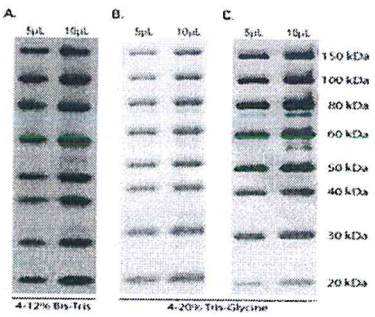


10. Explain the principle and procedure for SDS PAGE. Give its applications.

- 1st introduced by A Shaprio E. Vinela and J. Maizel in 1967. Laemmli system of SDS-PAGE was 1st introduced in 1970s. One of the standard techniques used to determine the charged molecules, mainly proteins and nucleic acids quantitatively.
- Particularly useful for monitoring protein purification and because this method is based upon the separation of proteins according to the size.
- This method is also used to determine the active molecular mass (or) molecular weight of the protein. Now a day this technique is most widely used in biochemistry, forensic science, genetics and molecular biology.



SDS-Coated large proteins migrate slowly through the gel matrix and small proteins migrate quickly through the matrix. The nearer the band to the well, the large the molecular size of protein



A. Staining band with Western blot
B. Coomassie blue stain
C. Silver stain

- **Applications:**
  - Separation, isolation and purification of protein small RNA and DNA molecules.
  - Determination of molecular weight of protein and isoenzyme.
  - Determine purity of protein samples.
  - Identifying disulfide bonds between proteins.
  - Quantifying proteins.
  - Blotting applications.

11. .

- ..

PART C

12. Explain a detail about the principle and instrumentation of TEM and SEM. Give its application.

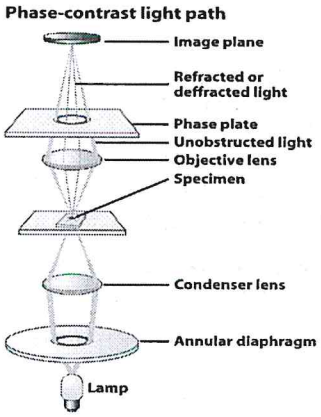
- Electron microscope uses electron beams and magnetic fields to produce the image instead of light waves and glass lenses used in the light microscopes.Resolving power of an electron microscope is greater than that of any other compound microscope. This is because the wavelength of electron is short.The wavelength of electrons is 100,000 times smaller than the wavelength of visible light.

- Drug development, crime detection
- Medical diagnosis
- Environmental field monitoring
- Industrial process control
- Manufacturing of pharmaceuticals and replacement of organs

9. Enumerate the principle and instrumentation of

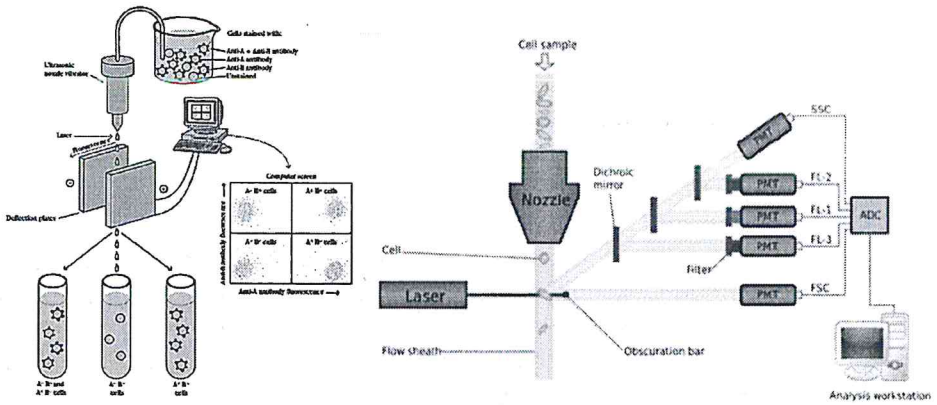
a) Phase contrast microscope.

- Phase contrast microscope, 1st described in 1934 by Dutch physicist Frits Zernike. Contrast-enhancing optical technique that can be utilized to produce high-contrast images of transparent specimens. Such as living cells (usually in culture) microorganisms, thin tissue slices, fibers, glass fragments, and subcellular particles (including nuclei and other organelles).
- The Phase contrast microscopy is special adaptation of the light microscopy and helps to obtain a clear picture of living or unstained cells. The adaptors convert minute difference in phase changes in transmitted light due to refractive indices of all cell organelles in to perceptible shades of grey. This allows organelles of the living cell to become visible with fair contrast in them.



b) Fluorescent microscope.

- British scientist **Sir George G. Stokes** first described fluorescence in 1852. He observed that the mineral fluorspar emitted red light when it was illuminated by ultraviolet-by-ultraviolet excitation.
- Stokes noted that fluorescence emission always occurred at a longer wavelength that of the excitation light. This shift towards longer wavelength is known as **stokes shift.**
- The ''Fluorescence microscope" refers to any microscope that uses fluorescence to generate an image, whether it is a simpler set up like an epifluorescence microscope, or a more complicated design such as a confocal microscope, which uses optical sectioning to get better resolution of the fluorescent image.
- **Principle:**The specimen is illuminated with light of a specific wavelength. Which is absorbed by the fluorophores, causing them to emit light of longer wavelengths (i.e., of a Principle different colour than the absorbed light).The illumination light is separated from the much weaker emitted fluorescence using a spectral emission filter.



- **Applications:**
  - Flow cytometer can determine which and how many members of a cell population bind fluorescently labelled antibodies. Flow cytometer has multiple applications to clinical and research problems.
  - A common clinical use is to determine the kind and number of white blood cells in blood samples. By treating appropriately processed blood samples with a fluorescently labeled antibody and performing flow cytometric analysis, one can obtain the following information:
  - How many cells express the target antigen as an absolute number and also as a percentage of cells passing the beam. For example, if one uses a fluorescent antibody specific for an antigen present on all T cells, it would be possible to determine the percentage of T cells in the total white blood cell population.
  - Then, it would be possible to isolate the T-cell fraction of the leukocyte population.The distribution of cells in a sample population according to antigen densities as determined by fluorescence intensity.
  - It is thus possible to obtain a measure of the distribution of antigen density within the population of cells that possess the antigen.

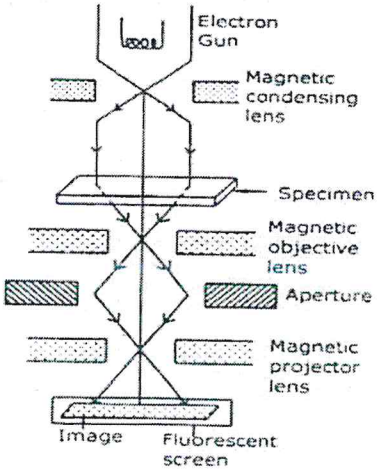
PART B

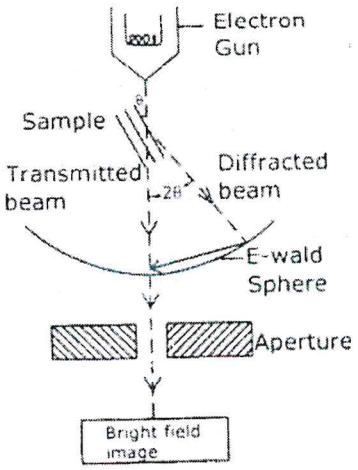
8. Explain the principle, different types, and applications of Biosensors.

- A biosensor has two distinct components, Bioreceptor – enzyme, cell etc.Physical component- transducer, amplifier etc.The bioreceptor is a biomolecule that recognizes the target analyte whereas the transducer converts the recognition event into a measurable signal.The uniqueness of a biosensor is that the two components are integrated into one single sensor.This combination enables one to measure the target analyte without using reagents.
- **Types of biosensors**
  1. Electrochemical biosensors
  2. Amperometric biosensors
  3. Potentiometric biosensors
  4. Conductimeteric biosensors
  5. Thermometric biosensors
  6. Optical biosensors
  7. Piezoelectric Biosensors
  8. Immuno–Biosensors
- The applications of different types of biosensors are
  - Food analysis
  - Study of Biomolecules and their interactions

Transmission Electron Microscope (TEM)

- **Principle:**Electrons are made to pass through the specimen and the image is formed on the fluorescent screen, either by using the transmitted beam or by using the diffracted beam.
- **Construction:** It consists of an **electron gun** (tungsten filament) which emitted electrons when being heated. **Magnetic condensing lens** is used to condense the electrons and is also used to adjust the size of the electron that falls on to the specimen. The **specimen** is placed in between the condensing lens and the objective lens as shown on the platform equipped with a mechanical arm for holding the specimen and controlling its position. The **magnetic objective lens** is used to block the high angle diffracted beam and the **aperture** is sued to eliminate the diffracted beam (if any) and in turn increases the contrast of the image. The **magnetic projector lens** is placed above the fluorescent screen in order to achieve higher magnification,. The image can be recorded by using a **fluorescentscreen** or **phosphorescent screen** (Phosphor) or (CCD – Charged Coupled device) also.





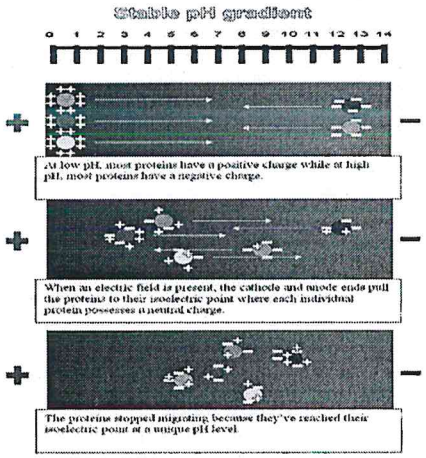
- **Biological Applications of TEM**
  - Biology and life science:Drug research, Food science., Virology, Cryobiology.
  - 3D Structure:3D Tissue imaging. (Subcellular macromolecular objects)
  - Medical field: Diagnostic tool to identify Renal (Kidney) biopsies.
  - Cancer research: Study the ultrastructure of tumor cells.
  - Toxicology: Examine the effects of environmental pollution on various levels of biological systems.
  - Material research:Medical research, Nanometrology, Material Qualification
  - Industries:Chemical/Petrochemical, Forensics and mining, Macro sample to nanometer metrology, Sample preparation.

Scanning Electron Microscope (SEM):

- **Principle:**When the accelerated **primary electrons strikes the sample,** significant amounts of kinetic energy generate and this energy dissipated as a variety of signals produced by electron-sample interactions when the incident electrons are decelerated in the solid sample, it produces **secondary electrons.** These secondary electrons are collected by a positive charged electron detector which in turn gives a 3D image of the sample.

- Urine and brain samples contain these compounds in micromolar or sub micromolar concentrations; in blood samples is the Concentration of catecholamines even in sub nanomolar range.
- Separation methods for complex sample mixtures.
- Sensitive detection methods are required for the analysis of these species in clinical samples.

4. **Enumerate Iso-electric focusing and give its applications.**
   - Proteins are separated in a pH gradient according to their isoelectric points. Basic principle involved is electrophoresis. Proteins are subjected to electric field in a pH gradient.Requires a solid surface normally polyacrylamide.
   - Technique combining ideals of isoelectric points and electric fields. Very high-resolution techniques for protein.Electrophoretic method that separates proteins according to the iso-electric points.
   - Isoelectric focusing is ideal for separation of amphoteric substances.Separation is achieved by applying a potential difference across a gel that containing a pH gradient.
   - Isoelectric focusing requires solid support such as agarose gel and polyacrylamide gel. Isoelectric focusing gels contain synthetic buffers called ampholytes that smooth the pH gradients. Ampholytes are complex mixtures of synthetic polyamino-poly carboxylic acids.Commercially available ampholytes are Bio-lytepharmalyte.



   - **Applications:**
   - For separating proteins and peptides. Used in limit test when the density of band is compared with the density of band of standard preparation.
   - For research in Taxonomy, Cytology, and Immunology etc. IEF gel is used as identity test when migration pattern on gel is compared with standard preparation.
   - Isoelectric focusing (IEF) offers and effective alternative to conventional electrophoresis for genetic marker typing.

5. **Write the different types of supporting medium used for electrophoresis.**
   - TheelectrophoreticseparationtechniquescanbebroadlydividedintotwomaintypesOn etheseparationiscarriedoutinaabsenceofstabilizingmediumiscalled**Freesolutionele ctrophoresismethod.**
   - Anotherttheseparationiscarriedoutinthepresenceofstabilizingmediumiscalled**Zoneel ectrophoresismethod.**

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DEPARTMENT OF BIOCHEMISTRY

UNIT TEST I , NOVEMBER 2022

Class	: I M. Sc Biochemistry	**Date**	: 01.12.2022
Subject	: Physiology and Cell biology	**Time**	: 12 to 1.00 PM
Subject Code: MG21C		**Max. Mark**	: 25

PART A – (5 X 1 = 5 Marks)

Answer any FIVE questions

CO.1 BL: 1 1. Tell about the significance of cadherins and integrins

CO.2 BL: 6 2. Write the functions of basement membrane

CO.1 BL: 4 3. Classify cell junctions.

CO.1 BL: 1 4. State the functions of gap junction

CO.1 BL: 1 5. Enumerate the energy sources for muscle contraction.

CO.5 BL: 1 6. Define action potential

CO.5 BL: 1 7. Quote about myofilaments

PART B – (2 X 5 = 10 Marks)

Answer any ONE question

CO.1 BL: 2 8. Explain the types and functions of epithelial tissues.

CO.3 BL: 4 9. Explain the digestion and absorption of carbohydrates.

CO.5 BL: 2 10. Describe the mechanism of muscular contraction and relaxation with neat diagrams.

CO.4 BL: 2 11. Discuss the role of various buffers in the maintenance of acid-base balance in the body.

PART C – (1 X 10 = 20 Marks)

Answer any ONE question

CO.1 BL: 6 12. Write a note on major families of cell adhesion molecules.

CO.2 BL: 4 13. Explain in detail about various types of membrane transport systems.

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DEPARTMENT OF BIOCHEMISTRY

UNIT TEST I , NOVEMBER 2022

Class: I MSc Biochemistry **Date:** 01.12.2022

Subject: Physiology and Cell biology **Time:** 12 to 1.00 PM

Subject Code: MG21C **Max. Mark:** 25

Answer

PART A – (5 X 1 = 5 Marks)

Answer any FIVE questions

CO.1 BL:1 1. **Tell about the significance of cadherins and integrins.**

Integrins and cadherins are two of the best-studied classes of adhesion receptors. Integrins mediate adhesion between the cell and its extracellular matrix (ECM), and cadherins mediate homotypic adhesion between cells.

CO.2 BL:6 2. **Write the functions of basement membrane**

The primary function of the basement membrane is to anchor down the epithelium to its loose connective tissue (the dermis or lamina propria) underneath. ...

The basement membrane acts as a mechanical barrier, preventing malignant cells from invading the deeper tissues.

CO.1 BL:4 3. **Classify cell junctions.**

Cell junctions fall into three functional classes: occluding junctions, anchoring junctions, and communicating junctions.

CO.1 BL:1 4. **State the functions of gap junction?**

Gap junctions allow the exchange of ions, second messengers, and small metabolites between adjacent cells and are formed by two unrelated protein families, the pannexins and connexins. Mutations in connexin genes cause a variety of genetic disorders, implicating a critical role in tissue homeostasis.

CO.1 BL:1 5. **Enumerate the energy sources for muscle contraction.**

To sustain muscle contraction, ATP needs to be regenerated at a rate complementary to ATP demand. Three energy systems function to replenish ATP in muscle: (1) Phosphagen, (2) Glycolytic, and (3) Mitochondrial Respiration.

CO.5 BL:1 6. **Define action potential?**

An action potential occurs when a neuron sends information down an axon, away from the cell body. Neuroscientists use other words, such as a "spike" or an "impulse" for the action potential. The action potential is an explosion of electrical activity that is created by a depolarizing current.

CO.5 BL:1 7. **Quote about myofilaments?**

Myofilaments are the three protein filaments of myofibrils in muscle cells. The main proteins involved are myosin, actin, and titin. Myosin and actin are the *contractile proteins* and titin is an elastic protein. The myofilaments act

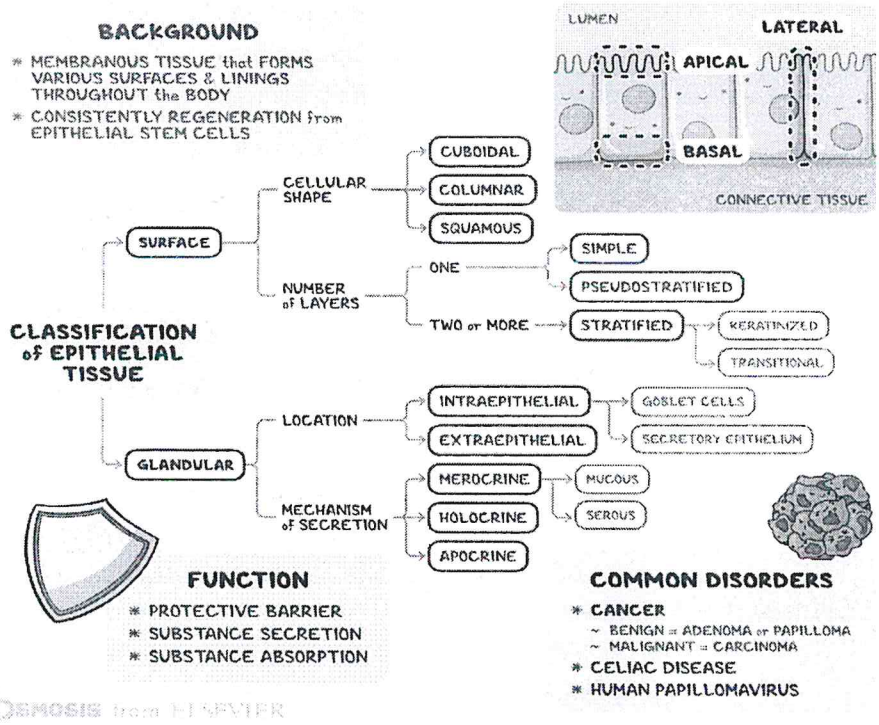
together in muscle contraction, and in order of size are a thick one of mostly myosin, a thin one of mostly actin, and a very thin one of mostly titin.

PART B – (2 X 5 = 10 Marks)

Answer any ONE question

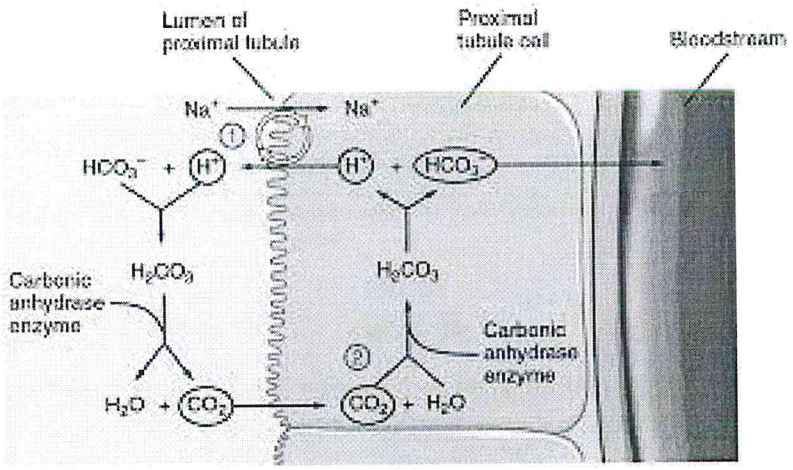
CO.1 BL: 4 8. **Explain the types and functions of epithelial tissues.**

Epithelium, endothelium and mesothelium are three types of epithelial cell layers that line your internal organs, body cavities and form the outer layer of your skin. Epithelium generally lines pathways that are open to the external environment, such as your respiratory tract and digestive system.



CO.3 BL:4 9. **Explain the digestive and absorption of carbohydrates.**

The goal of carbohydrate digestion is to break down all disaccharides and complex carbohydrates into monosaccharides for absorption, although not all are completely absorbed in the small intestine (e.g., fiber). Digestion begins in the mouth with salivary amylase released during the process of chewing.

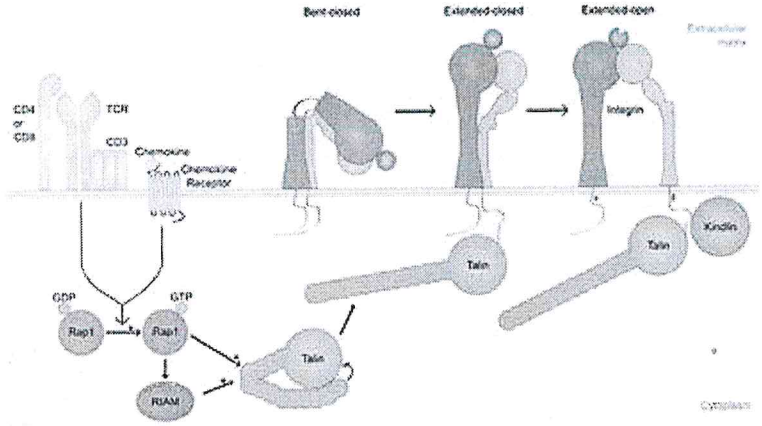


PART C – (1 X 10 = 20 Marks)

Answer any ONE question

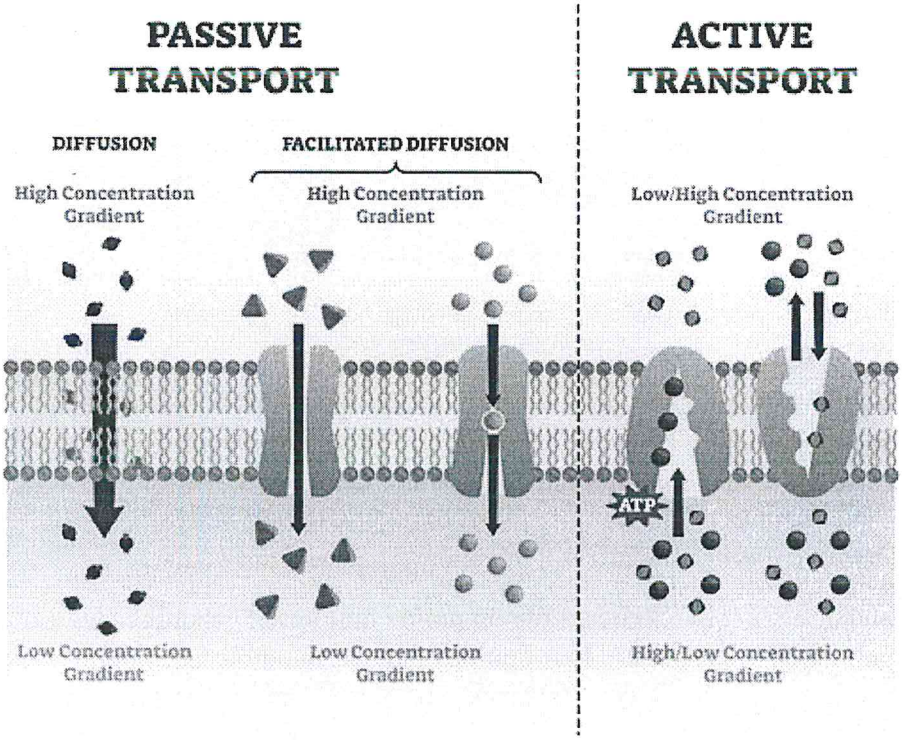
CO.1 BL:6 12. **Write a note on major families of cell adhesion molecules.**

There are four families of adhesion molecules: immunoglobulin-like adhesion molecules, integrins, cadherins and selectins. Most of them are typical transmembrane proteins that have cytoplasmic, transmembrane and extracellular domains.



CO.2 BL:4 13. **Explain in detail various types of membrane transport systems.**

Basic types of membrane transport, simple passive diffusion, facilitated diffusion (by channels and carriers), and active transport . Even simple passive diffusion requires energy to cross a bilayer membrane.



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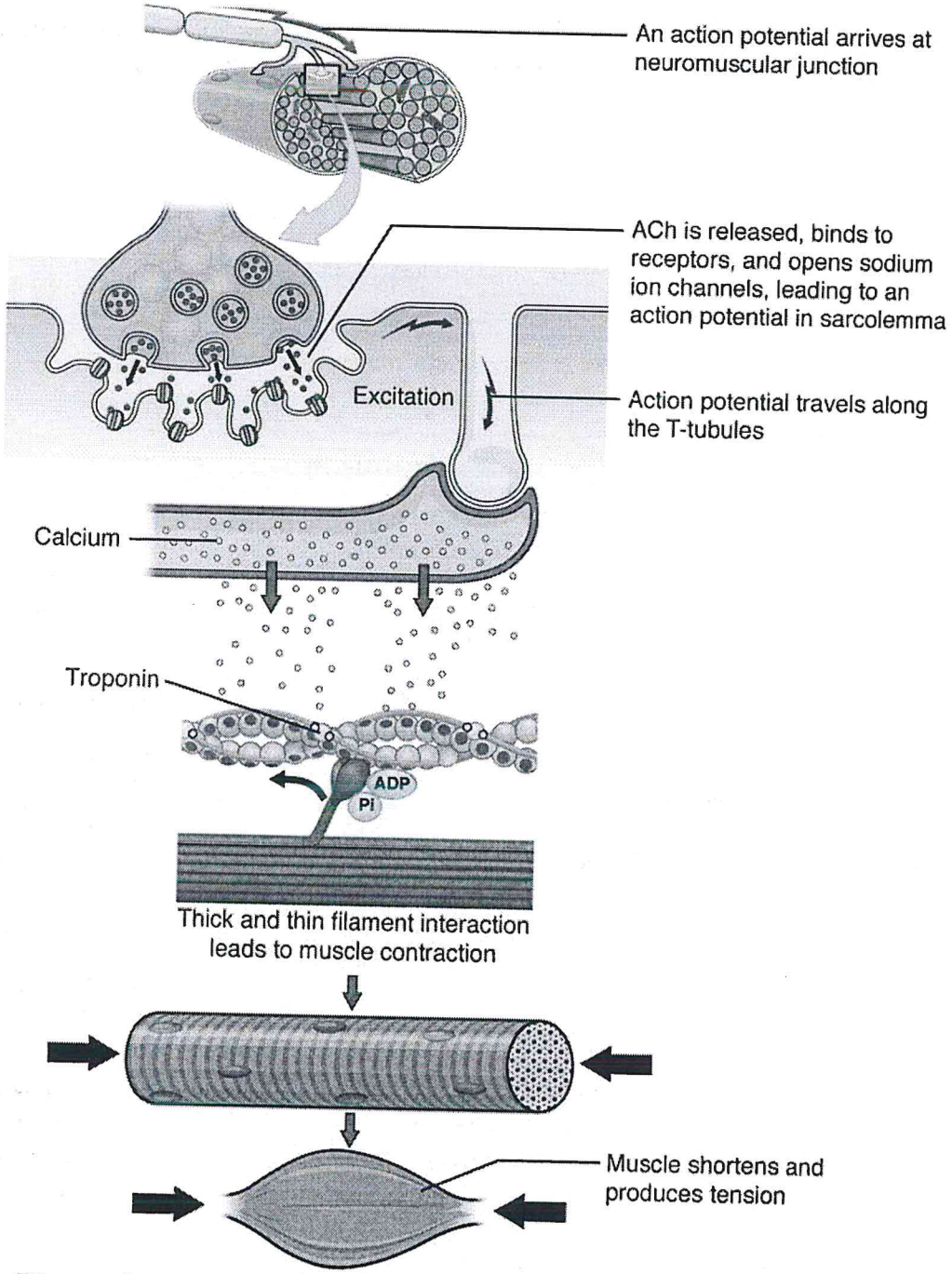
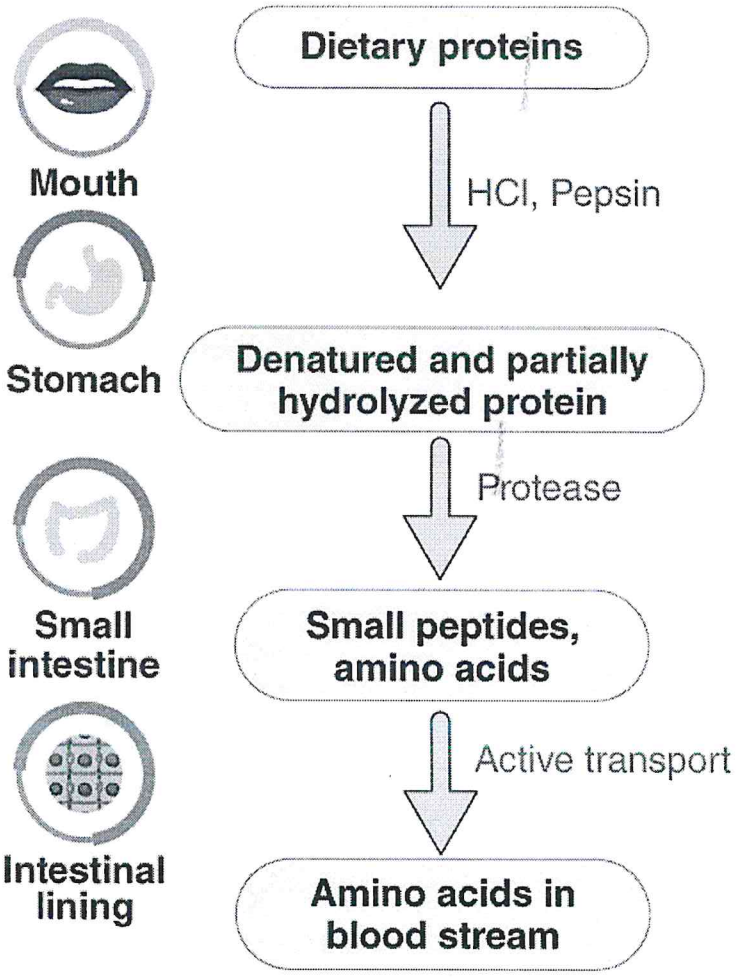


CO.4 BL:2 11. **Discuss the role of various buffers in the maintenance of acid-base balance in the body.**

The pH buffer systems work chemically to minimize changes in the pH of a solution by adjusting the proportion of acid and base. The most important pH buffer system in the blood involves carbonic acid (a weak acid formed from the carbon dioxide dissolved in blood) and bicarbonate ions (the corresponding weak base).



CO.5 BL:2 10. **Describe the mechanism of muscular contraction and relaxation with diagrams.**

Muscle contraction occurs when the thin actin and thick myosin filaments slide past each other. It is generally assumed that this process is driven by cross-bridges which extend from the myosin filaments and cyclically interact with the actin filaments as ATP is hydrolysed.

SRM ARTS AND SCIENCE COLLEGE, KATTANKULATHUR
DEPARTMENT OF BIOCHEMISTRY
UNIT TEST I, December 2022

Class: I M.Sc., Biochemistry **Date:** 02.12.2022
Subject: Microbiology **Time:** 2:30 to 3:30 PM
Subject Code: MG41A **Max. Mark:** 25

PART A – (5 X 1 = 5 Marks)
Answer any FIVE questions

CO.5 BL:2 1. Differentiate between narrow spectrum and broad-spectrum antibiotics.

CO.1 BL:2 2. Discuss about antimicrobial chemotherapy. Give an example

CO.5 BL:2 3. Discuss about antiretroviral agents. State an example.

CO 4 BL: 1 4.List out four subgroups of pathogenic E. coli

CO 4 BL:6 5. Write an account on salmonellosis.

CO 4 BL:1 6. Enumerate the microorganisms used for ethanol production

CO 6 BL:1 7. Name four microbial product of potential importance.

PART B – (2 X 5 = 10 Marks)
Answer any TWO questions

CO.1 BL: 4 8. Explain about the general characteristics of fungi.

CO.6 BL: 4 9. Explain single cell protein.

CO 4 BL:2 10. Describe the causes, symptoms, and control measures of Klebsiella pneumoniaeinfection

CO 6 BL:6 11. Write about the industrial production of α-amylose

PART C – (1 X 10 = 10 Marks)
Answer any ONE question

CO.6 BL: 2 12. Describe about downstream process of fermented product.

CO.2 BL:2 13. Explain in detail about food microbiological screening methods

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Answer key

PART A – (5 X 2 = 10 Marks)

Answer any FIVE questions

1. Differentiate between narrow spectrum and broad-spectrum antibiotics.

   Narrow spectrum antibiotics are effective against gram positive or gram-negative bacteria. Example: Penicillin G

   Broad spectrum antibiotics kill or inhibit a wide range of gram positive and gram-negative bacteria. Example: Chloramphenicol, tetracyclin

2. Discuss about antimicrobial chemotherapy. Give an example

   Antimicrobial chemotherapy is the clinical application of antimicrobial agents to treat infectious disease. There are five types of antimicrobial chemotherapy: Antibacterial chemotherapy, the use of antibacterial drugs to treat bacterial infections. Antifungal chemotherapy, the use of antifungal drugs to treat fungal infections. Anthelminthic chemotherapy, the use of antihelminthic drugs to treat worm infections.Antiprotozoal chemotherapy, the use of antiprotozoal drugs to treat protozoan infections. Antiviral chemotherapy, the use of antiviral drugs to treat viral infections.

   Various antimicrobial agents act by interfering with (1) cell wall synthesis, (2) plasma membrane integrity, (3) nucleic acid synthesis, (4) ribosomal function, and (5) folate synthesis. Example: penicillins, cephalosporins

3. Discuss about antiretroviral agents. State an example.

   Antiretroviral agents cause a stereochemical change within reverse transcriptase, thus inhibiting nucleoside binding and inhibition of DNA polymerase. Antiretroviral therapy (ART) is treatment of people infected with human immunodeficiency virus (HIV) using anti-HIV drugs. The standard treatment consists of a combination of drugs (often called "highly active antiretroviral therapy" or HAART) that suppress HIV replication. Examples include delavirdine, efavirenz, nevirapine, and rilpivirine.

4. List out four subgroups of pathogenic E. Coli

   Strains of E. Coli that cause gastroenteritis in humans can be grouped into six categories: **enteroaggregative (EAEC), enterohemorrhagic (EHEC), enteroinvasive (EIEC), enteropathogenic (EPEC), enterotoxigenic (ETEC), and diffuse adherent (DAEC)**. Each group is composed of unique O:H serotypes. The serotypes are characterized by using O-somatic and H-flagella antigens.

5. Write an account on salmonellosis.

   Salmonellosis is **an infection with a bacteria called Salmonella**, Salmonella live in the intestinal tracts of animals, including birds. Salmonella is usually transmitted to humans by eating foods contaminated with animal feces The salmonellae constitute a group of organisms with over 2000 different serotypes. These organisms are capable of causing disease in animals and man when taken into the body in sufficient numbers.

Many salmonella species have a wide host range. These are the organisms which commonly cause food poisoning.

6. Enumerate the microorganisms used for ethanol production.
   - Alcoholic fermentation is carried out by yeasts, fungi, and bacteria.
   - Yeast- Saccharomyces cerevisiae, S.ellipsoideus.
   - Bacteria -Zymomonas mobilis, Candida pseudotropicalis,Candida utilis.
   - Fungi- Baudoinia compniacensis

7. Name four microbial product of potential importance.
   - Streptomycin, alcohol, citric acid, α-Amylase, biofuel, biofertilizers etc

PART B – (1 X 5 = 5 Marks)

Answer any ONE question

8. Explain about the general characteristics of fungi.

Diagram (2M)

Explanation (2M)

Example (1M)

9. Explain single cell protein.

Selection of suitable strain (1M)

Fermentation (1M)

Harvesting and post-harvest treatment (1M)

Advantages and Disadvantages (1M)

Applications (1M)

10.Describe the causes, symptoms, and control measures of of Klebsiella Pneumoniae infection.

Causes (2 marks)

- These germs don't spread through the air.
- Direct contact to get sick. One way would be to touch a cut on your skin with dirty hands.
- Most infections happen in hospitals, nursing homes, and other places with lots of sick people.
- The germs can also spread when they get on medical devices like:
- IV catheters, tubes that go into a vein to give medicines
- Endotracheal tubes and ventilators, which help you breathe
- Urinary catheters, which drain urine away

Symptoms:(1mark)

- Fever ,Cough,Chest pain,Trouble breathing ,More mucus, which may be thick and bloody.
- Klebsiella pneumoniae can hit other parts of the body, too. For example, surgical wound could be infected. It could also get an infection in
- Blood (bacteremia or septicemia)
- Brain (meningitis)
- Heart (endocarditis)
- Skin (cellulitis)
- Urinary tract (utis)

Treatment(2marks)

- Klebsiellainfections can be dangerous, so doctors start treatment with antibiotics right away. Examples include cephalosporins (cefotaxime and ceftriaxone) and carbapenems (imipenem or cilastatin).
- If your doctor prescribes antibiotics, take them just as it says on the bottle. If you stop taking them too soon, the infection may come back.
- If it is an antibiotic-resistant infection, doctor will decide the a different type of antibiotic or a combination of them.
- Most people who get a klebsiella infection recover. But some cases can be deadly, especially pneumonia in people who are already very sick.

Prevention (1 mark)

One of the best ways to protect yourself is simple. Always wash your hands*before* you:

- Eat
- Touch your eyes, nose, or mouth
- Change bandages on a cut

And wash your hands*after* you:

- Use the bathroom
- Blow your nose, cough, or sneeze
- Touch things that might have germs on them, especially in doctor's offices or hospitals

11. Write about the industrial production of α-amylose

Bacterial source for Thermostable α-Amylase production:(2 marks)

- B.subtilis, B.stearothermophilus,,B.licheniformis,B.amyloliquefaciens.
- Temp:(45°C to 55°C), PH:(6.0–7.0), Incubation :48_72 hr

Halophilic amylases:Chromohalobacter sp., Halobacillus sp., Haloarcula hispanica, Halomonas meridiana

Substrate :

Carbon source: maltose,sucrose,glucose and oil cakes.

Fungal source: Aspergillus species: A.oryzae , A.niger, A.kawachii

Temp:(30-90°C), PH:(5.0–6.0), Incubation: 96 hr

Penicillium species:P.fellutanum,P.roquefortii, P.chrysogenum

Temp:(30-55°C),PH(6.0 to 7.0),Incubation : 72 hr

Nitrogen source (1 mark)

Inorganic nitrogen sources: ammonium sulphate, ammoniumchloride and ammonium

Hydrogen phosphate.

Organic sources: peptone, yeast extract andsoyabean

Production methods (2 marks)

1) Submerged fermentation (SMF)

2) Solid State fermentation (SSF)

Purification methods

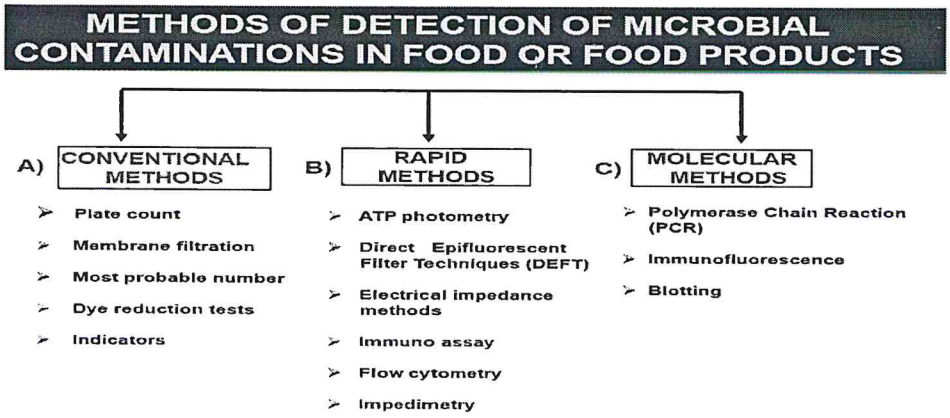
- Chromatographic techniques like ion exchange, Gel filtration and affinity chromatography for further separation and purification of the enzyme.
- The enzyme was precipitated- followed by dialysis and then column chromatography.

PART C – (1 X 10 = 10 Marks)

Answer any ONE question

12. Describe about downstream process of fermented product.
    Cell culture and removal of insoluble (2M)
    Cell lysis (2M)
    Isolation of products (2M)
    Purification of products (2M)
    Polishing of products and market (2M)
13. Explain in detail about food microbiological screening methods

- Methods (2 marks)



- Explain any four methods (8 marks)

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DEPARTMENT OF BIOCHEMISTRY

UNIT TEST I, SEPTEMBER 2022

Class: II M.Sc Biochemistry **Date:** 12.09.2022

Subject: Biotechnology **Time:** 12 to 1.00 PM

Subject Code: MEN3A **Max. Mark:** 25

Section A-(5 x 1 = 5)

Answer any FIVE questions

CO1 BL1 1. Define linker DNA.

CO1 BL1 2. Define adaptor DNA.

CO1 BL1 3. State homopolymer tail.

CO1 BL1 4. Define nucleic acid probe.

CO3 BL1 5. Quote cell culture.

CO3 BL1 6. Define contamination.

CO3 BL1 7. Quote copy right.

Section B - (2 x 5 = 10)

Answer any TWO questions

CO1 BL6 8. Write short notes on the mechanism of DNA Ligase.

CO1 BL2 9. Summarize about the restriction endonuclease enzymes.

CO3 BL2 10. Discuss about the different types of culture media.

CO3 BL2 11. Explain different methods of disaggregation in cell culture.

Section C – (1 x 10 = 10)

Answer any ONE question

CO5 BL4 12. Explain in detail about the mechanism involved in recombinant DNA technology. Give its applications.

CO3 BL2 13. Discuss about the IPR.

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ANSWER KEY

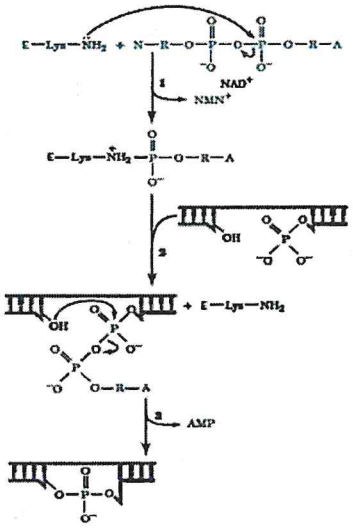
PART A

1. **Define linker DNA.**
   - Linker DNA is a synthetic, short and known double stranded, oligonucleotides sequence; having blunted ends on both sides andrestriction sites.Linker has blunt ends.
2. **Define Adaptor DNA.**
   - An adaptor is a short, chemically synthesized, double stranded DNA molecule which is used to link the ends or two other DNA molecules.The adaptor molecule have one blunt end bearing 5' phosphate group and a cohesive end which is not phosphorylated. Adaptor has cohesive ends
3. **State homopolymer tail.**
   - Method for joining DNA molecules make use of the annealing ofcomplementary homopolymer sequence.Addition of oligo (dA) sequences to the 3' ends of one DNA molecule and oligo (dT) blocks to the 3' end of another population.The enzyme terminal deoxynucleotidyl transferase will catalyze the addition of a string of nucleotides to the 3' end of a DNA fragment.One can add a string of G's to the 3' ends of the other fragment.
4. **Define nucleotide probe.**
   - In molecular biology, a hybridization probe is defined as a single stranded piece of DNA or RNA of variable length which can be radioactively labelled or non-radioactive label. It is a single stranded piece of DNA (sometimes RNA), which can range in size from as little as 15 base pairs to several hundred kilo bases, but usually 100–1000 bases long. It can be used in DNA or RNA samples to detect the presence of nucleotide sequences that are complementary to the sequence in the probe. It can identify, through base pairing, a specific DNA fragment of the library, which contains complementary sequences. A probe DNA will form complementary be pairing with another DNA strand.
5. **Quote cell culture.**
   - Cell culture or Tissue culture is the process by which cells are grown under controlled conditions, generally outside their natural environment.

6. **Define contamination.**
   - Cell culture contaminants can be divided into two main categories, chemical contaminants such as impurities in media, sera, and water, endotoxins, plasticizers, and detergents, and biological contaminants such as bacteria, molds, yeasts, viruses, mycoplasma, as well as cross contamination by other cell lines.
7. **Quote copyright.**
   - Copyright is a type of intellectual property that protects original works of authorship as soon as an author fixes the work in a tangible form of expression.

PART B

8. **Write short notes on the mechanism of DNA Ligase.**
   - In molecular biology DNA ligase catalyzes the formation of phosphodiester bond between 3' hydroxyl ends of one nucleotide (acceptor) of one strand of DNA or RNA with the 5'phosphate end of another (donor) strand of DNA or RNA.
   - **Steps involved in Ligation:**



   - **ATP is required for the ligase reaction, which proceeds in three steps:**
   - Adenylyl group of NAD is transferred to the ε-amino group of an enzyme Lys residue to form an unusual phosphoamide that is, readily isolated.
   - Adenylyl group of this activated enzyme is transferred to the 5'-phosphoryl terminus of the nick to form an adenylylated DNA. Here, AMP is linked to the 5'-nucleotide via a pyrophosphate rather than the usual phosphodiester bond.
   - DNA ligase catalyzes the formation of a phosphodiester bond by attack of the 3'-OH on the 5'-phosphoryl group, thereby sealing the nick and releasing AMP.

9. Summarize about the restriction endonuclease enzymes.

- It is an endonuclease that cut the DNA molecule at limited number of specific nucleotide sequence at specific points. Hence it is also called molecular scissors. It is named by Leaderberg and Meselsons in 1964, after various study of bacterial phage plating on different strain of *E.coli*.
- It is found naturally in a wide variety of prokaryotes, and bacterial species. It is an important tool for manipulating DNA. Naturally destroyed bacteriophage DNA in bacterial cells. It cannot digest host DNA with methylated C (cytosine).

Classification of restriction enzyme:

Classification based on methylation, cleavage site, structure of protein and recognition of nucleotides sequence. There are 3 types of restriction endonuclease enzyme namely type I, type II and type II.

Characters	Type I	Type II	Type III	Type IV
Protein structure	Three different subunit	Simple	2 different subunit	-
Functional Requirement for stimulation of nuclease activity.	Mg^{++}, S-adenosyl-methionine as co-factor and ATP as source of energy,	Mg^{++} as co-factor and no need of ATP.	Mg^{++}, S-adenosyl-methionine and ATP as co-factor .	S-adenosyl-methionine as co-factor.
Cleavage Site	**Random:** Around 1000bp away from recognition site.	**Specific:** At or near the host septicity	**Random:** 24 - 26bp away from 3' of host specificity site	**Random**
Location of Methylase	Generally large, multi-subunit complexes contain, both endonuclease and methylase located on a single protein molecule	Endonuclease and methylase are separate entities	Generally large, multi-subunit complexes contain, both endonuclease and methylase located on a single protein molecule	This enzymes cleave methylated DNA.
Enzyme turn over	No	Yes	Yes	-
DNA trans location	Yes	No	No	-
Site of methylation	Host specificity site	Host specificity site	Host specificity site	-
Examples	*EcoK* I, *EcoA* I, *CfrA* I	*EcoR* I, *BamH* I, *Hind* III	*EcoP* I, *Hinf* III, *Eco*P15 I	*Eco* 57I

10. Discuss about the different types of culture media.

- Natural media
- Artificial media

11. Explain different methods of disaggregation in cell culture.

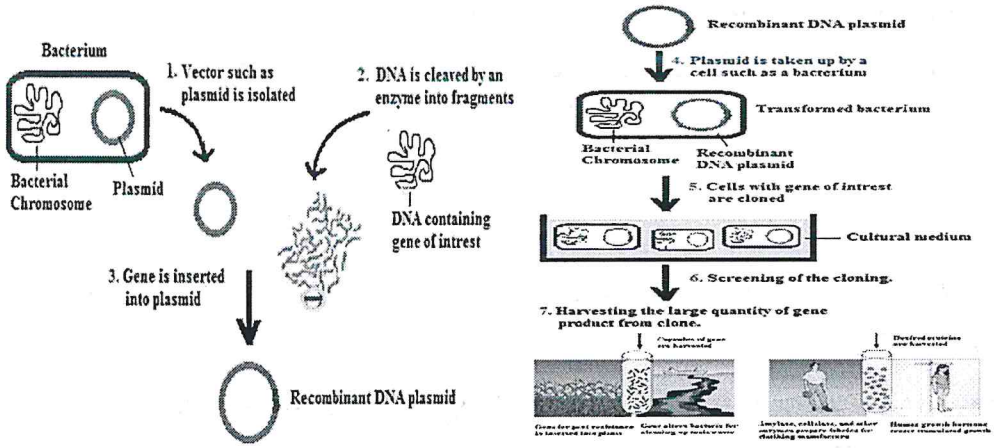
- Enzymatic disaggregation is commonly used to process tissue samples when a high recovery of cells is necessary. This technique uses enzymes, such as trypsin or collagenase to digest pieces of tissue in order to release cells.
- Mechanical disaggregation

PART C

12. Explain in detail about the mechanism involved in recombinant DNA technology. Give its applications.

- Recombinant DNA is produced when one gene from one kind or organism are introduced into gene of a different kind of organism.

- As a result of recombination, the DNA contain information from 2 different species of organisms.
- If these gene integrate permanently into the egg or sperm cells, such that it can be transferred to offspring's, the resulting organism is called transgenic or recombinant organism.
- These processes were 1st carried out in 1972 by Paul Berg and A.D Kaiser who inserted other prokaryotic DNA into bacterial cell. S.N Cohen and Herbert Bayer who inserted eukaryotic DNA into bacterial cell.
- This technique involves the breakage of a DNA molecule at 2 desired places to isolate a specific DNA segment and it is inserted in another DNA molecule at a desired position.
- Using these techniques, we can isolate and clone single copy of gene or DNA segment into an indefinite number of identical copies.
- This is the basis for the creating new genetic varieties of organism, known as **genetic engineering.**



13. Discuss about the IPR.

- Intellectual property rights are the rights given to persons over the creations of their minds. They usually give the creator an exclusive right over the use of his/her creation for a certain period of time.
- There are four types of intellectual property rights (IP): patents, trademarks, copyrights, and trade secrets.

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DEPARTMENT OF BIOCHEMISTRY

UNIT TEST I, SEPTEMBER 2022

Class: II M.Sc Biochemistry **Date:** 13.09.2022

Subject: Clinical Biochemistry-I **Time:** 12 to 1.00 PM

Subject Code: MEN3B **Max. Mark:** 25

PART A - (5 x 1 = 5)

Answer any FIVE questions

CO4 BL: 1 1.List out the symptoms of anemia.

CO3 BL: 1 2. Name any two antidiabetic drugs.

CO1 BL: 2 3.Explain the term accuracy.

CO1 BL: 2 4. Mention the volume of CSF in adult.

CO3 BL: 5 5.Assess the term Hypoglycaemia and mention its causes.

CO2 BL: 4 6. Infer about anticoagulants with examples.

CO 3 BL: 4 7.Name any two diabetic complications.

PART B - (2 x 5 = 10)

Answer any TWO questions

CO4 BL:1 8.Enumerate the causes, symptoms, and clinical significance of haemolytic anaemia

CO1 BL:3 9. How to collect and preserve urine sample and amniotic fluid?

CO2 BL:2 10.Discuss the factors influencing biochemical variables.

CO3 BL:5 11.Summarize about glycated hemoglobin .

PART C - (1 x 10 = 10)

Answer any ONE question

CO3 BL:2 12.Describe the cause, types, pathology and dietary management of diabetes mellitus.

CO2 BL:6 13.Write in detail about sources of error in biochemical investigation of blood.

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ANSWER KEY

PART A

1. **List out the symptoms of anemia**
   - Fatigue
   - Weakness
   - Pale or yellowish skin
   - Irregular heartbeats
   - Shortness of breath
   - Dizziness or lightheadedness
   - Chest pain
   - Cold hands and feet.
2. **Name any two antidiabetic drugs?**
   - Insulin (long- and rapid-acting) (write any twodrugs)
   - Metformin (biguanide class)
   - Glipizide (sulfonylurea class)
   - glimepiride (sulfonylurea class)
   - Invokana (sodium glucose cotransporter 2 inhibitor class)
   - Jardiance (SGLT2 class)
   - Januvia (dipeptidyl peptidase 4 inhibitor)

3. **What is meant by accuracy?**
   - Accuracy refers to how close a measurement is to the true or accepted value.
4. **Mention the volume of CSF in adult?**
   - Volume of CSF in adult is 140-170 ml

5. **Assess the term Hypoglycaemia and mention its causes.**
   - Hypoglycemia-Decreased blood glucose level than normal.
   - Causes
   - Taking too much insulin or diabetes medication.
   - Not eating enough.
   - Postponing or skipping a meal or snack.
   - Increasing exercise or physical activity without eating more or adjusting your medications.
   - Drinking alcohol.
6. **Infer about Anticoagulants with examples.**
   - Anticoagulants are substances that prevent coagulation of blood.Eg, Heparin, EDTA

7. **Name any two diabetic complications.**

- Short-term complication - a very high blood glucose level can sometimes lead to Coma
- Long-term complications
- Hardening of the arteries: angina, heart attacks, stroke
- Poor circulation
- Kidney damage
- Eye problems
- Nerve damage
- Foot problems
- Impotence

PART B

8. **Enumerate the causes, symptoms, and clinical significance of hemolyticanemia**

Hemolytic anemia is a disorder in which red blood cells are destroyed faster than they can be made. The destruction of red blood cells is called hemolysis. Red blood cells carry oxygen to all parts of your body. If you have a lower-than-normal amount of red blood cells, you have anemia.

CAUSES:

- Autoimmune conditions.
- Bone marrow failure.
- Complications from blood transfusions.
- Infections.
- Inherited blood conditions such as sickle cell disease or thalassemia.
- Some medicines.

Symptoms:

- Abnormal paleness or lack of color of the skin.
- Yellowish skin, eyes, and mouth (jaundice)
- Dark-colored urine.
- Fever.
- Weakness.
- Dizziness.
- Confusion.
- Can't handle physical activity

For example, glucose-6-phosphate dehydrogenase (G6PD) deficiency mostly affects males of African or Mediterranean descent. In the United States, the condition is more common among African Americans than Caucasians

The three main types of immune hemolytic anemia are autoimmune, alloimmune, and drug-induced.

- Autoimmune hemolytic anemia (AIHA). In this condition, your immune system makes antibodies (proteins) that attack your red blood cells. ...
- Alloimmune hemolytic anemia. ...
- Drug-induced hemolytic anemia.

Complications of haemolyticanemia

- Severe cases of hemolytic anemia can lead to serious complications.
- This includes heart arrhythmias, heart muscle disease (cardiomyopathy), and heart failure. It can also worsen existing heart disease, lung disease, and cerebrovascular disease

9. **How to collect and preserve urine sample and amniotic fluid**?

Types of urine specimens(3 marks)

- First morning specimen.
- Single random specimen.
- Timed short-term specimens.
- Timed long term specimens: 12 or 24 hours.
- Midstream (clean catch) urine collection is the most common method of obtaining urine specimens from adults, particularly men. This method allows a specimen, which is not contaminated from external sources to be obtained without catheterization.Catheterized specimen or specimen from an indwelling catheter.
- Double voided specimens (test for sugar and acetone)

Collecting a urine sample

- label a sterile, screw-top container with your name, date of birth and the date.
- wash your hands.
- Collect a sample of urine "mid-stream" in the container.
- screw the lid of the container shut.

A 24-hour urine collection helps diagnose kidney problems. It is often done to see how much creatinine clears through the kidneys. It's also done to measure protein, hormones, minerals, and other chemical compounds.

Urines specimens submitted for urine culture at LifeLabs must be preserved in boric acid prior to transport. Preserving urine in boric acid eliminates bacterial overgrowth of normal flora, leading to more accurate results.

within 1 hour, put the urine container in a sealed plastic bag then store it in the fridge at around 4C. Do not keep it for longer than 24 hours. The bacteria in the urine sample can multiply if it is not kept in a fridge

Procedure for Amniotic Fluid Collection & preservation(2marks)

- Amniotic fluid is aspirated by the needle into the amniotic sac is called amniocentesis.
- This is transabdominal amniocentesis.
- Another route is transvaginal amniocentesis. This method carries a great risk of infection.
- This procedure is safe if performed after the 14th week of gestation.
- Fluid for chromosomal analysis is collected after the 16th week of gestation.
- For fetal distress and maturity is collected in 3rd trimester.
- 30 mL of amniotic fluid is collected in the sterile syringes.
    - The first 2 to 3 ml collected is discarded because this may be contaminated by the maternal blood, tissue fluid, and cells.
    - In the case of haemolytic disease of the new-born, the sample should be avoided from the light. The sample should be kept in the amber-coloured bottle or test tubes.
- Sample for the fetal lung maturity, the sample should be placed in the ice for delivery to the laboratory and keep the sample in the fridge.
    - sample for the cytogenetics may be maintained at room temperature (37 °C) prior to analysis.
    - The sample for the biochemical testing should be separated immediately from the cellular elements and debris to avoid the effect of cellular metabolism.

10. Discuss the factors influencing biochemical variables.

- Preanalytical condition of the patient- Diet. Starvation,Exercise, Posture. Daily and seasonal variation Menstrual cycle, Pregnancy. Effects of drugs on laboratory tests,incorrect use of reference limits, Problems with immunochemical methods
- Hemolysis- technical errors in sampling Site of sampling and form of specimen
- Storage of samples
- Errors in urine collection. Mixing up of samples.

11. Summarize about glycated hemoglobin

- Glycated hemoglobin (glycohemoglobin, hemoglobin A1c, HbA1c, less commonly HbA1c, HgbA1c, Hb1c, etc., also A1C informally with patients) is a form of hemoglobin (Hb) that is chemically linked to a sugar. Most monosaccharides, including glucose, galactose and fructose, spontaneously (i.e. non-enzymatically) bond with hemoglobin, when present in the bloodstream of humans. However, glucose is less likely to do so than galactose and fructose (13% that of fructose and 21% that of galactose), which may explain why glucose is used as the primary metabolic fuel in humans.
- The formation of the sugar-hemoglobin linkage indicates the presence of excessive sugar in the bloodstream, often indicative of diabetes. A1C is of particular interest because it is easy to detect. The process by which sugars attach to hemoglobin is called glycation. HbA1c is a measure of the beta-N-1-deoxy fructosyl component of hemoglobin.
- A1c is measured primarily to determine the three-month average blood sugar level and can be used as a diagnostic test for diabetes mellitus and as an assessment test for glycemic control in people with diabetes.
- The test is limited to a three-month average because the average lifespan of a red blood cell is four months. Since individual red blood cells have varying lifespans, the test is used as a limited measure of three months.
- Normal levels of glucose produce a normal amount of glycated hemoglobin. As the average amount of plasma glucose increases, the fraction of glycated hemoglobin increases in a predictable way.
- In diabetes, higher amounts of glycated hemoglobin, indicating poorer control of blood glucose levels, have been associated with cardiovascular disease, nephropathy, neuropathy, and retinopathy.
- The life of the red blood cells (117 days for men and 106 days in women). Therefore, glucose levels on days nearer to the test contribute substantially more to the level of A1c than the levels in days further from the test.
- HbA1c levels improved significantly after 20 days from start or intensification of glucose-lowering treatment.

Measurement: Several techniques are used to measure hemoglobin A1c.

- High-performance liquid chromatography, immunoassay, enzymatic assay, capillary electrophoresis, or boronate affinity chromatography. Point of care (e.g., doctor's office) devices use immunoassay boronate affinity chromatography. (2marks)
  Interpretation of results.(2Marks)
- Persistent elevations in blood sugar (and, therefore, HbA1c) increase the risk of long-term vascular complications of diabetes, such as coronary disease, heart attack, stroke, heart failure, kidney failure, blindness, erectile dysfunction, neuropathy (loss

of sensation, especially in the feet), gangrene, and gastroparesis (slowed emptying of the stomach). Poor blood glucose control also increases the risk of short-term complications of surgery such as poor wound healing.

- Lower-than-expected levels of HbA1c can be seen in people with shortened red blood cell lifespans, such as with glucose-6-phosphate dehydrogenase deficiency, sickle-cell disease, or any other condition causing premature red blood cell death. Blood donation will result in rapid replacement of lost RBCs with newly formed red blood cells. Since these new RBCs will have only existed for a short period of time.
- Higher-than-expected levels can be seen in people with a longer red blood cell lifespan, such as with vitamin B12 or folate deficiency.
- Results can be unreliable in many circumstances, for example after blood loss, after surgery, blood transfusions, anemia, or high erythrocyte turnover; in the presence of chronic renal or liver disease; after administration of high-dose vitamin C; or erythropoietin treatment.
- In general, the reference range (that found in healthy young persons), is about 30–33 mmol/mol (4.9–5.2 DCCT %).
- The mean HbA1c for diabetics type 1 in Sweden in 2014 was 63 mmol/mol (7.9 DCCT%) and for type 2, 61 mmol/mol (7.7 DCCT%).(1 mark)

<5.7% Normal
5.7-6.4% Prediabetes
>6.4% Diabetes
Indications and uses

- Glycated hemoglobin testing is recommended for both checking the blood sugar control in people who might be prediabetic and monitoring blood sugar control in patients with more elevated levels, termed diabetes mellitus.
- For a single blood sample, it provides far more revealing information on glycemic behavior than a fasting blood sugar value. However, fasting blood sugar tests are crucial in making treatment decisions.
- The glycated hemoglobin test be performed at least twice a year in patients with diabetes who are meeting treatment goals (and who have stable glycemic control) and quarterly in patients with diabetes whose therapy has changed or who are not meeting glycemic goals.

PART C

12. **Describe the cause, types, pathology, and dietary management of diabetes mellitus.**

- CAUSES (2 marks)
- Diabetes—is caused by several factors, including lifestyle factors and genes.

- Type 2 diabetes usually begins with insulin resistance, a condition in which muscle, liver, and fat cells do not use insulin well. As a result, body needs more insulin to help glucose enter cells. At first, the pancreas makes more insulin to keep up with the added demand. Over time, the pancreas can't make enough insulin, and blood glucose levels rise.
- Overweight, obesity, and physical inactivity
- Genes and family history
- Type 1 diabetes is caused by genes and factors in the environment, such as viruses, that might trigger the disease.
- Gestational diabetes, a type of diabetes that develops during pregnancy, is caused by the hormonal changes of pregnancy along with genetic and lifestyle factors
- Symptoms:
- Increased thirst and urination
- Increased hunger
- blurred vision
- fatigue
- unexplained weight loss
- Types of Diabetes Mellitus (4 marks)
- Type 1 Diabetes - Insulin Dependence. ...
- Type 2 Diabetes - Insulin Resistance. ...
- Type 3 Diabetes - Brain Diabetes. ...
- Gestational Diabetes - During Pregnancy. ...
- LADA - Latent Autoimmune Diabetes in Adults. ...
- Double Diabetes - Type 1 with Insulin Resistance.
    - Pathology: (4 marks)
- The pathophysiology of diabetes involves plasm concentrations of glucose signaling the central nervous system to mobilize energy reserves. It is based on cerebral blood flow and tissue integrity, arterial plasma glucose, the speed that plasma glucose concentrations fall, and other available metabolic fuels.
- Type 1 diabetes mellitus (T1DM) results from the autoimmune destruction of β cells of the endocrine pancreas. Pathogenesis of T1DM is different from that of type 2 diabetes mellitus, where both insulin resistance and reduced secretion of insulin by the β cells play a synergistic role.
- The pathophysiology of type 2 diabetes mellitus is characterized by peripheral insulin resistance, impaired regulation of hepatic glucose production, and declining β-cell function, eventually leading toβ -cell failure.

- Dietary management of diabetes:(2 marks)

- Eating the healthiest foods in moderate amounts and sticking to regular mealtimes.
- Healthy-eating plan that's naturally rich in nutrients and low in fat and calories. Key elements are fruits, vegetables, and whole grains.
- Low energy weight maintenance diet

13. Write in detail about sources of error in biochemical investigation of blood

I.Pre-analytical errors (4 marks)

- Clinician must select appropriate investigations.
- Patient properly prepared for the test.
- Patients slip correctly filled in.
- Note taken of the effect of age, sex, diet, nutritional state, time on the test.
- Patient was fasted or was not fasted overnight

Effect of fist clenching:

- Contraction of forearm muscles causes release of potassium
- Intracellular electronegativity declines during depolarization of muscle cells favoring release of potassium rather than its uptakeCan cause 1-2 mmol/L increase, as much as 2.7 mmol/L increase

Patient variables

- Patient and specimen identification
  - Dietary Status, Medications
  - Body Position standing, sitting, supine (lying face upwards)
  - Site of Phlebotomy *vs* site of infusion
  - Tourniquet (placement, duration)
  - Quality of Phlebotomy (trauma, duration, etc.)
- Posture (sitting versus lying) can cause a 5% variation in some tests. For total cholesterol and HDL cholesterol it may be a 15% variation
- Vigorous exercise can increase total cholesterol by 6%
- Smoking or stress
- Wrong container used K EDTA for electrolytes, ALP, and calcium

Collection related factors

- Filling of Tube (blood: additive ratio)
- Order of Draw
- Type of Tube (glass *vs* plastic)
- Type of additive (none, anticoagulant, stabilizer, separator)

Order of Specimen Collection

- Blood culture tube
- Coagulation tube (citrate)
- Serum tube (with or without clot activator or gel separator)
- Heparin (with or without gel separator)
- EDTA
- Oxalate/ Fluoride

Process Related Causes

- Time
- Centrifuge
- Temperature
- Storage
- Sample taken from drip arm while drip running: If it is a dextrose saline drip it will falsely increase glucose, decrease sodium, chloride, urea and creatinine
- Is the specimen volume adequate?
- After centrifugation does the specimen show hemolysis, icterus, lipemia
    - Effect of tourniquet
- Greater hemoconcentration: 3 min vs 1min
- Venous stasis led to increased anaerobic glycolysis, accumulation of lactate, pH low
- Hypoxic effect leads to leakage of K from cells: cause spurious increase in serum K
- Drop in blood pH result in release of ionic Ca & Mg bound to albumin
    - Drop in blood pH: increase in free drug level

Exogenous Interference by Patients' Medication

Several drugs are known to interfere with certain parameters

* Laboratories should try to contact themanufacturer for Drug interference or perform studies to confirm the extent of interference from drugs e.g Phenytoin affects measurements of
certain enzymes ALP & Gamma GT andlowers serum levels of FSH, T4 etc.

- *Instructions for specimen collection should be given to laboratory users in a primary sample collection manual*
- Specimen collection, container, centrifuge speed
- Time lapse in transport for blood gas analysis or delay in analysis
- Storage conditions. In some cases, sample must be frozen after separation in other cases it must not be frozen. Freezing of whole blood will cause hemolysis
- Refrigerating whole blood may also cause hemolysis.
- Substances in higher concentration inside the red cells will leak into serum
- Higher concentration in red cells than in serum:

- K, phosphate, AST, LDH
- Lower concentration in red cells than in serum:
- Na, Cl and carbon dioxide
- Concentration about equal in red cells and serum: creatinine, glucose, urea, urate
- Rejection after Processing and Analysis
- * Serum indices are high – Bilirubin, Lipids, Hb
- These channels in the analyser will be dedicated for these indices.
- - Bilirubin is known to interfere with Creatinine, Chol, Glucose, TG and Uric acid.

II.Analytical(4marks)

The following aspects shall be monitored, evaluated, implemented, and maintained to ensure accuracy and precision of the test carried out:

- Quality of distilled water
- calibration of measuring and testing instruments including analysers, balances, incubators, centrifuges and semi-automatic pipettes, and regular servicing and maintenance of equipment.
- use standard/calibrator which is traceable to national/international reference material.
- include quality control specimens in each procedure daily

Analytical errors may be systematic or random

All data relating to the laboratory's internal QC practices and performance in external quality assessment schemes (scoring, ranks, etc.) should be recorded, reviewed and corrective actions implemented.

Stability of reagents

Laboratory personnel should be aware that the stability of all reagents kept at room temperature shall be reduced from the stated values if the temperature exceeds 35 ^{0}C.

Use of calibration graphs

A fresh standard curve should be carried out whenever:

- The calibrator is changed
- New reagents are introduced
- Problemswith QCare encountered

III .Post Analytical errors (2 marks)

Common post-analytical errors include failure to report test results, delay in reporting, incorrect calculation, critical results not reported or delayed, and results sent to the wrong patient.

Phase of Total Testing Process	Type of Error	Rates
Pre-analytical	Inappropriate test request Order entry errors Misidentification of patient Container inappropriate Sample collection and transport inadequate Inadequate sample/anticoagulant volume ratio Insufficient sample volume Sorting and routing errors Labeling errors	46%-68.2%
Analytical	Equipment malfunction Sample mix-ups/interference Undetected failure in quality control Procedure not followed	7%-13%
Post-analytical	Failure in reporting Erroneous validation of analytical data Improper data entry	18.5%-47%

S. No.	Variables	Post-Analytical Error
		%(Error/Total)
1	Requests released without result verification	99.5(4694/4719)
2	Critical values not communicated immediately	13.3(6/45)
3	Unrecorded test results	1.3(62/4719)
4	Results released out of TAT	1.1(53/4719)
5	All tests not performed as requested	0.2(8/4719)
6	Result printouts attached to the wrong request	0.1(4/4719)
7	Left over samples not retained as the policy	0(0/4719)
8	Laboratory requests with results lost	0(0/4719)
9	Request with incorrect unit of reporting	0(0/4719)
Total Errors from all post analytical QIs		12.8(4827/37,797)

Abbreviations: TAT, turnaround time; QIs, quality indicators.

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DEPARTMENT OF BIOCHEMISTRY

UNIT TEST I, SEPTEMBER 2022

Class: II M.Sc Biochemistry **Date:** 14.09.2022

Subject: Molecular Biology **Time:** 12 to 1.00 PM

Subject Code: MEN3C **Max. Mark:** 25

PART A – (5 X 1 = 5)

Answer any FIVE questions

CO.1 BL: 1 1. Define dominant and recessive alleles with suitable example.

CO.1 BL: 1 2. Define Inheritance.

CO.2 BL: 4 3. Explain about telomeres.

CO.4 BL: 6 4. Write about nascent RNA.

CO.3 BL: 6 5. Write notes on Induced mutation.

CO.3 BL: 6 6. Write any two DNA repair mechanism.

CO.3 BL: 4 7. Explain the role of enzymes involved in mismatch repair.

PART B – (5 X 2 = 10)

Answer any TWO questions

CO.1 BL: 4 8. Explain Mendel laws of inheritance.

CO.2 BL: 2 9. Describe the process of DNA replications in E.coli.

CO.3 BL: 4 10. Explain different types of mutations.

CO.3 BL: 4 11. Explain the role of Rec-A protein in repair mechanism.

PART C – (1 X 10 = 10)

Answer any ONE question

CO.4 BL: 3 12. Illustrate in detail about the prokaryotic transcription.

CO.3 BL: 5 13. Comment on:

a. Holliday model
b. Site specific recombination.

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Answer Key

PART A

1. Define dominant and recessive alleles with suitable example.

The most common interaction between alleles is a dominant/recessive relationship. An allele of a gene is said to be dominant when it effectively overrules the other (recessive) allele.
Eye colour and blood groups are both examples of dominant/recessive gene relationships.

Eye colour

The allele for brown eyes (B) is dominant over the allele for blue eyes (b). So, if you have one allele for brown eyes and one allele for blue eyes (Bb), your eyes will be brown. (This is also the case if you have two alleles for brown eyes, BB.) However, if both alleles are for the recessive trait (in this case, blue eyes, bb) you will inherit blue eyes.

2. Define Inheritance.

Inheritance is defined as transfer of parental character or disease from one generation to another is called as inheritance. It is purely depend upon genetic transfer. (DNA dependent)

3. Explain about telomeres.

A telomere is a region of repetitive DNA sequences at the end of a chromosome. Telomeres protect the ends of chromosomes from becoming frayed or tangled. Each time a cell divides, the telomeres become slightly shorter. Eventually, they become so short that the cell can no longer divide successfully, and the cell dies.

4. Write about nascent RNA.

An RNA molecule in the process of being synthesized (hence incomplete) or a complete, newly synthesized RNA molecule before any alterations have been made (e.g., prior to nuclear processing or RNA editing, *both of which see*).

5. Induced mutation.

Mutations can be induced by several methods. The three general approaches used to generate mutations are radiation, chemical and transposon insertion. The first induced mutations were created by treating Drosophila with X-rays. Using this a pproach Mueller to induce lethal mutations.

6. Name two DNA repair mechanism.

Base excision repair and Nucleotide excision repair.

7. Mention the role of enzymes involved in mismatch repair.

Mismatch repair enzymes detect distortions caused by mismatched bases inserted during DNA synthesis. Although the enzyme can find the site of the mutation

by detecting the distortion caused by the mismatched bases, additional information must be available to indicate which strand is incorrect.

DNA nucleases catalyze the cleavage of phosphodiester bonds. These enzymes play crucial roles in various DNA repair processes, which involve DNA replication, base excision repair, nucleotide excision repair, mismatch repair, and double strand break repair.

PART B

8. Explain Mendel laws of inheritance.

Johann Gregor Mendel (1822-1884), Father of Genetics.

Gregor Mendel, through his work on pea plants, discovered the fundamental laws of inheritance. He deduced that genes come in pairs and are inherited as distinct units, one from each parent. Mendel tracked the segregation of parental genes and their appearance in the offspring as dominant or recessive traits. He recognized the mathematical patterns of inheritance from one generation to the next. Mendel's Laws of Heredity are usually stated as:

1) **The Law of Segregation:** Each inherited trait is defined by a gene pair. Parental genes are randomly separated to the sex cells so that sex cells contain only one gene of the pair. Offspring therefore inherit one genetic allele from each parent when sex cells unite in fertilization.

2) **The Law of Independent Assortment:** Genes for different traits are sorted separately from one another so that the inheritance of one trait is not dependent on the inheritance of another.

3) **The Law of Dominance:** An organism with alternate forms of a gene will express the form that is dominant.

The genetic experiments Mendel did with pea plants took him eight years (1856-1863) and he published his results in 1865. During this time, Mendel grew over 10,000 pea plants, keeping track of progeny number and type. Mendel's work and his Laws of Inheritance were not appreciated in his time. It wasn't until 1900, after the rediscovery of his Laws, that his experimental results were understood.

9. Describe the process of DNA replications in E.coli.

DNA replication is the process by which an organism duplicates its DNA into another copy that is passed on to daughter cells.Replication occurs before a cell divides to ensure that both cells receive an exact copy of the parent's genetic material. DNA replication uses a semi-conservative method that results in a double-stranded DNA with one parental strand and a new daughter strand.Prokaryotic DNA replication is often studied in the model organism *coli*, but all other prokaryotes show many similarities.

Replication is bi-directional and originates at a single origin of replication (OriC).Takes place in the cell cytoplasm.Synthesis occurs only in the

5′to 3′direction.Individual strands of DNA are manufactured in different directions, producing a leading and a lagging strand.Lagging strands are created by the production of small DNA fragments called Okazaki fragments that are eventually joined together.

Enzymes of DNA Replication:

- **Helicases:** Unwind the DNA helix at the start of replication.
- **SSB proteins:** Bind to the single strands of unwound DNA to prevent reformation of the DNA helix during replication.
- **Primase:** Synthesizes the RNA primer needed for the initiation of DNA chain synthesis.
- **DNA Polymerase III (DNAP III):** Elongates DNA strand by adding deoxyribonucleotides to the 3′end of the chain. Synthesis can only occur in the 5′to 3′direction because of DNAP III.
- **DNA Polymerase I (DNAP I):** Replaces RNA primer with the appropriate deoxynucleotides.
- **DNA topoisomerase I:** Relaxes the DNA helix during replication through creation of a nick in one of the DNA strands.
- **DNA topoisomerase II:** Relieves the strain on the DNA helix during replication by forming supercoils in the helix through the creation of nicks in both strands of DNA.
- **DNA ligase:** Forms a 3′-5′phosphodiester bond between adjacent fragments of DNA.

DNA replication begins at a specific spot on the DNA molecule called the origin of replication.At the origin, enzymes unwind the double helix making its components accessible for replication.

- The helix is unwound by helicase to form a pair of replication forks.
- The unwound helix is stabilized by SSB proteins and DNA topoisomerases.
- Primase forms RNA primers (10 bases), which serve to initiate synthesis of both the leading and lagging strand.
- The leading strand is synthesized continuously in the 5′to 3′ direction by DNAP III.
- The lagging strand is synthesized discontinuously in the 5′to 3′ direction through the formation of Okazaki fragments.
- DNAP I remove the RNA primers and replace the existing gap with the appropriate deoxynucleotides.
- DNA ligase seals the breaks between the Okazaki fragments as well as around the primers to form continuous strands.

10. Explain different types of mutations.

Base substitution mutations (2M)
Frameshift mutations (2M)
Consequences (1M)

11. Emphasis on the role of Rec-A protein in repair mechanism.

Diagram (2M)
SOS response (1M)
Mechanism of action (2M)

PART C

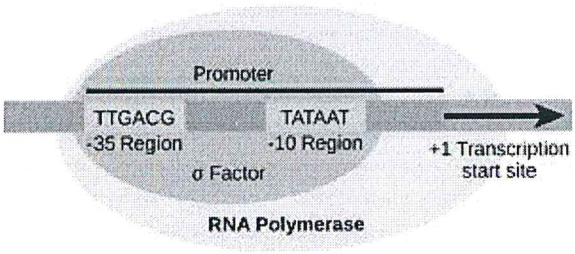
12. Illustrate in detail about the prokaryotic transcription.

Both prokaryotes and eukaryotes perform fundamentally the same process of transcription, with the important difference of the membrane-bound nucleus in eukaryotes. With the genes bound in the nucleus, transcription occurs in the nucleus of the cell and the mRNA transcript must be transported to the cytoplasm. In prokaryotes, which lack membrane-bound nuclei and other organelles, transcription occurs in the cytoplasm of the cell.

RNA Polymerase is the enzyme that produces the mRNA molecule (just like DNA polymerase produced a new DNA molecule during DNA replication). Prokaryotes use the same RNA polymerase to transcribe all of their genes. In *E. coli*, the polymerase is composed of five polypeptide subunits. These subunits assemble every time a gene is transcribed, and they disassemble once transcription is complete. Each subunit has a unique role (which you do not need to memorize). The polymerase comprised of all five subunits is called the **holoenzyme.**

Initiation:

Transcription in prokaryotes (and in eukaryotes) requires the DNA double helix to partially unwind in the region of mRNA synthesis. The region of unwinding is called a transcription bubble. The DNA sequence onto which the proteins and enzymes involved in transcription bind to initiate the process is called a **promoter**. In most cases, promoters exist upstream of the genes they regulate. The specific sequence of a promoter is very important because it determines whether the corresponding gene is transcribed all of the time, some of the time, or hardly at all. The structure and function of a prokaryotic promoter is relatively simple (Figure 1). One important sequence in the prokaryotic promoter is located 10 bases before the transcription start site (-10) and is commonly called the TATA box.

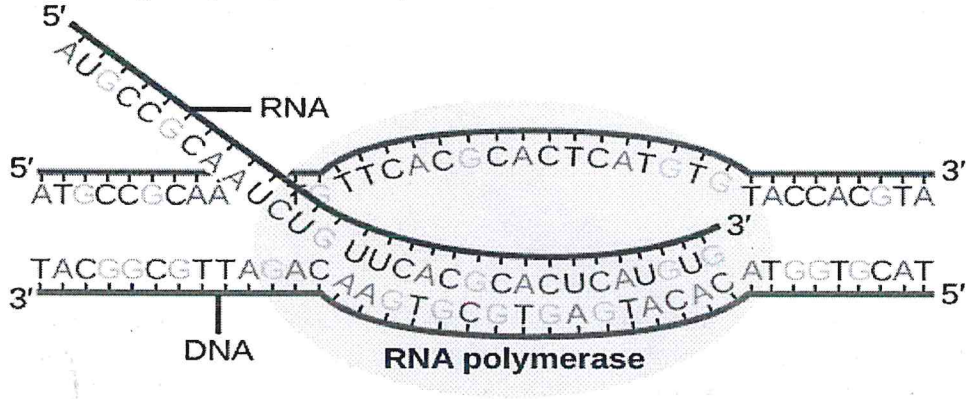


To begin transcription, the RNA polymerase holoenzyme assembles at the promoter. The dissociation of σ allows the core enzyme to proceed along the DNA template, synthesizing mRNA by adding RNA nucleotides according to the base pairing rules, similar to the way a new DNA molecule is produced during DNA replication. Only one of the two DNA strands is transcribed. The transcribed strand of DNA is called the **template strand** because it is the template for mRNA production. The mRNA product is complementary to the template strand and is almost identical to the other DNA strand, called the **non-template strand**, with the exception that RNA contains a uracil (U) in place of the thymine (T) found in DNA. Like DNA polymerase, RNA polymerase adds new nucleotides onto the 3′-OH group of the previous nucleotide. This means that the growing mRNA strand is being synthesized in the 5′

to 3′ direction. Because DNA is anti-parallel, this means that the RNA polymerase is moving in the 3′ to 5′ direction down the template strand.

Elongation

As elongation proceeds, the DNA is continuously unwound ahead of the core enzyme as the hydrogen bonds that connect the complementary base pairs in the DNA double helix are broken. The DNA is rewound behind the core enzyme as the hydrogen bonds are reformed. The base pairing between DNA and RNA is not stable enough to maintain the stability of the mRNA synthesis components. Instead, the RNA polymerase acts as a stable linker between the DNA template and the newly forming RNA strand to ensure that elongation is not interrupted prematurely.

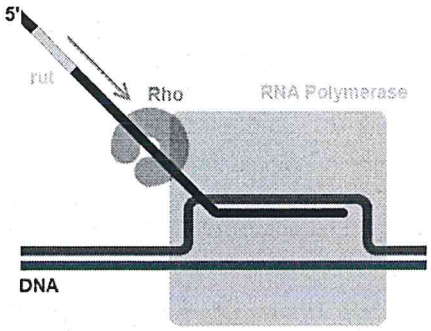


During elongation, RNA polymerase tracks along the DNA template, synthesizes mRNA in the 5′ to 3′ direction, and unwinds then rewinds the DNA as it is read.

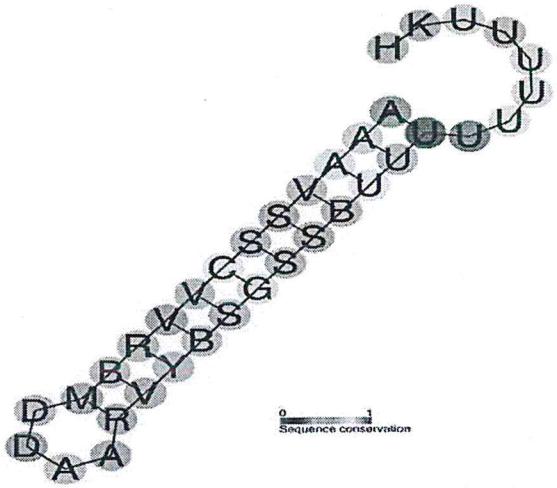
Termination

Rho dependent and Rho independent termination are two major termination strategies found in prokaryotes.Both forms release transcript from the DNA template to terminate the transcription.

Rho factor is a protein which has helicase activity. Rho protein binds with the RNA transcript and moves along the RNA polymerase in 5'-3' direction, encouraging the dissociation of hydrogen bonds between the DNA template and RNA transcript. When Rho factor reaches the transcription bubble, it pulls DNA/RNA hybrid apart and releases the transcript from the transcription bubble. When this occurs, it terminates the transcription.



Rho independent termination is the second strategy which terminates prokaryotic transcription. Usually, a terminator region has an inverted repeat sequence. Immediately after the inverted repeat sequence, there is an Adenine rich region (AAAA). When RNA polymerase moves ahead, it produces an mRNA sequence. Since the two regions are complementary in the inverted repeat sequence region, it forms a hairpin loop structure due to hydrogen bonding. Next region will be the U rich region. Hairpin structure ceases the RNA polymerase activity. Moreover, in the U rich regions, there are weak interactions between U bases of transcript and A bases of the template. These weak Adenine-Uracil bonds destabilize the DNA template and the RNA transcript and separate each other. In the end, transcript liberates from the transcription site.



13. Write notes on:

a. Holliday model
   Diagram (2M)
   Steps involved
   Double strand break (1M)
   Invasion of strands forming crossing over (1M)
   Cleavage of Holliday intermediates (1M)

b. Site specific recombination.
   Diagram (2M)
   Steps involved
   Insertion (1M)
   Deletion (1M)
   Inversion (1M)

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DEPARTMENT OF BIOCHEMISTRY

UNIT TEST I, SEPTEMBER 2022

Class: II M.Sc Biochemistry **Date:** 16.09.2022

Subject: Environmental Biotechnology **Time:** 12 to 1.00 PM

Subject Code: MDTBB **Max. Mark:** 25

PART A – (5 X 1 = 5 Marks)

Answer any FIVE questions

CO1 BL: 1 1. Define biofilm.

CO2 BL: 1 2. Comment on bioreactor.

CO2 BL: 3 3. Sketch an impeller.

CO4 BL: 1 4. Define detoxification.

CO4 BL: 1 5. Define on co-metabolism.

CO5 BL: 6 6 .Design on phycoremediation.

CO5 BL: 1 7. Label the disadvantages of ex situ bioremediation.

PART B – (2 X 5 = 10 Marks)

Answer any TWO questions

CO2 BL: 2 8..Explain Airlift bioreactors and fluidized bed bioreactors.

CO4 BL: 4. 9. Explain the factors affecting molecular recalcitrance.

CO4 BL: 2 10.Write about pollution monitoring.

CO5 BL: 1 11. Write about the bioremediation of petroleum.

PART C – (1 X 10 = 10 Marks)

Answer any ONE question

CO2 BL: 2 12. Describe the principle, design and types of bioreactors. Give its applications.

CO5 BL: 4 13. Explain the techniques of bioremediation.

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Answer Key

PART A

1. **Define biofilm.**
   - Biofilm are very adaptive to environmental changes. Detachment phenomenon is common among all biofilms. Through this phenomenon individual or clumps cells of bacteria become able to detach themselves from the biofilm colony. In favorable conditions, biofilms can migrate from surface to surface via streaming, rippling, detaching, seeding dispersal and rolling.
2. **Comment on bioreactor.**
   - They are employed for the production of various chemicals by fermentation on a large scale such as ethanol, butanol, lactic acid, fumaric acid, and succinic acid. Since they offer high reaction rates and are economical, this review becomes their subject matter.
3. **Sketch an impeller.**
   - The impeller, also known as agitator, is a key component of the bioreactor. It performs the important tasks of mixing, aeration, heat and mass transfer within the vessel. Learn about the different characteristics of various types of impellers and the importance of their designs.
   - The impeller (also called agitator) is an agitating device necessary for stirring of the fermenter. (ii) It mixes the microbial cells through the liquid culture medium. In this way, the stirring ensures uniform access of microbial cells to the nutrients.
4. **Define detoxification.**

   Biological Detoxification is a treatment process that controls and accelerates the natural microbial breakdown of hazardous organic chemicals, such as Polychlorinated Biphenyls (PCBs), into non-toxic or less toxic chemicals. Biological detoxification has been used to treat contaminated water, sludges, and soils. The treatment process speeds the breakdown of the toxic organic chemicals by increasing the number of microorganisms using the chemical for food.
5. **Define on co-metabolism.**

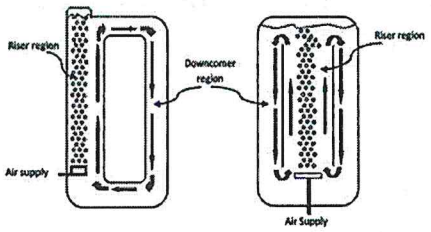
   Cometabolism is defined as the simultaneous degradation of two compounds, in which the degradation of the second compound (the secondary substrate) depends on the presence of the first compound (the primary substrate). Cometabolism occurs when an enzyme produced by an organism to catalyze the degradation of its growth-substrate to derive energy and carbon from it is also capable of degrading additional compounds. The fortuitous degradation of these additional compounds does not support the growth of the bacteria, and some of these compounds can even be toxic in certain concentrations to the bacteria.
6. **Design on phycoremediation**
   - Phycoremediation, a type of bioremediation, can be defined in a broader sense as the use of macroalgae or microalgae for the removal or biotransformation of pollutants including nutrients and xenobiotics from wastewater and CO2 from waste air

7. **Label the disadvantages of ex situ bioremediation.**
   - Ex situ bioremediation can be difficult to remove large quantities of contaminated soil or water from the environment. And, once you have the contaminated material, you need space to set up containment and treatment methods.

PART B

8. **Explain Airlift bioreactors and fluidized bed bioreactors.**

Airlift reactors (ALR): ALR contain two concentric tubes, **a riser** (an inner tube) and **a down comer** (an outer tube). In ALR, mixing is achieved by circulating essentially air at the bottom of the reactor. As a result of force applied by the air (at the bottom of the inner tube), the liquid in the inner tube moves up which then overflows (the inner tube) downward thus creating eddies to mix the liquid. In some of the ALR down comer is replaced with an external loop to circulate fermentation broth. Such reactors where air is replaced by an anaerobic gas are called **gas lift reactors.**Up flow anaerobic sludge blanket (UASB) reactors (contain granular biofilm particles) are used for anaerobic treatment of wastewater/industrial effluents. As the name suggests, the flow in these reactors is in upward direction. At the top of the reactor provisions are made for gases to escape and sludge particles to settle to the bottom part of the reactor. Reactor effluent is removed from the top of the reactor. UASB reactor was developed by **Lettinga.**



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Types of air lift bioreactors:

1. Internal loop air lift bioreactor: It has a single container with a central draft tube that creates interior liquid circulation channels.It is simple in design, with volume and circulation at a fixed rate for fermentation.

2. External loop air lift bioreactor: It possesses an external loop so that the liquid circulates through separate independent channels.These reactors can be suitably modified to suit the requirements of different fermentations.In general, the air lift bioreactors are more efficient than bubble columns, particularly for more denser suspension of microorganisms.This mainly because in these bioreactors, the mixing of the contents is better compared to bubble columns.

Advantages of ALRs: Hence, homogenous mixing / distribution of gas / oxygen.Simple design with no moving parts or agitator for less maintenance, less risk of defects.Easier sterilization (no agitator shaft parts).Low energy requirement homogenous distribution of nutrients and shear force.

Disadvantages of ALRs : Greater air throughput and higher pressure needed.

- Inefficient break the foam when foaming occurs.No bubbles breaker.

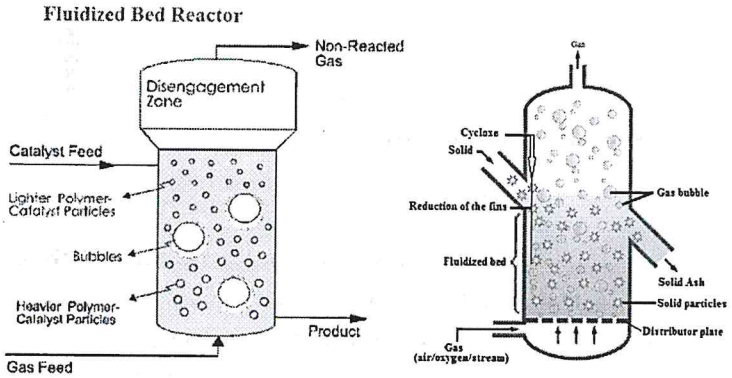
Fluidized bed bioreactors:

In FBR a fluid (gas or liquid) is passed through a solid (tiny sphere shaped granular) material at high enough velocities to suspend the solid and cause it to behave as though it were a fluid, this process, known as **fluidization**. Normally air is also introduced along with the influent flow from the in-let. In this reactor the packing materials expands and gets fluidized when the waste water to be treated moves upward in the reactor.

Formation of fluidization and operation period of this reactor is much longer without fibrous bed, this is the major advantage of FBR than other type of reactor. As a result of fluidized this reactor is now used in many industrial applications.

FBR can be used to carry out a variety of multiphase chemical reactions.FBR played a successful role in the degradation of toxic phenolic chemicals and butanol production. In these reactors butanol production was increased by approximately 40 - 50 times that of the batch reactors. FBR is popular to treat waste waters biologically either in aerobic or anaerobic conditions.FBR is also used for sludge treatment and removal of dissolved gases.

Cell growth and active biofilms formation occurs around the adsorbent particles. Accumulation of sufficient biomass in the reactor may take from 2 to 4 weeks. These reactors do not block due to excessive growth. FBR have been operated successfully for longer than 4 months in continuous operation.



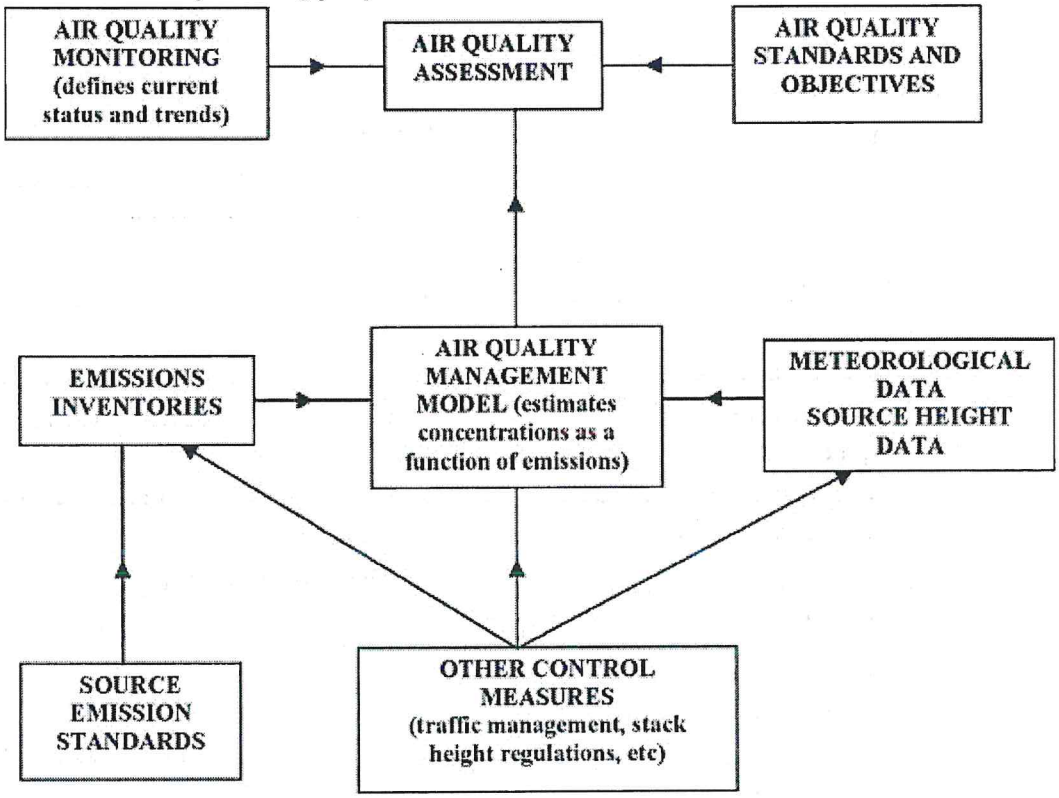
9. Explain the factors affecting molecular recalcitrance.

- Factors affecting molecular recalcitrance (2M)
- Molecular structure (1M)
- Environmental conditions (1M)
- Bioaugmentation (1M)

10. Write about pollution monitoring.

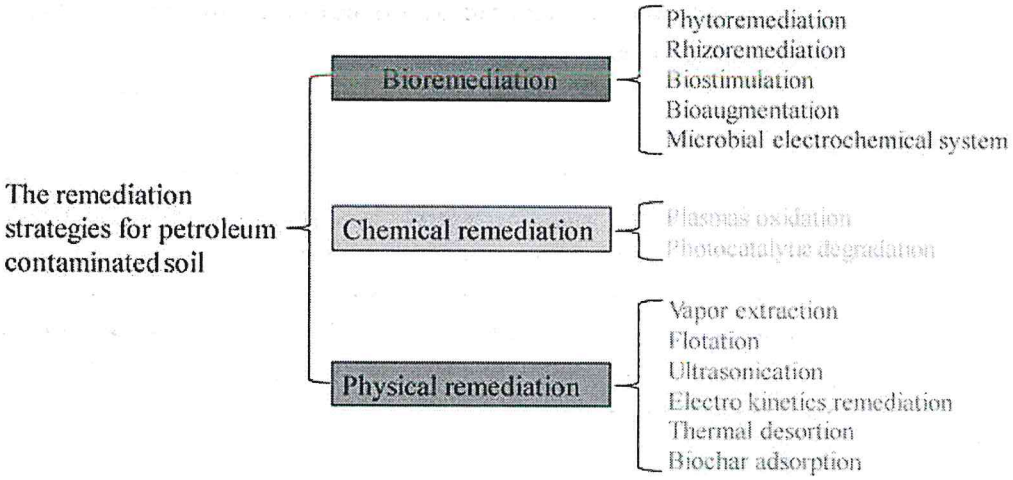
- Monitoring is an exercise to measure ambient air pollution levels in an area. The data will indicate the status of the quality of air we breathe.

- The data, over a long term, allows us to tease out patterns that help support air pollution control policy.
- Monitoring helps in assessing the level of pollution in relation to the ambient air quality standards.
- Standards are a regulatory measure to set the target for pollution reduction and achieve clean air. Robust monitoring helps to guard against extreme events by alerting people and initiate action



11. Write about the bioremediation of petroleum.

- Bioremediation is an eco-friendly and economic method to remove the petroleum pollutants of soil.
- There were several kinds of bioremediation have been applied to remediate the petroleum hydrocarbon from contaminated soils, such as phytoremediation, rhizoremediation, biostimulation, bioaugmentation, and so on.



PART C

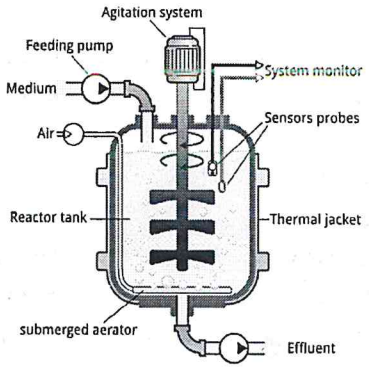
12. Describe the principle, design and types of bioreactors. Give its applications.

Biofilm reactors:

- They are employed for the production of various chemicals by fermentation on a large scale such as ethanol, butanol, lactic acid, fumaric acid, and succinic acid.
- Since they offer high reaction rates and are economical, this review becomes their subject matter.
- In biofilm reactors, cell concentrations as high as 74 gL^{-1} can be achieved.
- In addition, the cell layers in bio-particles become highly active, thus contributing to the high reactor productivities.
- Within fluidized bed reactors, the biofilm particles are of various shapes (including spherical and irregular shapes) and these reactors can be operated for long periods of time.
- The amount of adsorbent that is used in these reactors is low, which also reduces the cost of the cell support.
- In biofilm reactors, reactor configurations can vary from a simple packed bed reactor to fluidized bed, UASB, and airlift reactors.

Types of biofilm reactors:

- Biofilms reactors are of different types and the operation of biofilm reactors changes from reactor to reactor. Batch type reactors, Continuous stirred tank reactors (CSTR) (Agitating continuous reactors, Rotary continuous reactors),Packed bed reactors (PBR), Trickling bed reactors (TBR), Fluidized bed reactors (FBR), Airlift reactors (ALR), Up flow anaerobic sludge blanket reactors (UASB), Expanded granular sludge bed reactors (EGSB).



- **Applications:**Many different bioreactors and bioreactor applications are described, including those for cell growth, enzyme production, biocatalysis, food production, milk processing, extrusion, tissue engineering, algae production, protein synthesis, and anaerobic digestion.

13. Explain the techniques of bioremediation.

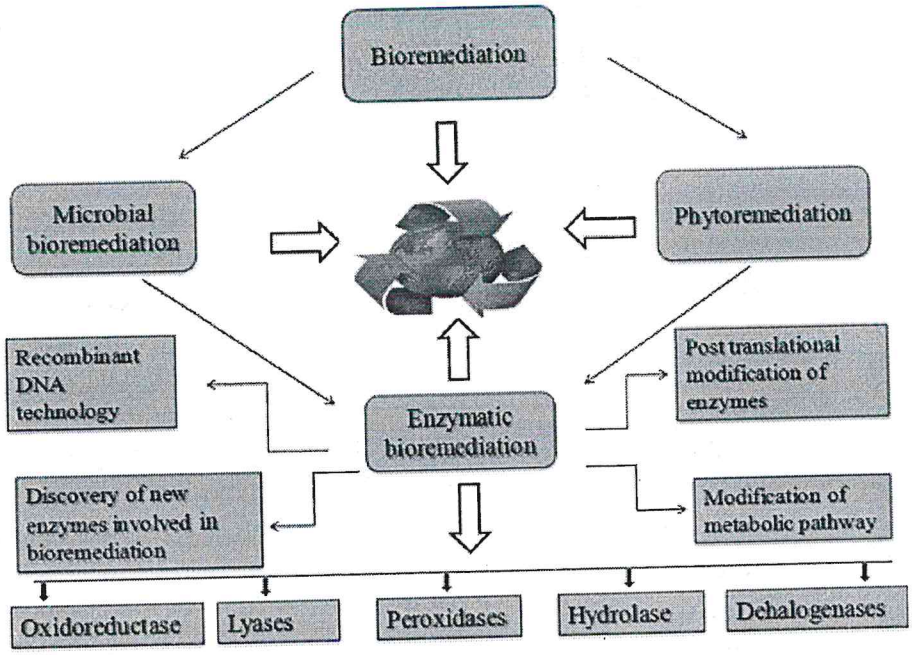
- Bioremediation is a process where biological organisms are used to remove or neutralize an environmental pollutant by metabolic process. The "biological" organisms include microscopic organisms, such as fungi, algae and bacteria, and the "remediation"—treating the situation.
- Ex situ bioremediation techniques
- These techniques involve excavating pollutants from polluted sites and subsequently transporting them to another site for treatment. Ex situ bioremediation techniques are usually considered based on: the cost of treatment, depth of pollution.
- Biopile

  Biopile mediated bioremediation involves above-ground piling of excavated polluted soil, followed by nutrient amendment, and sometimes aeration to enhance bioremediation by basically increasing microbial activities.
- Windrows

  As one of ex situ bioremediation techniques, windrows rely on periodic turning of piled polluted soil to enhance bioremediation by increasing degradation activities of indigenous and/or transient hydrocarbonoclastic bacteria present in polluted soil. The periodic turning of polluted soil, together with addition of water bring about increase in aeration, uniform distribution of pollutants, nutrients and microbial degradative activities.
- Bioreactor

  Bioreactor, as the name implies, is a vessel in which raw materials are converted to specific product(s) following series of biological reactions. There are different operating modes of bioreactor, which include: batch, fed-batch, sequencing batch, continuous and multistage. The choice of operating mode depends mostly on market economy and capital expenditure.

- Land farming
  Land farming is amongst the simplest bioremediation techniques owing to its low cost and less equipment requirement for operation. In most cases, it is regarded as ex situ bioremediation, while in some cases, it is regarded as in situ bioremediation technique. This debate is due to the site of treatment.
- Bioventing
  This technique involves controlled stimulation of airflow by delivering oxygen to unsaturated (vadose) zone in order to increase bioremediation, by increasing activities of indigenous microbes. In bioventing, amendments are made by adding nutrients and moisture to enhance bioremediation with the ultimate goal being to achieve microbial transformation of pollutants to a harmless state.
- Phytoremediation
  This technique relies on the use of plant interactions (physical, biochemical, biological, chemical and microbiological) in polluted sites to mitigate the toxic effects of pollutants.
- Biosparging
  This technique is very similar to bioventing in that air is injected into soil subsurface to stimulate microbial activities in order to promote pollutant removal from polluted sites.



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DEPARTMENT of BIOCHEMISTRY

Question & Answer Key

2022-2023

Odd Semester

SRM ARTS AND SCIENCE COLLEGE, KATTANKULATHUR

DEPARTMENT OF BIOCHEMISTRY

UNIT TEST I, SEPTEMBER 2022

Class: I B.Sc., Biochemistry | **Date:** 28.09.2022

Subject: Nutritional Biochemistry | **Time:** 12 to 1.00 PM

Subject Code: SB21A | **Max. Mark:** 25

PART A – (5 X 2 = 10 Marks)

Answer any FIVE questions

CO6 BL:5 1. Comment on nutrients.

CO1 BL:6 2. Write the sources of Protective Foods.

CO2 BL:6 3. Write the role of dietary Fibre.

CO3 BL:1 4.Define balanced diet.

CO1 BL:5 5. Comment on functional foods.

CO4 BL:6 6.Write the substances rich in vitamin D

CO2 BL:1 7.Define malnutrition.

PART B – (1 X 5 = 5 Marks)

Answer any ONE question

CO4 BL: 1,6 8. Define minerals. Write the sources of RDA and functions of Iron and Iodine.

CO1 BL:4 9.Explain about ICMR classification of food groups.

PART C – (1 X 10 = 10 Marks)

Answer any ONE question

CO6 BL: 4 10.Explain in detail about obesity.

CO1 BL: 5 11. Comment on energy yielding nutrients.

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Answer key

PART A

1. Comment on nutrients.

   Nutrients are chemical compounds in food that are used by the body to function properly and maintain health. Examples include proteins, fats, carbohydrates, vitamins, and minerals

2. Write the sources of Protective Foods

   Vegetables and Fruits are called protective foods. Our body requires Vitamins and Minerals for various vital processes of life and for formation of blood, bones and teeth.

3. Write the role of dietary Fibre.

   Dietary fiber increases the weight and size of your stool and softens it. A bulky stool is easier to pass, decreasing your chance of constipation. If you have loose, watery stools, fiber may help to solidify the stool because it absorbs water and adds bulk to stool. Helps maintain bowel health.

4. Define balanced diet.

   Balanced diet: A balanced diet is one that contains all of the essential elements that the human body needs. Carbohydrates, lipids, vitamins, minerals, proteins.

5. Comment on functional foods.

   Functional foods are foods that offer health benefits beyond their nutritional value. In addition to nutrient-rich ingredients like fruits and veggies, the category also includes foods fortified with vitamins, minerals, probiotics, and fiber.Functional foods are generally separated into two categories: conventional and modified.Conventional foods are natural, whole-food ingredients that are rich in important nutrients like vitamins, minerals, antioxidants, and heart-healthy fats.Meanwhile, modified foods have been fortified with additional ingredients, such as vitamins, minerals, probiotics, or fiber, to increase a food's health benefits.

6. Write the substances rich in vitamin D.

   Foods such as cow's milk, soy milk, orange juice, cereals, and oatmeal are sometimes fortified with vitamin D.

7. Define malnutrition.

   Malnutrition refers to deficiencies, excesses or imbalances in a person's intake of energy and/or nutrients.

PART B

8. Define minerals. Write the sources RDA and functions of Iron and Iodine.

Definition (1M)

RDA (1M)

Metabolic Functions (2M

9. Explain about ICMR classification of food groups.

Classification (1M)

Sources of Food Groups (2M)

Functions of food groups (2M)

PART C

10. Explain in detail about obesity.

Definition (2M)

Biological Functions (4M)

Deficiency manifestations (4M)

11. Comment of energy yielding nutrients.

Definition (2M)

RDA (1M)

Biological Functions (4M)

Deficiency manifestations (4M)

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DEPARTMENT OF BIOCHEMISTRY

UNIT TEST I, SEPTEMBER 2022

Class: I B.Sc., Biochemistry | **Date:** 29.09.2022

Subject: Allied-Chemistry-I | **Time:** 12 to 1.00 PM

Subject Code: SD3AA | **Max. Mark:** 25

PART - A (5 X 2 = 10)

Answer any **FIVE** questions

CO2 BL: 1 1. Define free radicals with examples

CO3 BL: 4 2. Differentiate the electrophile and nucleophile

CO2 BL: 3 3. What are biofertilizers? Give two uses.

CO3 BL: 2 4. Note on LPG

CO3 BL: 4 5. Explain about the biogas?

CO3 BL: 1 6. Write the composition of producer gas.

CO3 BL: 2 7. Describe the urea preparation.

PART - B (5 X 1 = 5)

Answer any **ONE** question

CO2 BL: 2 8. Discuss the hybridization of Benzene?

CO3 BL: 4 9. Give the classification of fuels with examples?

PART - C (10 X 1 = 10)

Answer any **ONE** question

CO2 BL: 4 10. How are organic compounds classified? Give examples.

CO3 BL: 2 11. Discuss the hybridization and bonding in Methane.

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Answer Key

PART - A

1. Define Free radicals with examples

Free radicals are atoms or molecules with an odd (unpaired) number of electrons.

2. Differentiate the electrophile and nucleophile

Nucleophiles are normally negatively charged. Even neutrally charged molecules with electron rich atoms can behave as nucleophiles.

3. What are biofertilizers? Give two uses.

Biofertilizers are substance that contains microbes, which helps in promoting the growth of plants and trees by increasing the supply of essential nutrients to the plants.

4. Note on LPG.

LPG—Liquid Petroleum Gas—is a flammable gas commonly used in residential heating, cooking and hot water systems; as a fuel in cars; and in industrial, agricultural, and manufacturing contexts. It is made from a mixture of propane and butane.

5. Explain about the biogas?

Biogas is produced when bacteria digest organic matter (biomass) in the absence of oxygen. This process is called anaerobic digestion.

6. Write the composition of producer gas.

A combustible mixture of nitrogen, carbon monoxide, and hydrogen

7. Describe the urea preparation.

Commercially urea is most commonly produced by reacting carbon dioxide with ammonia at 200°C

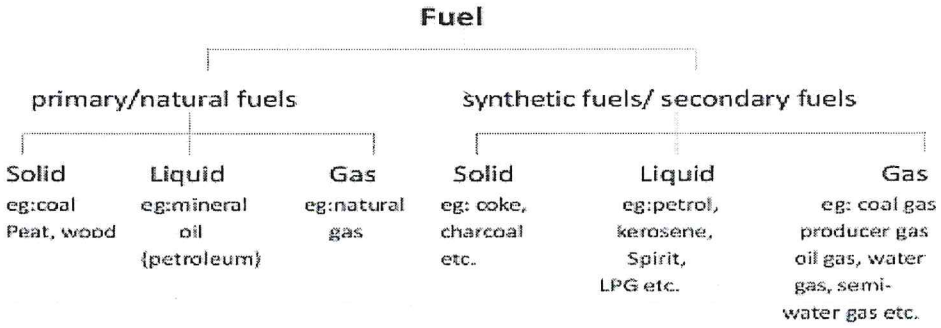
PART - B

8. Discuss the hybridization of Benzene?

Benzene is an aromatic planar compound with 6 carbon cyclic ring. Each carbon atom in the ring is sp2 hybridized.

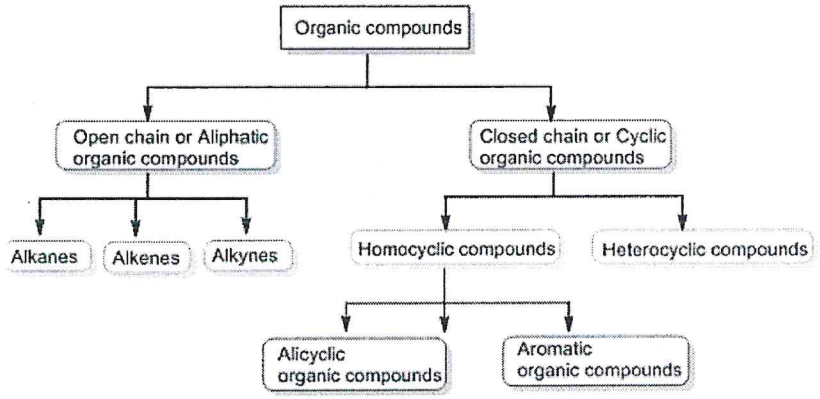
9. **Give the classification of fuels with examples?**

On the basis of state of aggregation fuels are divided into solids, liquids and gases.

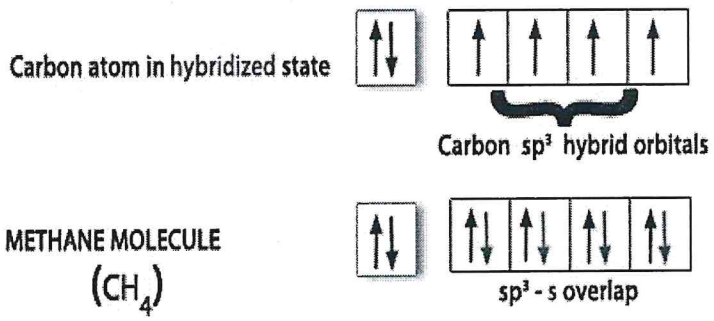


PART - C

10. How are organic compounds classified? Give examples.



11. Discuss the hybridization and bonding in Methane.



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DEPARTMENT OF BIOCHEMISTRY

UNIT TEST I, SEPTEMBER 2022

Class: I B.Sc., Microbiology **Date:** 29.09.2022

Subject: Allied Biochemistry-I **Time:** 12 to 1.00 PM

Subject Code: SB31A **Max. Mark:** 25

PART A – (5 X 2 = 10 Marks)

Answer any FIVE questions

CO.1 BL:6 1. Write the structure of glucose and galactose.

CO.1 BL:6 2. Write any two properties of lactose.

CO.1 BL:3. 3. Sketch the structure of sucrose and write any two properties.

CO.1 BL:1 4. Label the glycosidic linkage of maltose.

CO.1 BL:3 5. Sketch any one keto sugar.

CO.2 BL:1 6.Define an amino acids.

CO.2 BL:3 7.Sketch the structure of sulphur containing amino acid.

PART B – (1 X 5 = 5 Marks)

Answer any ONE question

CO.1 BL: 6 8. Write down the properties of monosaccharides.

CO.2 BL:4 9. Explain about the classification of amino acids based on side chain R group.

PART C – (1 X 10 = 10 Marks)

Answer any ONE question

CO.1 BL: 4 10. Classify the details of carbohydrates.

CO.2 BL: 6 11. Write a note on classification of amino acid.

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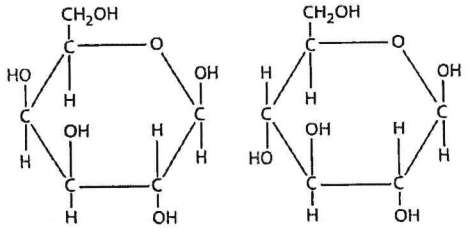
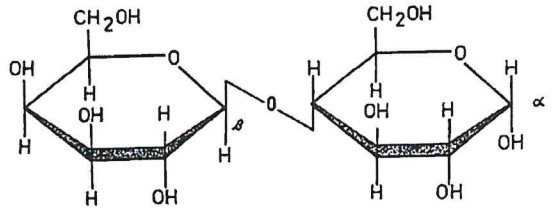
Answer Key

PART A

CO.1 BL:6 1.Write the structure of Glucose and Galactose.

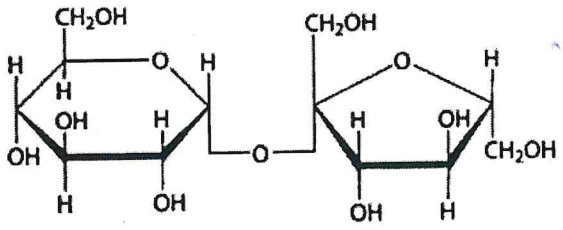


CO.1 BL:6 2. Write any two properties of Lactose.



- Lactose is a sugar present in milk. It is one of the important classes of biomolecules is carbohydrates.
- These biomolecules have a major role in daily life by providing three requirements.
- These requirements are food (starch), shelter (cellulose) and cloth (cellulose).

CO.1 BL:3. 3. Sketch the structure of sucrose and write any two properties.



Sucrose

(α-D- glucopyranosyl β - D- fructofuranoside)

Structure of sucrose

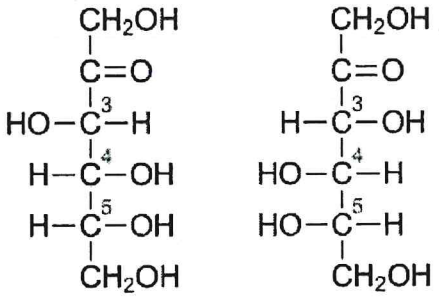
- Sucrose is ***commonly referred to as table sugar or cane sugar.***
- In a $C_{12}H_{22}O_{11}$ molecule, the fructose and glucose molecules are connected via a glycosidic bond. This type of linking of two monosaccharides called glycosidic linkage.

CO.1 BL:1 4. Label the Glycosidic linkage of Maltose.

Maltose is composed of two molecules of glucose joined by an **α-1,4-glycosidic linkage**. It is a reducing sugar that is found in sprouting grain. Lactose is composed of a molecule of galactose joined to a molecule of glucose by a β-1,4-glycosidic linkage.

It is a reducing sugar that is found in milk. **Give the structure of acidic amino acids**

CO.1 BL:3 5. Sketch any one Keto sugar.



D-Fructose L-Fructose

CO.2 BL:1 6.Define an amino acids.

An amino acid is **an organic molecule that is made up of a basic amino group ($-NH_2$), an acidic carboxyl group (−COOH), and an organic R group (or side chain) that is unique to each amino acid**. The term amino acid is short for α-amino [alpha-amino] carboxylic acid.

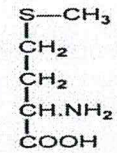
CO.2 BL:3 7. Sketch the structure of Sulphur containing Aminoacid.

Sulphur Containing Amino Acids

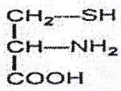
Sulphur containing amino acids are three:

- L- Methionine: essential amino acid,
- L- Cysteine
- L- Cystine, } both are non-essential amino acids

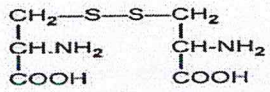
Structure of S-containing Amino acids:



L-Methionine (α-amino-γ-methyl thio-n-butyric acid)

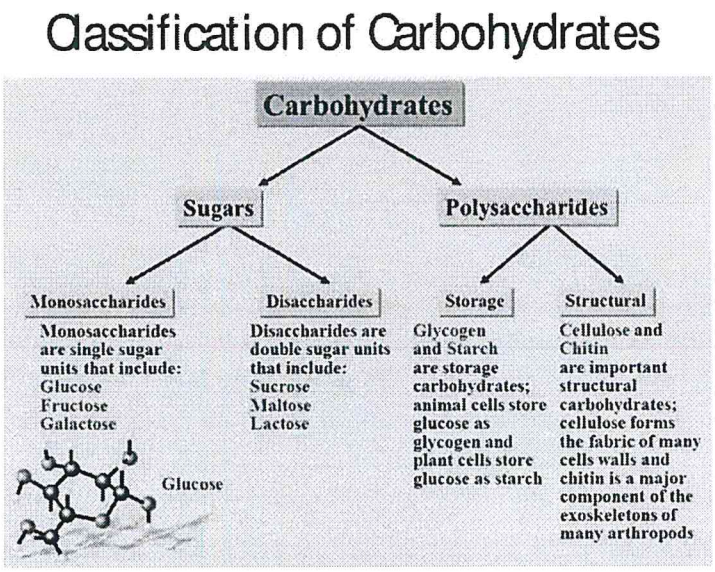


L-Cysteine (α-amino-β-mercapto-propionic acid)

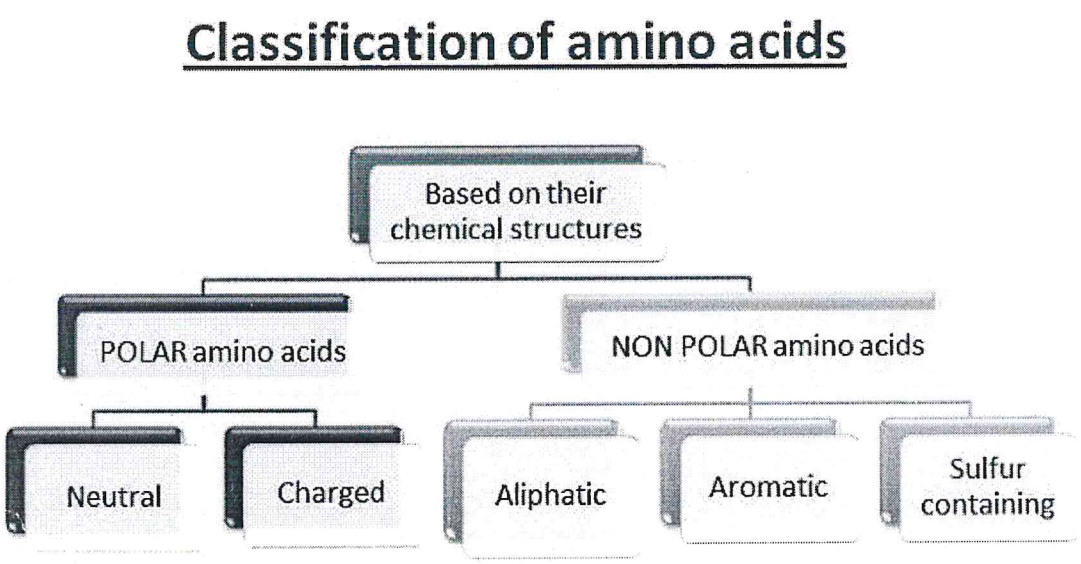


L-Cystine (β-β-dithio-α-amino propionic acid)

CO.1 BL: 4 10. Classify in details of Carbohydrate



CO.2 BL: 6 11. Write a note on Classification of Aminoacid.



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DEPARTMENT OF BIOCHEMISTRY

UNIT TEST I, SEPTEMBER 2022

Class: II B.Sc., Biochemistry **Date:** 14.09.2022

Subject: Biomolecules **Time:** 12 to 1.00 PM

Subject Code: SB23A **Max. Mark:** 25

PART A – (5 X 2 = 10 Marks)

Answer any FIVE questions

CO.1 BL:6 1. Write the structure of glucopyranose and fructofuranose.

CO.1 BL:6 2. Write the biological significance, physical properties of carbohydrates.

CO.1 BL:1. 3. Define Asymmetric carbon atom.

CO.3 BL:1 4. State the biological role of Amino acids.

CO.3 BL:1 5. Sketch the structure of acidic amino acids.

CO.3 BL:1 6.Define essential amino acids.

CO.1 BL:6 7.Write short about hydrophobic interaction.

PART B – (1 X 5 = 5 Marks)

Answer any ONE question

CO.3 BL: 6 8. Write the classification of amino acids based on 'R' group.

CO.5 BL:1 9. Brief out on the forces responsible for the stabilization of protein structure.

PART C – (1 X 10 = 10 Marks)

Answer any ONE question

CO.1 BL: 2 10.Describe in detail about the classifications of carbohydrates.

CO.5 BL: 6 11. Compile the detailed note on different levels of organization of proteins

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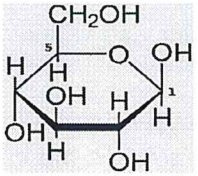
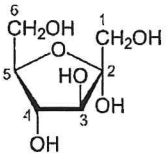
Answer Key

PART A

1. **Write the structure of glucopyranose and fructofuranose.**

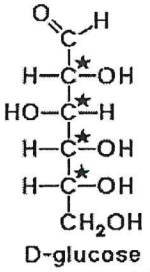


α D glucopyranose



α D fructofuranose

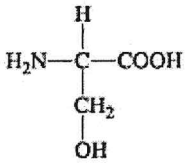
2. **Write the biological significance, physical properties of carbohydrates.**
   - Carbohydrates are, in fact, an essential part of our diet; grains, fruits, and vegetables are all natural sources of carbohydrates. Importantly, carbohydrates provide energy to the body, particularly through glucose, a simple sugar that is a component of starch and an ingredient in many basic foods.
   - Low molecular weight, crystalline in nature, sweat in taste, soluble in water, insoluble in absolute alcohol or organic solvents.
3. **Define Asymmetric carbon atom.**
   - A carbon atom to which four different atoms or group of atoms are attached is said to be asymmetric carbon atom.
   - Example glucose has 4 asymmetric carbon atoms.



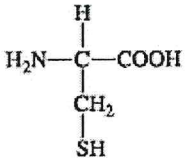
D-glucose

2,3,4,5,6-pentahydroxyhexanal
(with 4 chiral centers)

4. **Mention the biological role of Amino acids.**
   - Amino acids function as the **building blocks of proteins**. Proteins catalyse the vast majority of chemical reactions that occur in the cell.
   - They provide many of the structural elements of a cell, and they help to bind cells together into tissues
5. **Give the structure of acidic amino acids**



serine
(Ser, S)

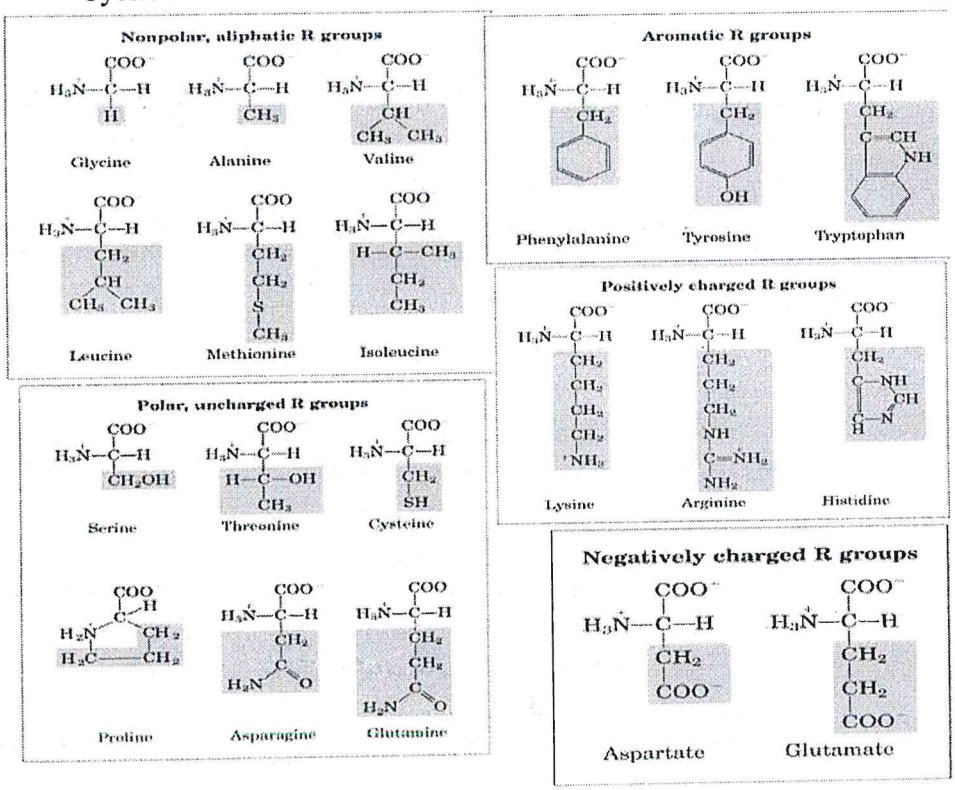


cysteine
(CysH, C)

6. **Define essential amino acids**
   - Essential Amino Acids cannot be made by the body. As a result, they must come from food.
   - The 9 essential amino acids are: histidine, isoleucine, leucine, lysine, methionine, phenylalanine, threonine, tryptophan, and valine.
7. **Write short about Hydrophobic interaction**
   - The major driving force in protein folding is the hydrophobic effect. This is the tendency for hydrophobic molecules to isolate themselves from contact with water.
   - As a consequence during protein folding the hydrophobic side chains become buried in the interior of the protein.

PART B

8. **Write the classification of amino acids based on 'R' group**
   - Based on type of functional group (R group) present amino acids are classified as:
   - Aliphatic,
   - Aromatic,
   - Acidic,
   - Basic,
   - Acid Amide,
   - Sulphur And
   - Cyclic Amino Acids.



9. **Brief out on the forces responsible for the stabilization of protein structure.**

Forces stabilizing the tertiary structure of proteins:

Disulfide bonds	• Stabilize the native conformation of the protein.
Hydrophobic interactions	• In the interior of the protein to hide the hydrophobic residues.
Hydrogen bonds	• Formed between polar residues and water and between other polar groups within the protein.
Ionic interactions.	• To stabilize the protein structure.

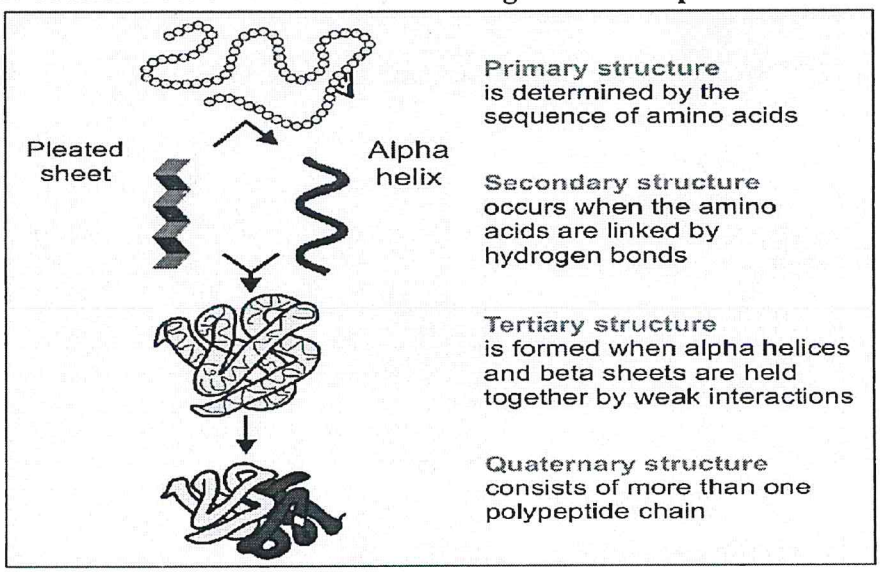
PART C

10. **Describe in detail about the classifications of carbohydrates.**

- Carbohydrates may be defined as poly hydroxy alcohols with aldehydes or ketones and their derivatives. They could be represented by general formula of $C_x(H_20)_{-1}$
- Carbohydrates may be classified broadly into four major groups as follows. Monosaccharides (C_nH_2O) n, Disaccharides $(C_nH_2O)n-1$, Oligosaccharides $(C_nH_2O)n$, Polysaccharides $(C_nH_2O)n$,
- **Monosaccharides:** These are often called simple sugars which cannot be hydrolysed into a simpler form. $C_6\ H_{12}\ O_6$. The general formula is Cn (H_2O) n.
- **Disaccharides:** These are carbohydrates produce two molecules of the same or of different monosaccharides on hydrolysis. The general formula is C_n (H_2O) n-1.Examples are Lactose, Maltose, Sucrose.
- Lactoseon hydrolysis to yield glucose and galactose by enzyme lactase. Maltose on hydrolysis to yield glucose and glucose by enzyme maltase. Sucroseon hydrolysis to yield glucose and fructose by enzyme sucrase.
- **Polysaccharides:**These carbohydrates yield more than 6 monosaccharides molecules on hydrolysis.The general formula is $(C_6H_{12}O_5)x$. These may be classified as, **Homopolysaccharides:** Containing only a single type of monosaccharides or monomer.Examples are: Starch, Glycogen, Cellulose, Dextrin.**Heteropolysaccharides:** Contain two or more different kinds ofmonosaccharides or monomer in alternating repeating sequence.Also called as

Mucopolysaccharides. Examples are: Hyaluronic acid, chondroitin sulphate, Heparin.

11. Compile detailed note on different levels of organization of proteins



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DEPARTMENT OF BIOCHEMISTRY

UNIT TEST I, SEPTEMBER 2022

Class: III B.Sc Biochemistry | **Date:** 12.09.2022

Subject: Enzymes | **Time:** 12 to 1.00 PM

Subject Code: SB25A | **Max. Mark:** 25

PART A – (5 X 2 = 10 Marks)

Answer any FIVE questions

CO.1 BL: 1 1. Define the term active site.

CO.1 BL: 6 2.Write notes on allosteric enzymes?

CO.3 BL: 1 3. Define modulators.

CO.1 BL: 5 4. Comment on enzyme specificity?

CO.2 BL: 6 5. Write the significance of Km.

CO.5 BL: 1 6. State the Role of biotin in enzyme catalyzed reaction

CO.5 BL: 5 7. What are Co enzymes?

PART B – (1 X 5 = 5 Marks)

Answer any ONE question

CO.1 BL: 5 7. Comment on induced fit theory.

CO.6 BL: 2 8. Write an account on Biosensor.

PART C – (1 X 10 = 10 Marks)

Answer any ONE question

CO.1 BL: 4 9. Explain the nomenclature and classification of enzymes.

CO.5 BL: 2 10. Write in detail any three water soluble vitamin Co enzymes

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Answer Key

PART A

1. **Define the term active site.**

   The active site of an enzyme is the region of the protein that is able to bind a specific substrate (usually a small molecule) and then catalyze the reaction.

2. **What are called Allosteric enzymes?**

   An allosteric enzyme is an enzyme that contains a region to which small, regulatory molecules (effectors) may bind in addition to and separate from the substrate binding site and thereby affect the catalytic activity.

3. **Define modulators.**

   Enzyme activators and inhibitors are essential in the study of intracellular mechanisms. The presence of these modulators may lead to an alteration in biological activity, with the effect being dependent on the use of an activator or inhibitor.

4. **What is meant by enzyme specificity?**

   Enzymes show variable degrees of specificity towards their substrate. It is an important property of enzymes.

   The specificity is of different types namely,

   1) Absolute substrate specificity
   2) Absolute group substrate specificity or broad specificity
   3) Relative group substrate specificity or bond specificity
   4) Geometrical specificity
   5) Optical specificity (Stereo specificity)
   6) Reaction specificity

5. **Write the significance of Km.**

   Km value is used as a measure of an enzyme's affinity for its substrate. The lower the Km value the higher the enzyme's affinity for the substrate and vice versa.

   2) Km value also provides an idea of the strength of binding of the substrate to the enzyme molecule.

6. **Mention the Role of biotin in enzyme catalyzed reaction**

   - Biotin regulates the catabolic enzyme propionyl-CoA carboxylase at the posttranscriptional level whereas the holo-carboxylase synthetase is regulated at the transcriptional level.

- Biotin functions as a cofactor that aids in the transfer of CO2 groups to various target macromolecules.

7. **What are Co enzymes ?**
   - Coenzymes are organic compounds required by many enzymes for catalytic activity.
   - They are often vitamins, or derivatives of vitamins. Sometimes they can act as catalysts in the absence of enzymes, but not so effectively as in conjunction with an enzyme.

PART B

8. **Comment on induced fit theory.**

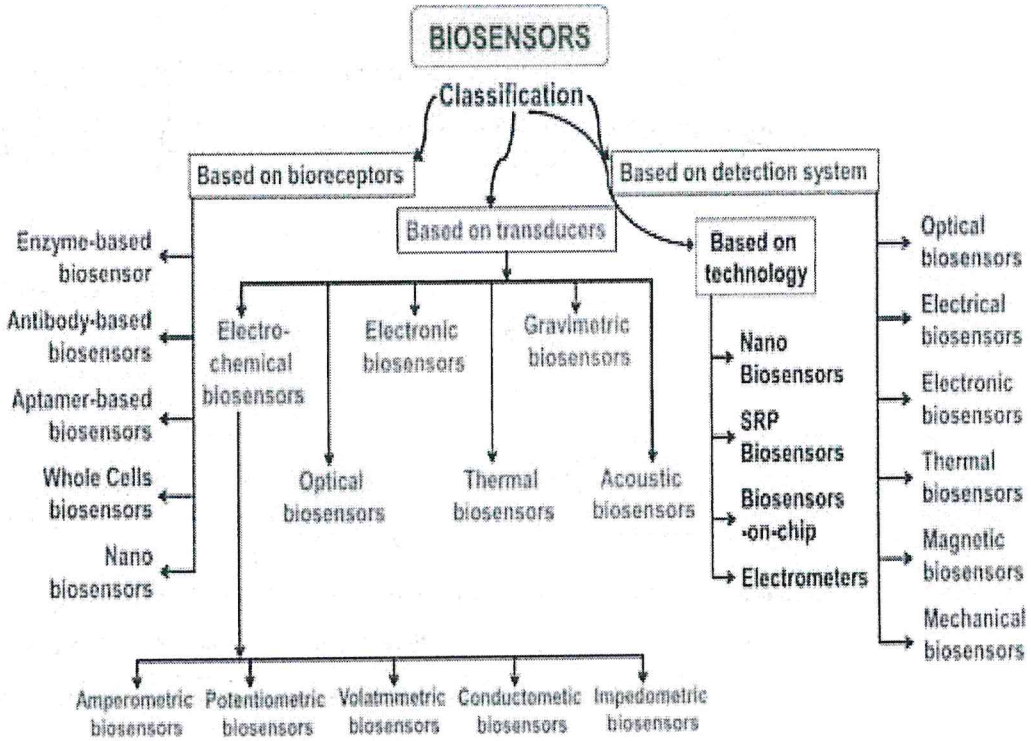
   Diagram (2M)

   Explanation (2M)

   Proximity and orientation (1M)

9. **Write an account on Biosensor.**

   A biosensor is a device that measures biological or chemical reactions by generating signals proportional to the concentration of an analyte in the reaction



PART C

10. Explain the nomenclature and classification of enzymes.

Nomenclature (2M)

Classification 6 types (2M)

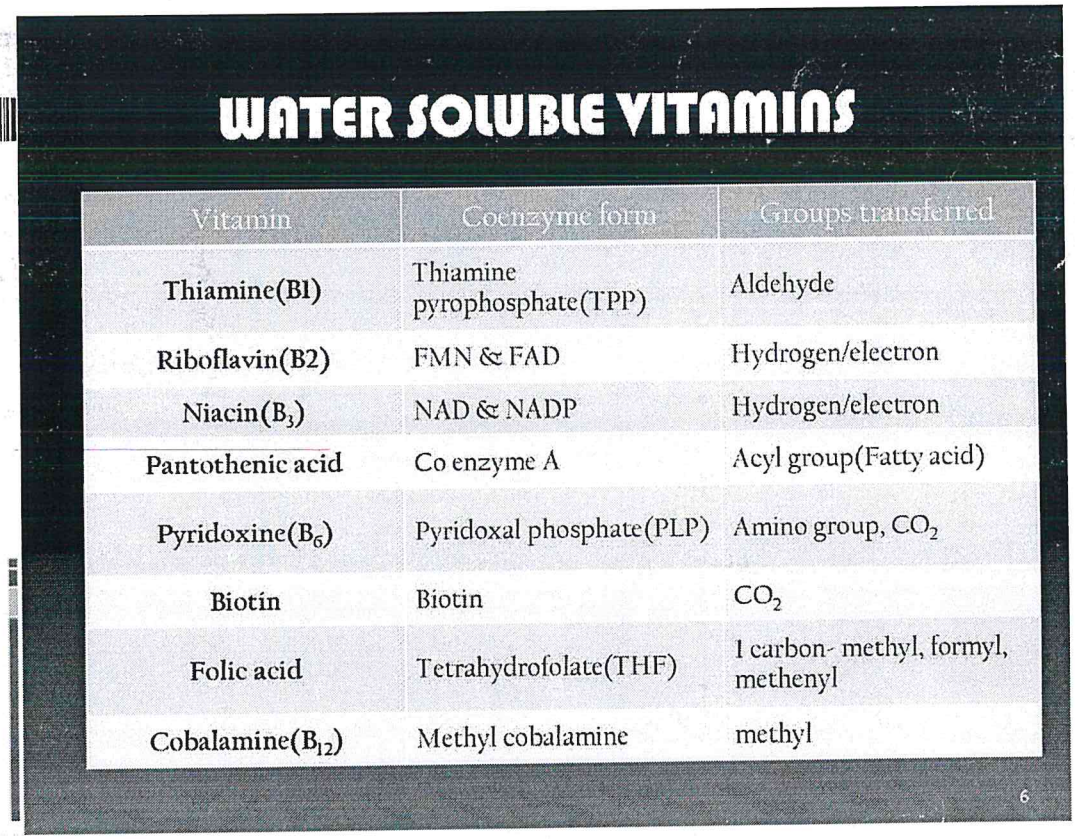
Explanation of each class (2M)

Example for each class (2M)

EC number of that example (2M)

11. Write in detail any three water soluble vitamin Co enzymes

- All of the water-soluble vitamins and two of the fat-soluble vitamins, A and K, function as cofactors or coenzymes. ...
- The active forms of
- Riboflavin,
- Vitamin B_2, are the coenzymes
- Flavin mononucleotide (FMN) and
- Flavin adenine dinucleotide (FAD).



WATER SOLUBLE VITAMINS

Vitamin	Coenzyme form	Groups transferred
Thiamine(B1)	Thiamine pyrophosphate(TPP)	Aldehyde
Riboflavin(B2)	FMN & FAD	Hydrogen/electron
Niacin(B_3)	NAD & NADP	Hydrogen/electron
Pantothenic acid	Co enzyme A	Acyl group(Fatty acid)
Pyridoxine(B_6)	Pyridoxal phosphate(PLP)	Amino group, CO_2
Biotin	Biotin	CO_2
Folic acid	Tetrahydrofolate(THF)	1 carbon- methyl, formyl, methenyl
Cobalamine(B_{12})	Methyl cobalamine	methyl

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DEPARTMENT OF BIOCHEMISTRY

UNIT TEST I, SEPTEMBER 2022

Class: III B.Sc Biochemistry **Date:** 13.09.2022

Subject: Metabolism **Time:** 12 to 1.00 PM

Subject Code: SB25B **Max. Mark:** 25

PART A – (5 X 2 = 10)

Answer any FIVE questions

CO: 1 BL: 1 1. Define Redox.

CO: 1 BL: 1 2. Define substrate level Phosphorylation.

CO: 1 BL: 2 3. Explain Lipmanns ATP cycle

CO: 1 BL: 2 4. Explain in detail about exothermic reaction?

CO: 6 BL: 1 5. Define metabolism.

CO: 2 BL: 2 6. Why erythrocytes proceed anaerobic glycolysis?

CO: 2 BL: 2 7. Mention the ATP produced from aerobic glycolysis?

PART B – (1 X 5 = 5)

Answer any ONE question

CO: 1 BL: 2 8. Explain in detail about electron transport chain and its inhibitors.

CO: 2 BL: 2 9. Explain oxidative decarboxylation with example?

PART C – (1 X 10 = 10)

Answer any ONE question

CO: 1 BL: 2 10. Explain in detail about any five types of high energy compounds with the type of energy liberation.

CO: 2 BL: 2 11. Explain in detail about TCA cycle?

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Answer Key

PART A

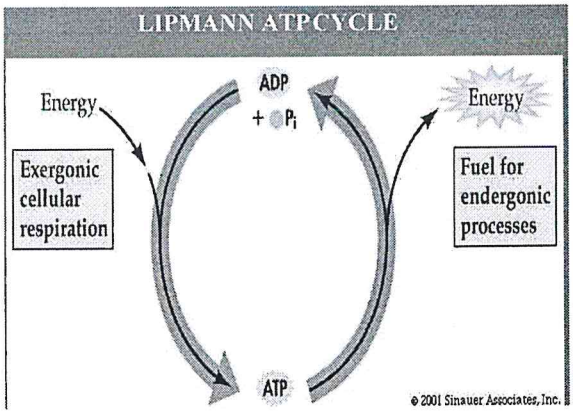
1. **Define Redox.**

   Redox is common term in chemistry and biology. Both reduction and Oxidation reaction are simultaneously occurs between chemical substances. In this reaction, there is the *actual* transfer or shifting of electrons that takes place among different chemical species. In this reaction, one species *loses* electrons while the other *gains* the electron. The species which gain the electron is said to be ***reduced*** while the species that lost the electron is said to be ***oxidized.*** In biology, a redox reaction has defined all aspects of life as it is the form of reaction that occurs in multifarious biological processes.

2. **Define substrate level phosphorylation.**

   Substrate level phosphorylation is defined as addition of phosphate to ADP directly from the substrate moiety phosphoenol pyruvate then it becomes ATP and Pyruvate was produced. The above reaction is a very good example for substrate level phosphorylation.

3. **Explain Lipmann's ATP cycle**



4. **Explain in detail about exothermic reaction?**

   When a bond is broken from the molecule it liberate free energy. The heat energy is released out from the molecule. The released energy is called as exothermic reactions.

5. **Define metabolism**

   Metabolism is the set of life-sustaining chemical reactions in organisms. The three main purposes of metabolism are: the conversion of the energy in food to energy available to run cellular processes.

6. **Why erythrocytes proceeds anaerobic glycolysis?**

Because it cannot oxidize fats, a process requiring mitochondrial activity, the RBC relies exclusively on blood glucose as a fuel. Metabolism of glucose in the RBC is entirely anaerobic, consistent with the primary role of the RBC in oxygen transport and delivery, rather than its utilization.

7. **Mention the ATP produced from aerobic glycolysis?**

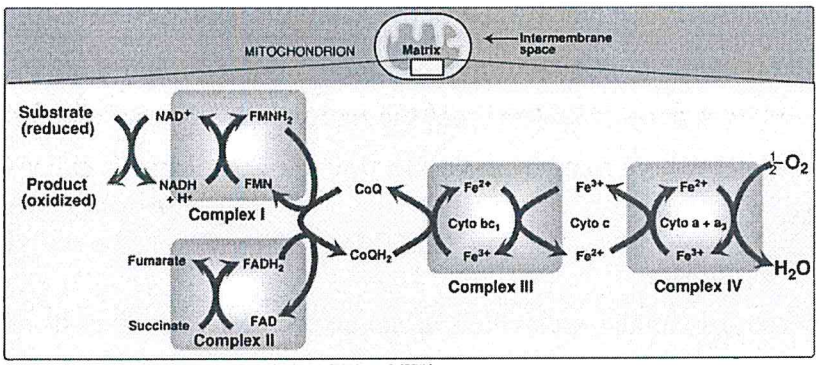
8 ATP

PART B

8. **Explain in detail about electron transport chain and its inhibitors.**

A system of electron transport that uses respiratory O_2 to finally produce ATP (energy). Located in the inner mitochondrial membrane. Final common pathway of metabolism. Electrons from food metabolism are transported to O_2. Uses maximum amount of body's oxygen.

- All members/components are located in the inner mitochondrial membrane (IMM)
- IMM contains 5 complexes:
  - Complex I, II, III, IV (part of ETC)
  - Complex V (ATP synthase: catalyzes ATP synthesis)
  - Mobile electron carriers
    - CoQ
    - Cytochrome c
- Each complex accepts or donates electrons to mobile carriers
- Carriers accept electrons from donors and then donate to the next carrier in chain
- Electrons finally combine with oxygen and protons to form water
- Oxygen is required as a final acceptor (respiratory chain)



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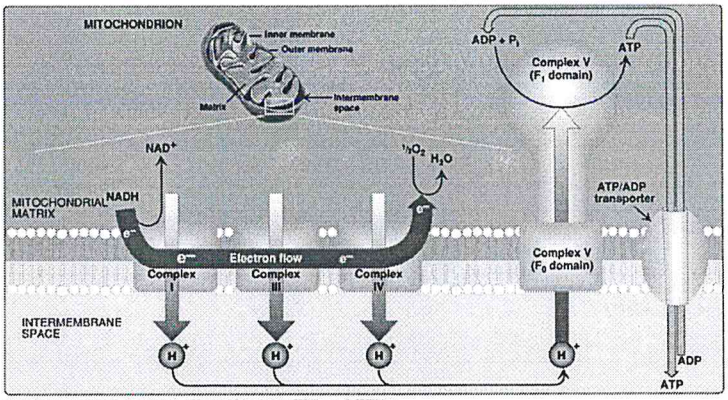

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9. Explain oxidative decarboxylation with example?

Pyruvate decarboxylation or pyruvate oxidation, also known as the link reaction (or oxidative decarboxylation of pyruvate), is the conversion of pyruvate into acetyl-CoA by the enzyme complex pyruvate dehydrogenase complex.The reaction may be simplified as:

$$\text{Pyruvate} + NAD^+ + CoA \rightarrow \text{Acetyl-CoA} + NADH + CO_2$$

Pyruvate oxidation is the step that connects glycolysis and the Krebs cycle. In glycolysis, a single glucose molecule (6 carbons) is split into 2 pyruvates (3 carbons each). Because of this, the link reaction occurs twice for each glucose molecule to produce a total of 2 acetyl-CoA molecules, which can then enter the Krebs cycle.

PART C

10. Explain in detail about any five types of high energy compounds

High energy compounds are mainly classified into 5 groups:

1. Pyrophosphates
2. Enol phosphates
3. Acyl phosphates
4. Thiol phosphates

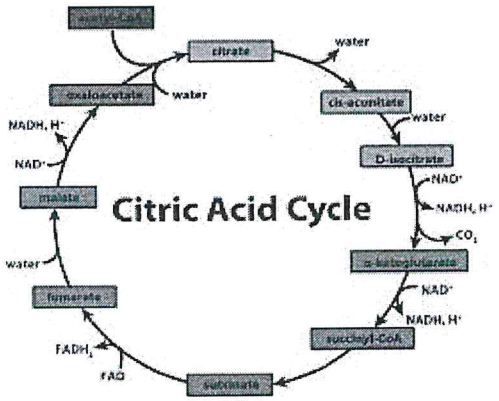
Guanido phosphates or phophagens. **ATP** has special roles in energy coupling & P_i transfer.DG of phosphate hydrolysis from ATP is **intermediate** among examples below.ATP can thus act as a P_i donor, & ATP can be synthesized by P_i transfer, e.g., from PEP.

Compound	**$DG^{o'}$ of phosphate hydrolysis, kJ/mol**
Phosphoenolpyruvate (PEP)	**- 61.9**

Phosphocreatine	**- 43.1**
Pyrophosphate	**- 33.5**
ATP (to ADP)	**- 30.5**
Glucose-6-phosphate	**- 13.8**
Glycerol-3-phosphate	**- 9.2**

Chemical Structure also needed.

11. Explain in detail about TCA cycle.



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UNIT TEST I, SEPTEMBER 2022

Class: III B.Sc., Biochemistry **Date:** 14.09.2022

Subject: Analytical Biochemistry **Time:** 12 to 1.00 PM

Subject Code: SB25C **Max. Mark:** 25

PART A – (5 X 2 = 10)

Answer any FIVE questions

CO 2 BL: 1 1. Enumerate the uses of partition chromatography?

CO 2 BL: 2 2. Explain the role of ligands in affinity chromatography.

CO 2 BL: 6 3. Write the principle of paper chromatography.

CO 1 BL: 1 4. Define buffer. Mention the various buffers of blood.

CO 1 BL: 1 5. Define normality.

CO 3 BL: 3 6. Illustrate out the factors that affects the electrophoresis

CO 3 BL: 1 7. Define electrophoresis

PART B – (1 X 5 = 5)

Answer any ONE question

CO 2 BL: 3 8. Illustrate the difference between partition and adsorption chromatography?

CO 1 BL; 2 9. Discuss the Henderson Hassel Balch equation. Add a note on its importance.

PART C – (1 X 10 = 10)

Answer any ONE question

CO 2 BL: 2 10. Discuss the principle is used in separation of compounds using affinity Chromatography.

CO 1 BL: 2 11. Explain the determination of pH using glass electrode

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Answer Key

1. Enumerate the uses of partition chromatography?

The advantages of partition chromatography consist of an easy-to-operate and economical method for separation. The partition chromatography technique can isolate both organic and inorganic compounds. It saves time because in a short duration it separates compounds. It provides high efficiency. This technique provides accurate results. Selectivity is better in partition chromatography because a mobile phase can be simply changed.

2. Explain the role of ligands in affinity chromatography.

Ligands plays a vital role in affinity chromatography. It attracts and binds with the sample of interest effectively. Usually the below ligands were used.

Sr. no	Types of ligand	Target molecule
1	Substrate analogue	Enzymes
2	Antibody	Antigen
3	Lectin	Polysaccharide
4	Nucleic acid	Complementary base sequence
5	Hormone	Receptor
6	Avidin	Biotin/Biotin-conjugated molecule
7	Calmodulin	Calmodulin binding partner
8	Glutathione	GST fusion protein
9	Proteins A and G	Immunoglobulins
10	Metal ions	Poly-histidine fusion protein

3. Write the principle of paper chromatography.

The principle involved can be partition chromatography or adsorption chromatography. Partition chromatography because the substances are partitioned or distributed between liquid phases. The two phases are water held in pores of the filter paper and the other phase is a mobile phase which passes through the paper. When the mobile phase moves, the separation of the mixture takes place. The compounds in the mixture separate themselves based on the differences in their affinity towards stationary and mobile phase solvents under the capillary action of pores in the paper. Adsorption chromatography between solid and liquid phases, wherein the solid surface of the paper is the stationary phase, and the liquid phase is the mobile phase.

4. Define buffer. Mention the various buffers of blood.

If a solution resists a change in hydrogen ion concentration on addition of acid or alkali, it will be called as buffer. Buffersare a mixture of weak acids and their conjugatebases.

Buffers present in Blood are

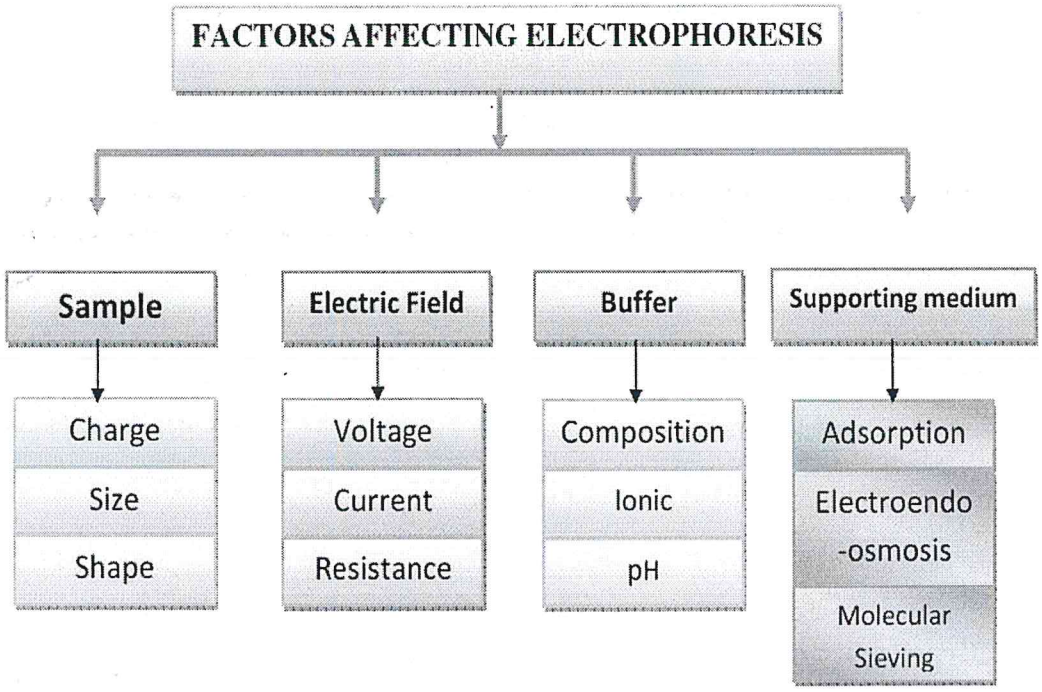
- Bicarbonate buffer system
- Phosphate buffer system
- Haemoglobin buffer system
- Serum protein buffer system

5. Define normality

Normality is defined as the number of gram or mole equivalents of solute present in one litre of solutionweight. Equivalent is the number of moles of reactive units of a compound.

Normality = Weight of solute (gram) x (Equivalent weight x Volume (L)
N = Eq/ V
N = Normality
Eq =Number of gram equivalents of solute
V = Volume of solvents in litre

6. Illustrate out the factors that affects the electrophoresis



7. Define electrophoresis

Electrophoresis is defined as the migration of charged particles through a solution under influence of an electric field. Biological molecules such as amino acids, peptides, protein, nucleotides, and nucleic acids possess ionisable groups and are made to exist as electrically charged species either as cations or anions. Even carbohydrates can be given weak charges by derivatization such as borates or phosphates. In electrophoresis cation move towards cathode and anion move towards anode

PART B – (1 X 5 = 5)

8. Illustrate the difference between partition and adsorption chromatography?

Adsorption vs Partition Chromatography	
Adsorption chromatography is defined as a type of chromatography in which separation occurs based on adsorption.	Partition chromatography is a type of chromatography in which separation is based on partition.
Extraction	
Adsorption chromatography is a liquid-solid extraction.	Partition chromatography is a liquid-liquid extraction.
Stationary Phase	

The stationary phase is in the solid state of adsorption chromatography.	The stationary phase is a liquid state in partition chromatography.
Developments	
Adsorption chromatography was not further developed.	Partition chromatography leads to the development of other types of chromatography.

9.Discuss the Henderson Hassel Balch equation. Add a note on its importance.

The Henderson Hasselbalch equation is an approximate equation that shows the relationship between the pH or pOH of a solution and the pKa or pKb and the ratio of the concentrations of the dissociated chemical species.
According to Henderson-Hasselbach equation, when the concentrations of the acid and the conjugate base are the same, i.e, when the acid is 50% dissociated, the pH of the solution is equal to the pKa of the acid. This relationship is used to determine the pKa of compounds experimentally.
In 1908, Lawrence Henderson derived an equation to calculate the pH of a solution that resists changing its pH value on dilution or with the addition of a small volume of acid or alkali.

This equation was later re-expressed in logarithmic terms by Karl Albert Hasselbalch in 1917. The resulting equation was named as Henderson-Hasselbalch Equation and is written as:

$pH = pKa + \log10 ([A–]/[HA])$

Where,
pKa represents the acid dissociation constant,
[A–] represents the molar concentration of the conjugate base and
[HA] represents the molar concentration of the weak acid.

The Henderson Hasselbalch equation shows the approximate pH value of a Buffer solution. This equation represents the relationship between the pH or pOH of an aqueous solution and the acid dissociation constant and the ratio of the concentrations of the dissociated chemical species.
Henderson Hasselbalch Equation can only be used if the acid dissociation constant is known. Henderson Hasselbalch Equation formula is written as follows:

$pH=pKa+\log10([A−]/[HA])$

Derivation of Henderson Hasselbalch Equation
The ionization constants of strong acids and strong bases can be calculated easily with the direct formula. But it is difficult to find the ionization constants of the weak acids and bases with the same methods as the extent of ionization of these acids and bases are very low. So, in such a situation, Henderson-Hasselbalch Equation is very helpful.

There are two ways to derive Henderson Hasselbalch Equation. The first derivation of the Henderson Hasselbalch Equation is for Base and the second derivation is for acid.

There are 3 main Assumptions that we must make before starting the derivation:

$-1 < \log([A^-]/[HA]) < 1$
The self-ionization energy of water can be ignored.
The acid used is monobasic.
Derivation 1) For the derivation of Henderson Hasselbach Equation for acid, take an example of ionization of weak acid HA:

In general, the equilibrium shown by a weak acid HA is:

$HA + H2O \leftrightarrow H+ + A-$

The dissociation constant of the reaction is

$Ka = [H+]\,[A^-] / [HA]$

Taking the negative logarithm on both sides,

$-\log Ka = -\log[H+]\,[A^-] / [HA]$

$-\log Ka = -\log [H+] - \log [A^-] / [HA]$

We know that, $-\log [H+] = pH$ and $-\log Ka = pKa$, substituting these in Equation

We get the following equation,

$pKa = pH - \log [A^-] / [HA]$

After rearranging the equation, we get,

$pH = pKa + \log [A^-] / [HA]$

This is the Henderson Hasselbalch equation for acid.

Now, if $[A^-] = [HA]$

We get $\log [A^-] / [HA] = 0$

Therefore, we get pH = pKa, which means that both the species are the same and the acid will be half dissociated.

Derivation 2) For the derivation of Henderson Hasselbalch Equation, take an example of ionization of a base:

$B + H2O \leftrightarrow OH+ + HB-$

The first step is to use the formula for acid dissociation constant, Ka

$Kb = [BH+] [OH-] / [B]$

Taking negative logs on both sides,

$-\log Kb = -\log [BH+] [OH-] / [B]$

$-\log Kb = -\log [OH-] - \log [BH+] / [B]$

We know that $-\log [OH-] = pOH$ and $-\log Kb = pKb$

We get the following equation,

$pKb = pOH - \log [BH+] / [B]$

After rearranging the equation, we get,

$pOH = pKb + \log [BH+] / [B]$

This is the Henderson Hasselbalch equation for Base.

Applications of Henderson Hasselbalch Equation

- It provides the formula for pH value in terms of acidity in chemical as well as biological systems.
- To calculate the pH of the buffer solution made by mixing salt and weak acid/base.
- It is used to calculate the pKa value.
- Prepare buffer solution of needed pH.
- It is majorly used to calculate the isoelectric point of proteins (the position at which a protein can neither accept nor yield protons).

Limitations of the Henderson-Hasselbalch Equation

- The Henderson-Hasselbalch equation doesn't give accurate values for the strong acids and strong bases.
- It fails to offer accurate pH values for extremely dilute buffer solutio

PART C

10.Discuss the principle is used in separation of compounds using affinity chromatography?

Chromatography is an important biophysical technique that enables the separation, identification, and purification of the components of a mixture for qualitative and quantitative analysis.It is a separation technique in which a mobile phase carrying a mixture is caused to move in contact with a selectively absorbent stationary phase.Affinity chromatography is a type of liquid chromatography for the separation, purification or specific analysis of sample components.It utilizes the reversible biological interaction or molecular recognition called affinity which refers to the attracting forced exerted in different degrees between atoms which cause them to remain in combination.

Example: Enzyme with an inhibitor, antigen with an antibody, etc.

- It was discovered by Pedro Cuatrecasas and Meir Wilcheck.

Principle of Affinity Chromatography

- The stationary phase consists of a support medium, on which the substrate (ligand) is bound covalently, in such a way that the reactive groups that are essential for binding of the target molecule are exposed.
- As the crude mixture of the substances is passed through the chromatography column, substances with binding site for the immobilized substrate bind to the stationary phase, while all other substances is eluted in the void volume of the column.
- Once the other substances are eluted, the bound target molecules can be eluted by methods such as including a competing ligand in the mobile phase or changing the pH, ionic strength or polarity conditions.

1. Matrix
   - The matrix is an inert support to which a ligand can be directly or indirectly coupled.
   - In order to for the matrix to be effective it must have certain characters:
   - Matrix should be chemically and physically inert.
   - It must be insoluble in solvents and buffers employed in the process
   - It must be chemically and mechanically stable.
   - It must be easily coupled to a ligand or spacer arm onto which the ligand can be attached.
   - It must exhibit good flow properties and have a relatively large surface area for attachment.
   - The most useful matrix materials are agarose and polyacrylamide.
2. Spacer arm
   - It is used to improve binding between ligand and target molecule by overcoming any effects of steric hindrance.
3. Ligand
   - It refers to the molecule that binds reversibly to a specific target molecule.
   - The ligand can be selected only after the nature of the macromolecule to be isolated is known.
   - When a hormone receptor protein is to be purified by affinity chromatography, the hormone itself is an ideal candidate for the ligand.
   - For antibody isolation, an antigen or hapten may be used as ligand.
   - If an enzyme is to be purified,a substrate analog, inhibitor, cofactor, or effector may be used as a the immobilized ligand.

Steps in affinity chromatography:

- Affinity medium is equilibrated in binding buffer.
- Sample is applied under conditions that favor specific binding of the target molecule(s) to a complementary binding substance (the ligand). Target substances bind specifically, but reversibly, to the ligand and unbound material washes through the column.
- Elution is performed specifically, using a competitive ligand, or non-specifically, by changing the pH, ionic strength or polarity. Target protein is collected in a purified, concentrated form.
- Affinity medium is re-equilibrated with binding buffer.

These events can be summarized into the following three major steps:

Preparation of Column

- The column is loaded with solid support such as sepharose, agarose, cellulose etc.
- Ligand is selected according to the desired isolate.

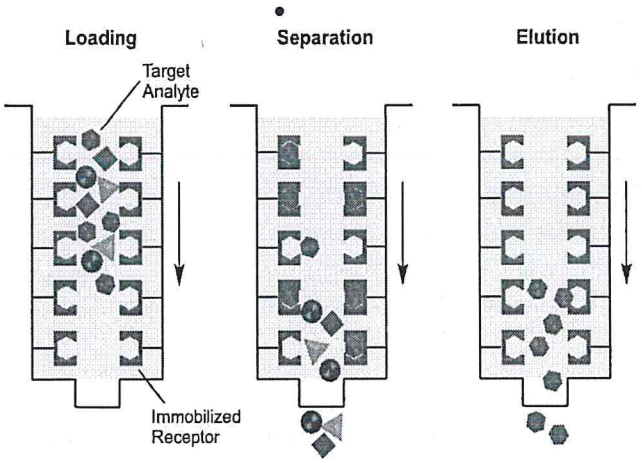
- Spacer arm is attached between the ligand and solid support.

Loading of Sample

- Solution containing a mixture of substances is poured into the elution column and allowed to run at a controlled rate.

Elution of Ligand-Molecule Complex

- Target substance is recovered by changing conditions to favor elution of the bound molecules.



Applications:

- Affinity chromatography is one of the most useful methods for the separation and purification of specific products.
- It is essentially a sample purification technique, used primarily for biological molecules such as proteins.

Its major application includes:

- Separation of mixture of compounds.
- Removal of impurities or in purification process.
- In enzyme assays
- Detection of substrates
- Investigation of binding sites of enzymes
- In in vitro antigen-antibody reactions
- Detection of Single Nuceotide polymorphisms and mutations in nucleic acids

Advantages of Affinity Chromatography:

- High specificity
- Target molecules can be obtained in a highly pure state
- Single step purification
- The matrix can be reused rapidly.
- The matrix is a solid, can be easily washed and dried.
- Give purified product with high yield.
- Affinity chromatography can also be used to remove specific contaminants, such as proteases.

Limitations:

- Time consuming method.
- More amounts of solvents are required which may be expensive.
- Intense labour
- Non-specific adsorption cannot be totally eliminated, it can only be minimized.

- Limited availability and high cost of immobilized ligands.
- Proteins get denatured if required pH is not adjusted.

11.Explain the determination of pH using glass electrode

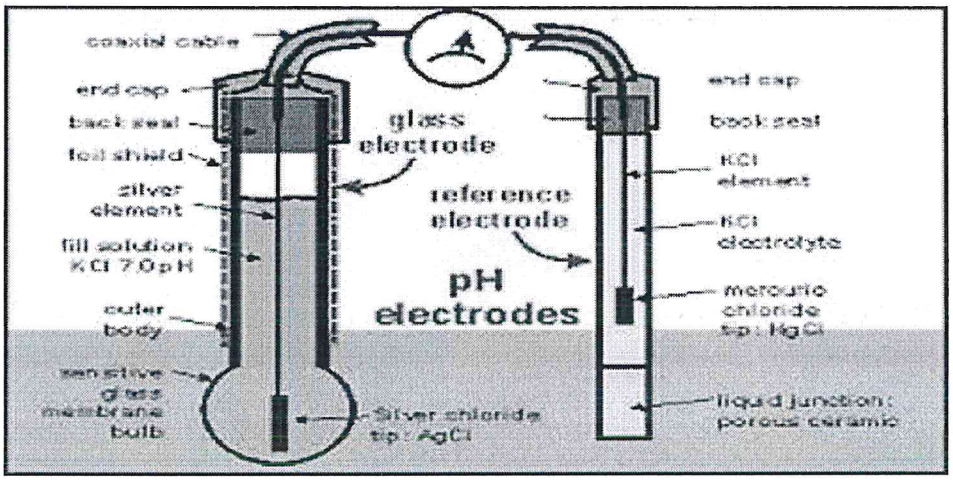
Principles of the Glass-Electrode Method for pH measurement

In the glass-electrode method, the known pH of a reference solution is determined by using two electrodes, a glass eGlass Electrode for pH Measurement

Chemical Equilibrium

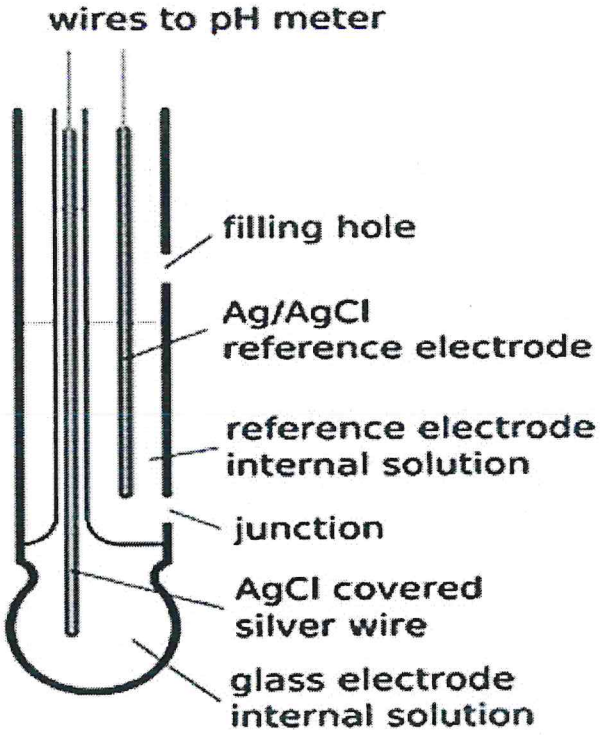
Glass Electrode for pH Measurement

The glass electrode for pH Measurement



Glass electrode has become the most useful and convenient electrode in determining the pH of solutions, particularly with the commercially built pH meters. Most often used pH electrodes are glass electrodes. A typical model is made of glass tube ended with small glass bubble. A glass electrode consists of a glass tube with a thin-walled bulb at the end (Figure). Inside of the electrode is usually filled with a buffered solution of chlorides in which silver wire covered with silver chloride is immersed. pH of internal solution varies. The bulb is filled with 1 mol L-1 HCl solution. One end of a silver wire is coated with AgCl and sealed into the glass bulb in such a way that the AgCl-coated end dips into the HCl solution. The entire assembly forms an electrode known as glass electrode. This is represented as-

Ag | AgCl | HCl (1 mol L-1) | Glass |



If the glass electrode is placed in a solution of H+ ions, a potential is developed across the glass membrane due to the difference of the H+ ion concentration on the two sides of the membrane. The potential is given by,

E Glass = E0 Glass – RT/F ln [H+]

= E0Glass – 0.0591 pH … …. … (1)

In order to determine the pH of an unknown solution the glass electrode is combined with calomel electrode to set up the following cell:

Glass Electrode | Solution of unknown pH | Calontel Electrode

The emf of the cell is given by,

Ecell = Ecal – EGless …. …. (2)

Substituting equation (1) into (2) we get,

Ecell = Ecal – EGless – 0.0591 pH

pH = (Ecal – EGless – Ecell) / 0.0591

Thus the pH of an unknown solution can be easily determined by measuring the e.m.f. of the cell, since, ECal and E0Glass are known. Glass electrodes are commercially available. These have the following advantages:

(i) simple to use,

(ii) not affected by oxidizing and reducing agents,

(iii) not easily poisoned,

(iv) can be used for a few solutions.

Applications of pH measurement:

- For the diagnosis of various disorders in the human body
- Pharmaceutical
- Agriculture
- Corrosion prevention
- Dyeing Printing

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DEPARTMENT OF BIOCHEMISTRY

UNIT TEST I, SEPTEMBER 2022

Class: III B.Sc Biochemistry | **Date:** 15.09.2022

Subject: Physiology | **Time:** 12 to 1.00 PM

Subject Code: | **Max. Mark:** 25

Section A (5 x 2 = 10)

(Answer any **FIVE** questions)

CO1 BL:1 1. Define PCV?

CO2 BL:1 2. Define erythropoietin.

CO3 BL:1 3. List the formed elements of blood and its function.

CO3 BL:1 4. Name the respiratory pigments.

CO4 BL:4 5. Differentiate anatomical and physiological Dead space.

CO5 BL:1 6. State the bore effect.

CO6 BL:6 7. Write the events in chloride shift.

Section B (1 x 5 = 5)

(Answer any **ONE** question)

CO3 BL:6 8. Write the composition and functions of blood.

CO2 BL:6 9. Write a note on the mechanism of respiration.

Section C (1 x 10 = 10)

(Answer any **ONE** question)

CO1 BL:2 10. Discuss about the blood clotting mechanism.

CO2 BL:4 11. Explain the overall organs involved in respiration in man.

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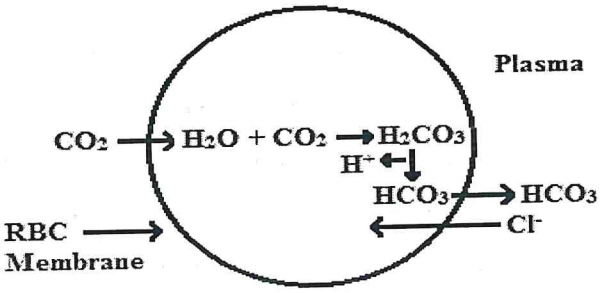
Answer Key

PART A

1. **What is PCV?**
   - Red blood cells carry oxygen throughout your body. Having too few or too many red blood cells can be a sign of certain diseases. The hematocrit test, also known as a **packed-cell volume** (PCV) test, is a simple blood test.
2. **Define erythropoietin.**
   - Red blood cells are produced in the bone marrow (the spongy tissue inside the bone). In order to make red blood cells, the body maintains an adequate supply of erythropoietin (EPO), **a hormone that is produced by the kidney**. EPO helps make red blood cells.
3. **What are formed elements of blood and its function?**
   - The formed elements are **cells and cell fragments suspended in the plasma**. The three classes of formed elements are the erythrocytes (red blood cells), leukocytes (white blood cells), and the thrombocytes (platelets).
4. **What are respiratory pigments?**
   - A respiratory pigment is a molecule, such as hemoglobin in humans and other vertebrates that increases the oxygen-carrying capacity of the blood. The four most common invertebrate respiratory pigments are hemoglobin, hemocyanin, hemerythrin and chlorocruorin.
5. **What is anatomical and physiological Dead space?**
   - **Anatomic dead space** specifically refers to the volume of air located in the respiratory tract segments that are responsible for conducting air to the alveoli and respiratory bronchioles but do not take part in the process of gas exchange itself.
   - **Physiologic dead space** (VDphys) is the sum of the anatomic (VDana) and alveolar (VDalv) dead space. Dead space ventilation (VD) is then calculated by multiplying VDphys by the respiratory rate (RR). Total ventilation (VE) is, therefore, the sum of alveolar ventilation (Valv) and VD.
6. **What is Bore effect?**
   - The Bohr effect describes hemoglobin's lower affinity for oxygen secondary to increases in the partial pressure of carbon dioxide and/or decreased blood pH. This lower affinity, in turn, enhances the unloading of oxygen into tissues to meet the oxygen demand of the tissue.

- Phenomenon 1st described in 1904 by the Danish physiologist Christian Bohr.
- The Bohr effect is important because it enhances delivery of oxygen to the muscles and tissues where metabolism is occurring and carbon dioxide is being produced. This helps deliver oxygen where it is most needed. So, as CO2 increases in those muscles of respirations, oxygen delivery to those muscles also increases.

7. **Write the events in chloride shift.**
   - Chloride shifts also known as the Hamburger shift or Hamburger phenomenon, named after Hartog Jakob Hamburger.
   - It is a process which occurs in a cardiovascular system and refers to the exchange of bicarbonate (HCO_3^-) and chloride (Cl^-) across the membrane of red blood cells.



Entry of chloride ions (Cl^-) into a red blood cell from the surrounding plasma.
CO_2 is carried into the cell from respiring tissues.

PART B

8. **What is blood? Write the composition and functions of blood.**

Blood may be described as a specialized connective tissue. In which there is liquid in intra cellular substances known as plasma and formed elements, the RBC, WBC and platelets are suspended in the plasma.

- Transport of respiratory gases
- Transport of nutrition
- It act as a vehicle
- Drainage of waste products
- It maintains water balance of the body
- Maintains acid-base equilibrium
- Defensive action
- By the property of coagulation
- Regulation of body temperature

9. Write a note on the mechanism of respiration.

- Respiration is the process by which O_2 from the lungs is carried by the blood to the tissues and CO_2 formed in the tissues by metabolic activity is carried by the blood to the lungs and is expired out.Process of respiration involves four stages:
    - Ventilation: means the passage or air in and out of lungs during inspiration and expiration respectively.
    - Intrapulmonary gas mixing: Distribution of O_2 rich inspired air with the air already present in the lungs.
    - Diffusion: Gas transfer across the alveolar capillary membrane due to tension gradient.
    - Perfusion: Means flow of adequate quantity of blood through the lungs so that the diffused gases are carried away.
- Upper respiratory tract: extends from the upper nares to the vocal cord. Lower respiratory tract: extends from the vocal cord to the alveoli.
- Trachea is wind pipe is a cartilaginous and membranous tube, about 10 or 11cm long. It is not quite cylindrical, being flattened posteriorly, its external diameter from side to side is about 2cm in adult male and 1.5cm in female. It is kept patent by incomplete C shaped ring of cartilage on its anterior lateral wall glands in the sub mucous coat innervated by the vagi. Mucous gland along with goblet cells traps dust in the inspired air and air is moistened by contact with moist lining of serous glands. The cilia beat spontaneously at the rate of 20times per minute and by their movement drive out mucus trapped foreign particle and bacteria towards the mouth from the respiratory passage ante velocity of movement being a24mm per minute. The ciliary movement is independent of nerves but dependent in the presence of atmospheric O_2 in the respiratory tubes.
- Functions of the respiratory tract: Filtering effects, air conditioning effect, cough reflex, sneeze reflex etc. Functions of respiration: Gas transfer, regulation of $PCO_2$of blood, regulation of pH of blood, excretion of certain volatile gases, pumping action.

PART C

10. Briefly discuss about the blood clotting mechanism.

Platelets $\xrightarrow{\text{Disintegrate}}$ Phospholipids.

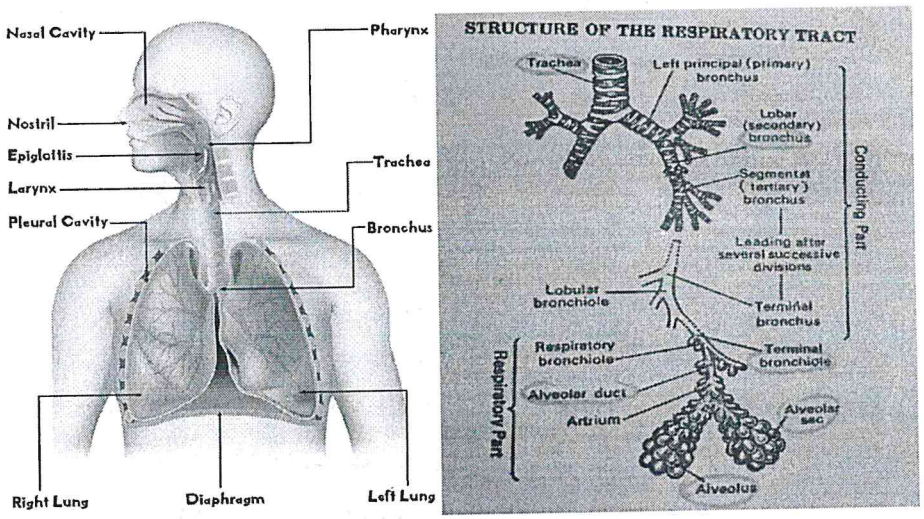
Phospholipids + globulins $\longrightarrow$ Thromboplastin (Lipoprotein)

Prothrombin $\xrightarrow[\text{[forms prothrombiase]}]{\text{Thromboplastin}}$ Thrombin

Fibrinogen (Soluble) $\xrightarrow[Ca^{+2}\text{ ion}]{\text{Thrombin}}$ Fibrin (insoluble protein)

Fibrin $\xrightarrow{\text{Polymerisation}}$ Fibrin threads

11. Outline the overall organs involved in respiration in man.



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DEPARTMENT OF BIOCHEMISTRY

UNIT TEST- I, FEBRUARY- 2023

Class: I B.Sc., Biochemistry

Date: 01.03.2023

Subject: Cell Biology

Time: 12.00AM to 1.00 PM

Subject Code: SB22A

Max. Mark: 25

Section A (5 x 2 =10)

Answer any **FIVE** questions

CO 2 BL1	1. Give the difference between rough and smooth ER
CO 2 BL2	2. Discuss about the enzymes present in the matrix of mitochondria.
CO 2 BL 1	3. List the main functions of plasma membrane.
CO 2 BL2	4. Discuss about the nucleopores and its function.
CO 4 BL1	5. Define Centriole
CO 4 BL1	6. Define Cell-cycle
CO 4 BL:1	7. Define genome

Section B (1 x 5 = 10)

Answer any **ONE** question

CO 2 BL2	8. Describe the functions of chloroplast with neat diagram.
CO 4 BL2	9. Differentiate between mitosis and Meiosis

Section C (1 x 10 = 10)

Answer any **ONE** question

CO 2 BL2	10. Discuss the structure, importance and functions of Golgi apparatus.
CO 4 BL4	11. Explain in detail about eukaryotic genome?

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DEPARTMENT OF BIOCHEMISTRY

UNIT TEST- I, FEBRUARY- 2023

Answer key

Class: I B.Sc. Biochemistry
Subject: Cell Biology
Subject Code: SB22A

Max. Mark: 25
Time: 1 Hour

Section A (5 x 2 =10)

Answer any **FIVE** questions

1. **Give the difference between rough and smooth ER**

The most basic difference between RER and SER is the presence of ribosomes. When ribosomes attach to the surface of an ER, it gives a characteristic rough appearance; hence it is called Rough ER. On the other hand, a smooth ER does not have ribosomes on its surface. It possesses ribosomes attached to its membrane.

2. **Discuss about the enzymes present in the matrix of mitochondria.**

Some of the enzymes present in the matrix are pyruvate dehydrogenase, citrate synthase, aconitase, isocitrate dehydrogenase, fumarase, and malate dehydrogenase are some of the enzymes present in the mitochondrial matrix.

3. **List the main functions of plasma membrane.**

The plasma membrane, or the cell membrane, provides protection for a cell. It also provides a fixed environment inside the cell. And that membrane has several different functions. One is to transport nutrients into the cell and also to transport toxic substances out of the cell.

4. **Discuss about the nucleopores and its function.**

It controls the passage of substances to the inside or outside of the nucleus. It helps in the transport of proteins and RNA from the nucleus to the cytoplasm and also transport the carbohydrates, signaling molecules and lipids moving into the nucleus.

5. **Define Centriole**

The centriole is an organelle in an animal cell. These are tube-like structures and made of tubulin protein and is a vital part of centrosomes. These are mainly found in moist animal cells, fungi and algae but not in plants. This form is the main part of eukaryotic cells.

6. Define Cell-cycle

The process a cell goes through each time it divides. The cell cycle consists of a series of steps during which the chromosomes and other cell material double to make two copies. The cell then divides into two daughter cells, each receiving one copy of the doubled material

7. Define genome

The complete set of DNA (genetic material) in an organism. In people, almost every cell in the body contains a complete copy of the genome. The genome contains all of the information needed for a person to develop and grow.

Section B (1 x 5 = 10)
Answer any **ONE** question

8. Describe the functions of chloroplast with neat diagram.

Diagram (2M)
Description (2M)
Functions (1M)

9. Differentiate between mitosis and Meiosis

Diagram (2M)
Description (2M)
Functions (1M)

Section C (1 x 10 = 10)
Answer any **ONE** question

10. Discuss the structure, importance and functions of Golgi apparatus.

Diagram (2M)
Description (5M)
Functions (3M)

11. Explain in detail about eukaryotic genome?

Diagram (2M)
Description (5M)
Functions (3M)

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DEPARTMENT OF BIOCHEMISTRY

UNIT TEST- I, FEBRUARY- 2023

Class: I B.Sc., Biochemistry **Date: 02.03.2023**

Subject: Allied Chemistry II **Time:** 12.00AM to 1.00 PM

Subject Code: SD3AC **Max. Mark:** 25

Section - A (5 X 2 = 10)

Answer any **FIVE** questions

CO4 BL: 1 1. What are the types of Catalysis? Give examples.

CO4 BL: 1 2. Define Autocatalysis. Give an example.

CO1 BL: 1 3. What is EDTA? Give its structure.

CO1 BL: 1 4. What are bidendate ligands? Give an example.

CO1 BL: 1 5. Define Chelation. Give an example.

CO1 BL: 1 6. Give two examples for neutral complexes?

CO1 BL: 1 7. Name the coordination complexes (a) $K[Pt(NH_3)Cl_3]$ (b) $[Co(CO)_5]$

Section - B (5 X 1 = 5)

Answer any **ONE** question

CO1 BL: 2 8. Discuss the effective atomic number rule with examples?

CO1 BL: 2 9. Describe the postulates of valence bond theory?

Section - C (10 X 1 = 10)

Answer any **ONE** question

CO4 BL: 2 10. Explain the biological role of chlorophyll and hemoglobin?

CO1 BL: 2 11. Discuss the hybridization, structure and magnetic nature of $K_2[Ni(CN)_4]$ and $[Co(CN)_6]^{3-}$ on the basis of valence bond theory?

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DEPARTMENT OF BIOCHEMISTRY

UNIT TEST- I, FEBRUARY- 2023

Class: I B.Sc., Biochemistry **Date: 02.03.2023**

Subject: Allied Chemistry II **Time:** 12 to 1.00 PM

Subject Code: SD3AC **Max. Mark:** 25

ANSWER KEY

Section - A (5 X 2 = 10)

(Answer any **FIVE** questions)

1. What are the types of Catalysis? Give examples.

   Catalysts can be divided into two main types - heterogeneous and homogeneous. In a heterogeneous reaction, the catalyst is in a different phase from the reactants. In a homogeneous reaction, the catalyst is in the same phase as the reactants.
2. Auto-catalysis : In certain reactions, one of the product acts as a catalyst. In the initial stages the reaction is slow but as soon as the products come into existences the reaction rate increases. This type of phenomenon is known as autocatalysis.
3. What is EDTA? Give its structure.

   Ethylenediaminetetraacetic acid is a molecule that we know as a chelating agent.
4. What are bidendate ligands? Give two examples.

   Ethylenediamine, oxalate ion
5. Define Chelation. Give an example.

   Multidentate ligand (poly dentate ligand)simultaneously coordinating to a metal ion through more than one site is called chelating ligand. The process is known as Chelation.

   Example: Ethylenediamine, EDTA
6. Give two examples for neutral complexes? H_2O, NH_3
7. Name the coordination complexes (a) K[Pt (NH_3) Cl_3] (b) [$Co(CO)_5$]

Section - B (5 X 1 = 5)

(Answer any **ONE** question)

8. Discuss the effective atomic number rule with examples?

EAN for the iron will be = an Atomic number of iron + total number of electrons donated by the ligand.

9. What are the postulates of valence bond theory?

1) Valence orbitals of atom overlap each other to form a bond. 2) A pair electrons is present in overlapping orbitals. 3) Electron density is maximum around bonded atoms. 4) Degree of overlapping determines strength of the bond.

Section - C (10 X 1 = 10)

(Answer any **ONE** question)

10. Explain the biological role of chlorophyll and hemoglobin?

Chlorophyll is the major pigment used by plants for capturing light energy. • A chlorophyll molecule consists of a porphyrin head (four pyrrole rings containing nitrogen arranged in a ring around a magnesium ion) and a long hydrocarbon tail. The hydrocarbon tail is lipid-soluble.

Hemoglobin has a critical role in our body. It's the protein in red blood cells (RBCs) that carries oxygen from lungs to the tissues of the body.

11. Discuss the hybridization, structure and magnetic nature of

K_2 [$Ni(CN)_4$] - Square planar geometry formed by dsp^2 hybridisation, diamagnetic.

[$Co(CN)_6$]$^{3-}$ - Octahedral geometry , $d^2 SP^3$ - Paramagnectic.

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DEPARTMENT OF BIOCHEMISTRY

UNIT TEST-I, FEBRUARY-2023

Class: II B.Sc., Biochemistry

Subject: Biomolecules and Biochemical techniques

Subject Code: SB24A

Date: 01.03.2023

Time: 12.00AM to 1.00 PM

Max. Mark: 25

PART A – (5 X 2 = 10 Marks)

Answer any FIVE questions

CO.1 BL:1 1.Define cyclic fatty acids, Give example

CO.1 BL:1 2. State RM number

CO.1 BL:1. 3. Name the unsaturated fattyacids, Give example

CO.2 BL:1 4.Define Glycolipids. Give example

CO.2 BL:6 5.Write the difference between fats and waxes

CO.3BL: 1 6. Define the term Annealing

CO.3BL: 6 7. Write a note on Sn RNA and Polycistronic mRNA

PART B – (1 X 5 = 5 Marks)

Answer any ONE question

CO.1 BL: 2 8. Describe the structure and properties of fatty acids

CO.3 BL:3 9. Illustrate the Structure and properties of DNA

PART C – (1 X 10 = 10 Marks)

Answer any ONE question

CO.2 BL: 2 10.Describe the classification of lipids with suitable examples.

CO.3 BL: 2 11. Explain in detail about the types of RNA

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UNIT TEST I, FEBRUARY 2023

Class: II B.Sc., Biochemistry

Subject: Biomolecules and Biochemical techniques

Subject Code: SB24A

Date: 01.03.2023

Time: 12 to 1.00 PM

Max. Mark: 25

Answer Key

PART A – (5 X 2 = 10 Marks)

Answer any FIVE questions

CO.1 BL:1 1.**Define cyclic fatty acids, Give example**

Name	Abbreviated Structural Formula	Source
oleic acid	$C_{17}H_{33}COOH$	olive oil
linoleic acid	$C_{17}H_{31}COOH$	canola oil
α-linolenic acid	$C_{17}H_{29}COOH$	flaxseed
arachidonic acid	$C_{19}H_{31}COOH$	liver

CO.1 BL:1 2. **State RM number**

It is defined as the number of ml 0.1 N KOH required to completely neutralize the soluble volatile fatty acids distilled from 5 g fat.

CO.1 BL:1. 3.**Name the unsaturated fattyacids, Give example**

A fatty acid is a long chain of hydrocarbon with a carboxylic acid at the beginning (*alpha*) and a methyl end (*omega*). If there is at least one double carbon-carbon bond that fatty acid is classified as an unsaturated. In contrast, a long chain of hydrocarbon linked together by a single bond is a saturated type of fatty acid.

CO.2 BL:1 4.**Define Glycolipids. Give example**

An example of a glycolipid is a glycosphingolipid. It is comprised of a carbohydrate and a sphingolipid linked together by a glycosidic bond. Hydrolysis of the glycosphingolipid, thus, yields sugar, fatty acid, and sphingosine (or dihydrospingosine)

CO.2 BL:6 **5.Write the difference between fats and waxes**

Fats are esters of fatty acids with glycerol, and are solid at, room temperature. On the other hand, waxes are esters of fatty acids other than glycerol. They contain one mole of long chain fatty acid esterified with one mole of high molecular weight monohydroxy alcohol.

CO.3BL: 1 **6.Define the term Annealing**

Annealing is a heat treatment process that changes the physical and sometimes also the chemical properties of a material to increase ductility and reduce the hardness to make it more workable. The annealing process requires the material above its recrystallization temperature for a set amount of time before cooling.

CO.3BL: 6 **7.Write a note on Sn RNA and Polycistronic mRNA**

The term polycistronic is used to describe an mRNA corresponding to multiple genes whose expression is also controlled by a single promoter and a single terminator. Polycistronic mRNAs are also called operons. All eukaryotic mRNAs are monocistronic.

PART B – (1 X 5 = 5 Marks)

Answer any ONE question

CO.1 BL: 2 **8. Describe the structure and properties of fatty acids**

Fatty acids are carbon chains with a methyl group at one end of the molecule (designated omega, ω) and a carboxyl group at the other end (Figure 1). The carbon atom next to the carboxyl group is called the a carbon, and the subsequent one the β carbon.

CO.3 BL:3 **9. Illustrate the Structure and properties of DNA**

The DNA molecule is composed of units called nucleotides, and each nucleotide is composed of three different components such as sugar, phosphate groups and nitrogen bases. The basic building blocks of DNA are nucleotides, which are composed of a sugar group, a phosphate group, and a nitrogen base.

PART C – (1 X 10 = 10 Marks)

Answer any ONE question

CO.2 BL: 2 **10.Describe the classification of lipids with suitable examples.**

There are two major types of lipids- simple lipids and complex lipids. Simple lipids are esters of fatty acids with various alcohols. For eg., fats and waxes. On the contrary, complex lipids are esters of fatty acids with groups other than alcohol and fatty acids.

Derived lipids

- They occur as such or are released from the other two major groups because of hydrolysis that is are the building blocks for simple and complex lipids.

CO.3 BL: 2 11. **Explain in detail about the types of RNA**

The three major types of RNA are:

- mRNA (messenger RNA): it provides the template for protein synthesis during translation.
- tRNA (transfer RNA): it brings amino acids and reads the genetic code during translation.
- rRNA (ribosomal RNA): it plays a structural and catalytic role during translation.

Messenger RNA (mRNA) carries the genetic code from DNA in a form that can be recognized to make proteins. The coding sequence of the mRNA determines the amino acid sequence in the protein produced. Once transcribed from DNA, eukaryotic mRNA briefly exists in a form called "precursor mRNA (pre-mRNA)" before it is fully processed into mature mRNA.

This processing step, which is called "RNA splicing", removes the introns—non-coding sections of the pre-mRNA. There are approximately 23,000 mRNAs encoded in the human genome.

Non-coding RNA (ncRNA)

- **Ribosomal RNA (rRNA):**

  Ribosomal RNA is the catalytic component of ribosomes. In the cytoplasm, rRNAs and protein components combine to form a nucleoprotein complex called the ribosome which binds mRNA and synthesizes proteins (also called translation).

- **Transfer RNA (tRNA):**

  Transfer RNA is a small RNA chain of about 80 nucleotides. During translation, tRNA transfers specific amino acids that correspond to the mRNA sequence into the growing polypeptide chain at the ribosome.

- **Small nuclear RNAs (snRNA; 150 nt):**

  Small nuclear RNAs are always associated with a group of specific proteins to form the complexes referred to as "small nuclear ribonucleoproteins (snRNP)" in the nucleus. Their primary function is to process the precursor mRNA (pre-mRNA).

- **Small nucleolar RNAs (snoRNA; 60-300 nt):**

Classification of lipids

They may be classified based on their physical properties at room temperature (solid or liquid, respectively fats and oils), on polarity, or on their essentiality for humans, but the preferable classification is based on their structure.

Based on structure, they can be classified in three major groups.

- **Simple lipids**
  They consist of two types of structural moieties.
  They include:

glyceryl esters that is esters of glycerol and fatty acids: e.g. triacylglycerols, mono- and diacylglycerols;
cholesteryl esters that is esters of cholesterol and fatty acids;
waxes which are esters of long-chain alcohols and fatty acids, so including esters of vitamins A and D;
ceramides that is amides of fatty acids with long-chain di- or trihydroxy bases containing 12–22 carbon atoms in the carbon chain: e.g. sphingosine.

- **Complex lipids**
  They consist of more than two types of structural moieties.
  They include:

phospholipids that is glycerol esters of fatty acids;
phosphoric acid, and other groups containing nitrogen;
phosphatidic acid that is diacylglycerol esterified to phosphoric acid;
phosphatidylcholine that is phosphatidic acid linked to choline, also called lecithin;
phosphatidylethanolamine;
phosphatidylserine;
posphatidylinositol;
phosphatidylacylglycerol in which more than one glycerol molecule is esterified to phosphoric acid: e.g. cardiolipin and diphosphatidylacylglycerol;
glycoglycerolipids that is 1,2-diacylglycerol joined by a glycosidic linkage through position sn-3 with a carbohydrate moiety;
gangliosides that is glycolipids that are structurally similar to ceramidepolyhexoside and also contain 1-3 sialic acid residues; most contain an amino sugar in addition to the other sugars;
sphingolipids, derivatives of ceramides;
sphingomyelin that is ceramidephosphorylcholine;
cerebroside: they are ceramidemonohexoside that is ceramide linked to a single sugar moiety at the terminal hydroxyl group of the base);
ceramide di- and polyhexoside that is linked respectively to a disaccharide or a tri- or oligosaccharide;
cerebrosidesulfate that is ceramidemonohexoside esterified to a sulfate group.

Small nucleolar RNAs are components of small nucleolarribonucleoproteins (snoRNPs), which are complexes that are responsible for sequence-specific nucleotide modification.

- **Piwi-interacting RNAs (piRNA; 24-30 nt):**

  Piwi-interacting RNAs bind the PIWI subfamily proteins that are involved in maintaining genome stability in germline cells. Piwi-interacting RNAs also play a role in gametogenesis.

- **MicroRNAs (miRNA; 21-22 nt):**

  MicroRNAs are small ncRNAs of ~22 nucleotides (nt) and the most widely studied class of ncRNAs. These RNA species mediate post-transcriptional gene silencing through RNA interference (RNAi), where an effector complex of miRNA and enzymes can target complementary mRNA by blocking the mRNA from being translated or accelerating its degradation. In humans, miRNAs are estimated to regulate the translation of >60% of protein-coding genes.

- **Long noncoding RNAs (lncRNA):**

  Long noncoding RNAs are a heterogeneous group of non-coding transcripts larger than 200 nt in size and make up the largest portion of the mammalian non-coding transcriptome. It is estimated that more than 8,000 lncRNAs encoded in the human genome. lncRNAs are essential in many physiological processes. To date, various mechanisms of gene regulation by some lncRNAs have been reported, whereas most are still of unknown function.

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DEPARTMENT OF BIOCHEMISTRY

UNIT TEST I, FEBRUARY- 2023

Class: III B.Sc., Biochemistry

Subject: Clinical Biochemistry

Subject Code:

Date: 27.02.2023

Time: 12.00AM to 1.00 PM

Max. Mark: 25

PART A – (5 X 2 = 10 Marks)

Answer any FIVE questions

CO.1 BL:1	1.Define Homeostasis
CO.1 BL:2	2. Explain Diabetus Mellitus
CO.1 BL:1.	3. Name the hormones regulate blood glucose level in blood
CO.2 BL:1	4.Define Detoxification
CO.2 BL:6	5.Write the functions of liver
CO.2 BL: 1	6. Define BSP
CO.1 BL: 6	7. Write a note on polyurea

PART B – (1 X 5 = 5 Marks)

Answer any ONE question

CO.2 BL: 2	8. Illustrate the liver function test based on carbohydrate metabolism
CO.3 BL:2	9. Explain in detail about hypo and hyperglycemia conditions

PART C – (1 X 10 = 10 Marks)

Answer any ONE question

CO.2 BL: 2	10.Describe the classification of\ glycogen storage disease.
CO.3 BL: 2	11. Explain in detail about the LFT based on plasma proteins.

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DEPARTMENT OF BIOCHEMISTRY

UNIT TEST I, JANUARY 2023

Class: III B.Sc., Biochemistry **Date: 27.02.2023**

Subject: Clinical Biochemistry **Time:** 12 to 1.00 PM

Subject Code: **Answer Key**

PART A – (5 X 2 = 10 Marks)

Answer any FIVE questions

1. Define Homeostasis

Homeostasis is the state of steady internal, physical, and chemical conditions maintained by living systems. This is the condition of optimal functioning for the organism and includes many variables, such as body temperature and fluid balance, being kept within certain pre-set limits (homeostatic range). Other variables include the pH of extracellular fluid, the concentrations of sodium, potassium, and calcium ions, as well as the blood sugar level, and these need to be regulated despite changes in the environment, diet, or level of activity. Each of these variables is controlled by one or more regulators or homeostatic mechanisms, which together maintain life

2. Explain Diabetus Mellitus

Diabetes mellitus refers to a group of diseases that affect how the body uses blood sugar (glucose). Glucose is an important source of energy for the cells that make up the muscles and tissues. It's also the brain's main source of fuel.

3. Name the hormones regulate blood glucose level in blood

Insulin and glucagon work together in a balance and play a vital role in regulating a person's blood sugar levels. Glucagon breaks down glycogen to glucose in the liver. Insulin enables blood glucose to enter cells, where they use it to produce energy. Together, insulin and glucagon help maintain homeostasis, where conditions inside the body hold steady. When a person's blood sugar is too high, their pancreas secretes more insulin. When their blood sugar levels drop, their

pancreas releases glucagon to raise them. This balance helps provide sufficient energy to the cells while preventing damage that can result from consistently high blood sugar levels.

4.Define Detoxification

Detoxification or detoxication (detox for short) is the physiological or medicinal removal of toxic substances from a living organism, including the human body, which is mainly carried out by the liver. Additionally, it can refer to the period of drug withdrawal during which an organism returns to homeostasis after long-term use of an addictive substance. In medicine, detoxification can be achieved by decontamination of poison ingestion and the use of antidotes as well as techniques such as dialysis and (in a limited number of cases) chelation therapy.

5. Write the functions of liver

All the blood leaving the stomach and intestines passes through the liver. The liver processes this blood and breaks down, balances, and creates the nutrients and also metabolizes drugs into forms that are easier to use for the rest of the body or that are nontoxic.

6. Define BSP

Bromsulfthalein (also known as bromsulphthalein, bromosulfophthalein, and BSP) is a phthalein dye used in liver function tests. Determining the rate of removal of the dye from the blood stream gives a measure of liver function

7. Write a note on polyurea

Polyuria is excessive or an abnormally large production or passage of urine (greater than 2.5 L or 3 L over 24 hours in adults). Increased production and passage of urine may also be termed diuresis.

PART B – (1 X 5 = 5 Marks)

Answer any ONE question

8. Illustrate the liver function test based on carbohydrate metabolism

Definition : 1 mark

Test Procedure : 3 marks

Flowchart : 1 mark

9. Explain in detail about hypo and hyperglycemia conditions

Definition : 2 marks

Hormonal regulation : 3 marks

PART C – (1 X 10 = 10 Marks)

Answer any ONE question

10. Describe the classification of\ glycogen storage disease.

Definition : 2 marks

Classification : 8 marks

11. Explain in detail about the LFT based on plasma proteins.

Definition : 2 marks

Procedure : 8 marks

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SRM ARTS AND SCIENCE COLLEGE, KATTANKULATHUR
DEPARTMENT OF BIOCHEMISTRY
Unit Test-I, February-2023

Class: III B.Sc Biochemistry | **Date: 28.02.2023**
Subject: Molecular biology | **(12.00pm to 1.00pm)**
Subject Code: | **Max. Mark: 25**

Section A (5 x 2 =10)
Answer any **FIVE** questions.

CO 1 BL1: 1.Mention the significance of Griffith's experiment.
CO 1 BL6: 2.Define plasmids?
CO 6 BL6:3Write any two characteristics of mitochondrial DNA.
CO 1 BL2: 4.Explain TATA box?
CO 6 BL1: 5. Define promoters.
CO 4 BL1:6.Define unambiguous nature of genetic code.
CO 4 BL6:7.Write about START and STOP codon?

Section B (1 x 5 = 10)
Answer any **ONE** question.

CO 1 BL :2. Discuss about Hershey and Chase experiment. Mention its significance.
CO 4 BL2:9. Describe about wobble hypothesis.

Section C (1 x 10 = 10)
Answer any **ONE** question.

CO 1 BL:3 10.Sketch DNA as the unit of inheritance through Griffith and Avery Mcleod experiments?
CO 4 BL1:11. Compile about the salient features of genetic code.

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DEPARTMENT OF BIOCHEMISTRY
Unit Test-I, February-2023

Class: III B.Sc Biochemistry **Date: 28.02.2023**
Subject: Molecular biology **(12.00pm to 1.00pm)**
Subject Code: **Max. Mark: 25**

Section A (5 x 2 =10)

Answer any **FIVE** questions.

1. Mention the significance of Griffith's experiment.

   Griffith's experiment, reported in 1928 by Frederick Griffith, was the first experiment suggesting that bacteria can transfer genetic information through a process known as transformation.

2. What are plasmids?

   A plasmid is a small, circular, double-stranded DNA molecule that is distinct from a cell's chromosomal DNA. Plasmids naturally exist in bacterial cells, and they also occur in some eukaryotes. Often, the genes carried in plasmids provide bacteria with genetic advantages, such as antibiotic resistance.

3. Write any two characteristics of mitochondrial DNA.

   Mitochondrial DNA (mtDNA) has several advantages over nuclear DNA (nDNA) for species identification purposes, including a higher copy number, a lack of sequence ambiguities from heterozygous genotypes, and a faster rate of mutation.

4. What is TATA box?

   A TATA box is a DNA sequence that indicates where a genetic sequence can be read and decoded. It is a type of promoter sequence, which specifies to other molecules where transcription begins. Transcription is a process that produces an RNA molecule from a DNA sequence.The sequence of a TATA box consists of "TATAAA" in the gene start transcription region and the sequence of a GC box consists of "GGGCGG" in the gene start transcription region.

5. Define promoters.

   A promoter is a sequence of DNA needed to turn a gene on or off. The process of transcription is initiated at the promoter. Usually found near the beginning of a gene, the promoter has a binding site for the enzyme used to make a messenger RNA (mRNA) molecule.

6.Define unambiguous natureof genetic code.

The genetic code is unambiguous: **each codon specifies one amino acid only**. **The code is degenerate**. One amino acid may be specified by more than one codon. For instance, serine is encoded by six codons, glycine by four and lysine by two.

7.Write about START and STOP codon.

The start codon marks the site at which translation into protein sequence begins, and the stop codon marks the site at which translation ends.

START codon: AUG.

STOP codon: UAA, UAG and UGA

Section B (1 x 5 = 10)

Answer any **ONE** question.

8.Discuss about Hershey and Chase experiment. Mention its significance.

Experiment (1M)

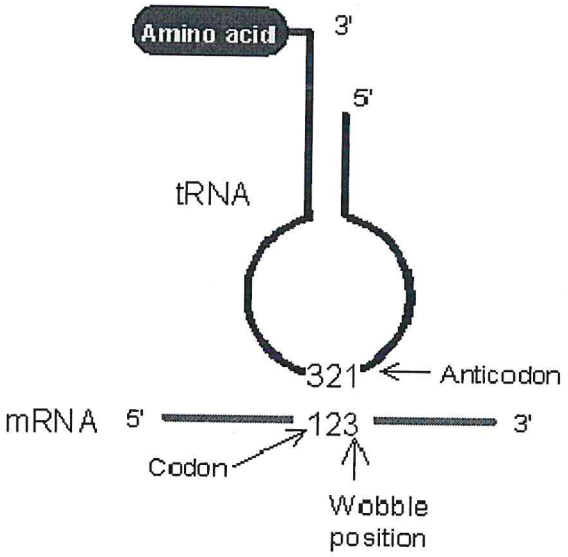
Conclusion (1M)

Diagram (2M)

Significance (1M)

9.Describe about wobble hypothesis.

wobble base pair is a pairing between two nucleotides in RNA molecules that does not follow Watson-Crick base pair rules. The four main wobble base pairs are guanine-uracil, hypoxanthine-uracil, hypoxanthine-adenine, and hypoxanthine-cytosine.



Wobble bases

tRNA	C	A	G	U	I
mRNA	G	U	C U	A G	C A U

Wobble bases

mRNA	C	A	G	U
tRNA	G I	U I	C U	A G I

Section C (1 x 10 = 10)

Answer any **ONE** question.

10.How will you prove DNA as the unit of inheritance through Griffith and Avery Mcleod experiments?

Experiment (2M)

Observation (2M)

Conclusion (2M)

Strains of bacteria (2M)

Diagram (2M)

11.Compile about the salient features of genetic code.

Definition (2 marks)

Features with eg- 4 marks.

The genetic code is universal. All known living organisms use the same genetic code. ...

The genetic code is unambiguous. Each codon codes for just one amino acid (or start or stop). ...

The genetic code is redundant. Most amino acids are encoded by more than one codon.

Table(4 marks)

GENETIC CODE TABLE

FIRST LETTER	SECOND LETTER: U	SECOND LETTER: C	SECOND LETTER: A	SECOND LETTER: G	THIRD LETTER
U	UUU Phe	UCU Ser	UAU Tyr	UGU Cys	U
	UUC Phe	UCC Ser	UAC Tyr	UGC Cys	C
	UUA Leu	UCA Ser	UAA Stop	UGA Stop	A
	UUG Leu	UCG Ser	UAG Stop	UGG Trp	G
C	CUU Leu	CCU Pro	CAU His	CGU Arg	U
	CUC Leu	CCC Pro	CAC His	CGC Arg	C
	CUA Leu	CCA Pro	CAA Gln	CGA Arg	A
	CUG Leu	CCG Pro	CAG Gln	CGG Arg	G
A	AUU Ile	ACU Thr	AAU Asn	AGU Ser	U
	AUC Ile	ACC Thr	AAC Asn	AGC Ser	C
	AUA Ile	ACA Thr	AAA Lys	AGA Arg	A
	AUG Met	ACG Thr	AAG Lys	AGG Arg	G
G	GUU Val	GCU Ala	GAU Asp	GGU Gly	U
	GUC Val	GCC Ala	GAC Asp	GGC Gly	C
	GUA Val	GCA Ala	GAA Glu	GGA Gly	A
	GUG Val	GCG Ala	GAG Glu	GGG Gly	G

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DEPARTMENT OF BIOCHEMISTRY

UNIT TEST-I, FEBRUARY-2023

Class: III B.Sc., Biochemistry

Subject: Biotechnology

Subject Code:

Date: 02.03.2023

Time: 12 to 1.00 PM

Max. Mark: 25

PART A – (5 X 2 = 10 Marks)

Answer any FIVE questions

CO.1 BL: 1 1. Enumerate linker DNA?

CO.1 BL: 2 2. Quote adaptor DNA?

CO.6 BL: 6 3. Write about cDNA library?

CO.2 BL: 1 4. Define plasmid vector.

CO.4 BL: 6 5. Write about the mechanism of tissue culture

CO.4 BL: 1 6. Define vector

CO.4 BL: 6 7. Write in detail about culture media.

PART B – (1 X 5 = 5 Marks)

Answer any ONE question

CO.6 BL: 6 8. Write short notes on Restriction endonuclease enzymes, types, and applications.

CO.4 BL: 2 9. Explain in detail about the constituents of organic and inorganic minerals which is present in the culture media.

PART C – (1 X 10 = 10 Marks)

Answer any ONE question

CO.1 BL: 4 10. Explain in detail about rDNA technology. Give its applications.

CO.3 BL: 4 11. Explain in detail about plant tissue culture stepwise experimental procedure,

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DEPARTMENT OF BIOCHEMISTRY

UNIT TEST-I, FEBRUARY-2023

Class: III B.Sc., Biochemistry

Subject: Biotechnology

Subject Code:

Date: 02.03.2023

Time: 12 to 1.00 PM

Max. Mark: 25

Answer Key

PART A – (5 X 2 = 10 Marks)

Answer any FIVE questions

1. **Enumerate linker DNA?**

   - Short double-stranded segments of **DNA (linkers)** containing desired restriction sites may be added to create end structures that are compatible with the vector.

2. **Quote adaptor DNA?**

   - Adapter or ***linker*** in genetic engineering is a short, chemically synthesized, single-stranded or double-stranded oligonucleotide that can be ligated to the ends of other ***DNA*** or RNA ***molecules***.
   - Double stranded adapters can be synthesized to have blunt ends to both terminals or to have sticky end at one end and blunt end.

3. **Write about cDNA library?**

   - A cDNA library is **a collection of cloned DNA sequences that are complementary to the mRNA that was extracted from an organism or tissue** (the 'c' in cDNA stands for 'complementary').
   - cDNA libraries are **used to express eukaryotic genes in prokaryotes.** Prokaryotes do not have introns in their DNA and therefore do not possess any enzymes that can cut it out during transcription process. cDNA does not have introns and therefore can be expressed in prokaryotic cells.

4. **Define plasmid vector.**

   - A **plasmid** is a small, circular, double-stranded DNA molecule that is distinct from a cell's chromosomal DNA. **Plasmids** naturally exist in bacterial cells, and they also occur in some eukaryotes (yeast and mitochondria).
   - Genes carried in **plasmids** provide bacteria with genetic advantages, such as antibiotic resistance. Each bacterial cell contains about 25 to 20 plasmids.
   - Plasmid can be considered as suitable cloning vehicle for transformation of genetic material form one cell to another. Plasmid cloning **vector** is typically used to clone DNA fragments of up to 15kbp.

5. **Write about the mechanism of tissue culture.**

- Plant tissue culture was a new addition to the methods of plant breeding that developed around the 1950s. Since the conventional breeding techniques could not fulfil the required demand of crops, tissue culture came around as a grand leap in breeding practices. It makes use of parts of a plant to generate multiple copies of the plant in a very short duration. The technique exploits the property of totipotency of plant cell which means that any cell from any part of the plant can be used to generate a whole new plant.

6. **Define vector**

- A vector, as related to molecular biology, is a DNA molecule (often plasmid or virus) that is used as a vehicle to carry a particular DNA segment into a host cell as part of a cloning or recombinant DNA technique.

7. **Write in detail about culture media.**

- Culture media is a gel or liquid that contains nutrients and is used to grow bacteria or microorganisms. They are also termed growth media. Different cell types are grown in various types of medium. Nutrient broths and agar plates are the most typical growth media for microorganisms.

PART B – (1 X 5 = 5 Marks)

Answer any ONE question

8. **Write short notes on Restriction endonuclease enzymes, types and applications.**

Characters	Type I	Type II	Type III	Type IV
Protein structure	Three different subunit	Simple	2 different subunit	-
Functional Requirement for stimulation of nuclease activity.	Mg^{++}, S-adenosyl-methionine as co-factor and ATP as source of energy.	Mg^{++} as co-factor and no need of ATP.	Mg^{++}, S-adenosyl-methionine and ATP as co-factor.	S-adenosyl-methionine as co-factor.
Cleavage Site	Random: Around 1000bp away from recognition site.	Specific: At or near the host septicity	Random: 24 - 26bp away from 3' of host specificity site	Random
Location of Methylase	Generally large, multi-subunit complexes contain, both endonuclease and methylase located on a single protein molecule	Endonuclease and methylase are separate entities	Generally large, multi-subunit complexes contain, both endonuclease and methylase located on a single protein molecule	This enzymes cleave methylated DNA.
Enzyme turn over	No	Yes	Yes	-
DNA trans location	Yes	No	No	-
Site of methylation	Host specificity site	Host specificity site	Host specificity site	-
Examples	*EcoK* I, *EcoA* I, *CfrA* I	*EcoR* I, *BamH* I, *Hind* III	*EcoP* I, *Hinf* III, *Eco*P15 I	*Eco* 57I

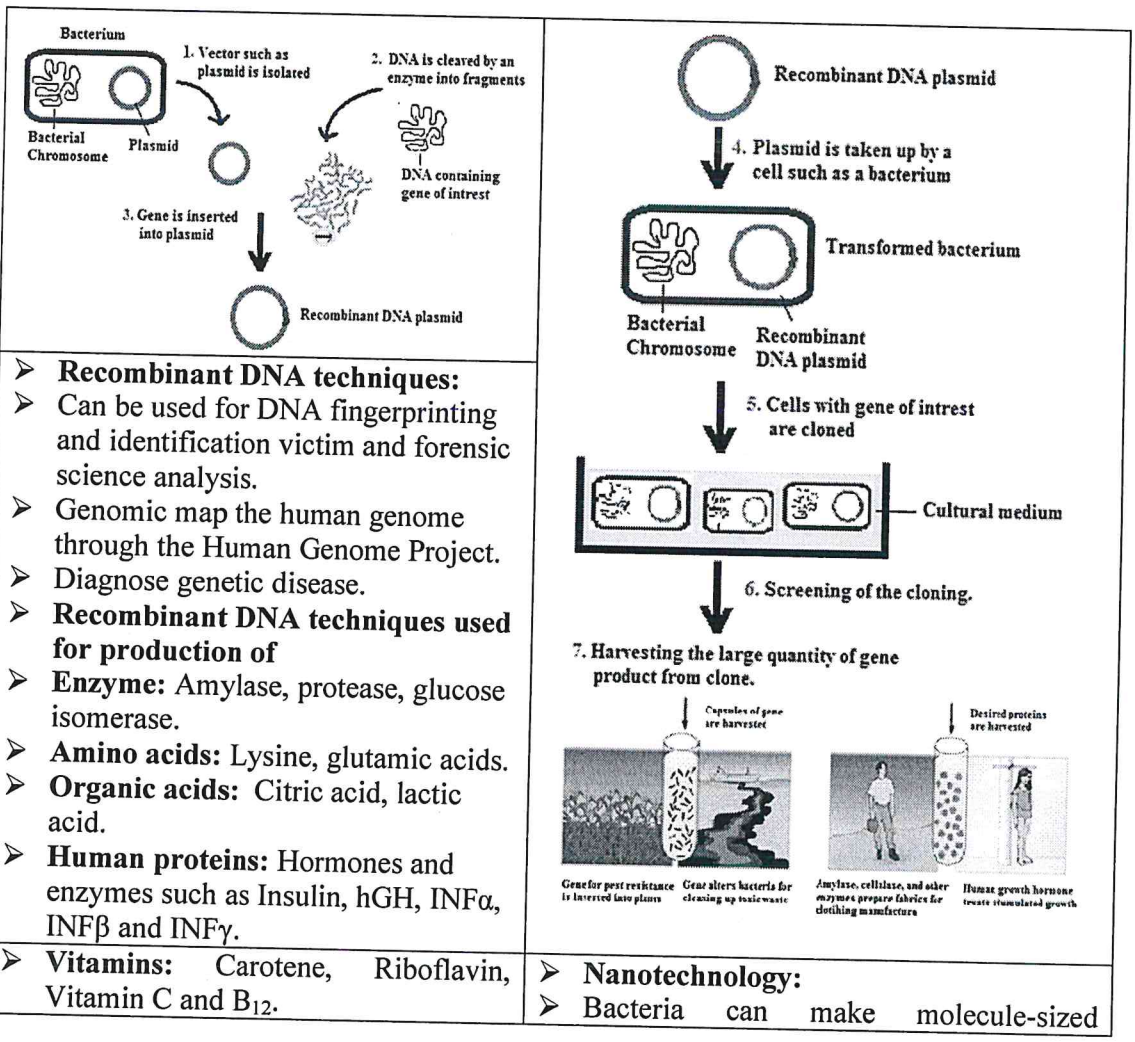
9. **Explain in detail about the constituents of organic and inorganic minerals which is present in the culture media.**

- The part(s) of the plant used for culturing is known as explants. The explants are cultured in-vitro on a nutrient medium that caters to fulfil its nutritional requirements. The nutrient medium must provide the following:-
- **Macronutrients** – This includes elements like nitrogen (N), phosphorus (P), potassium (K), calcium (Ca), sulfur (S) which is required for proper growth and morphogenesis.
- **Micronutrients** – Elements like iron (Fe), manganese (Mn), zinc (Zn) etc., which are also crucial to the growth of tissues.
- **Carbon or Energy source** – This is one of the most crucial ingredients of the nutrient media. Sucrose is the most widely used carbon source among other carbohydrates that serve to provide C, H, and O.
- Vitamins, amino acids, and other inorganic salts.

PART C – (1 X 10 = 10 Marks)

Answer any ONE question

10. Explain in detail about rDNA technology. Give its applications.



- **Recombinant DNA techniques:**
- Can be used for DNA fingerprinting and identification victim and forensic science analysis.
- Genomic map the human genome through the Human Genome Project.
- Diagnose genetic disease.
- **Recombinant DNA techniques used for production of**
- **Enzyme:** Amylase, protease, glucose isomerase.
- **Amino acids:** Lysine, glutamic acids.
- **Organic acids:** Citric acid, lactic acid.
- **Human proteins:** Hormones and enzymes such as Insulin, hGH, INFα, INFβ and INFγ.
- **Vitamins:** Carotene, Riboflavin, Vitamin C and B_{12}.
- **Nanotechnology:**
- Bacteria can make molecule-sized

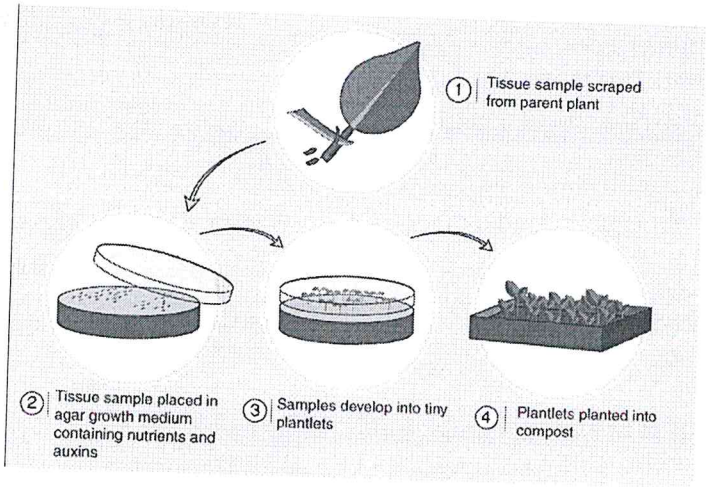
➢ **Single cell protein.** ➢ **Diagnostic Tests:** ➢ Genetic engineering can produce very specific and sensitive diagnostic tests for many diseases, using engineered proteins. ➢ This new technology is also opening novel ways of delivering medicines to specific targets.	particles *Bacillus* cells growing on selenium form chains of elemental selenium. ➢ **Gene silencing** – RNA interference - siRNA or microRNA. ➢ **Gene therapy** ➢ **Pharmacogenomics** ➢ **Agricultural field (herbicides, Nif gene transfer and insecticide** that produces *Bacillus thuringiensis* toxin.

11. Explain in detail about plant tissue culture stepwise experimental procedure

- Plant tissue culture was a new addition to the methods of plant breeding that developed around the 1950s. Since the conventional breeding techniques could not fulfil the required demand of crops, tissue culture came around as a grand leap in breeding practices. It makes use of parts of a plant to generate multiple copies of the plant in a very short duration. The technique exploits the property of totipotency of plant cell which means that any cell from any part of the plant can be used to generate a whole new plant.

Types of Plant tissue culture

1. Seed Culture
2. Embryo Culture
3. Callus Culture
4. Organ Culture
5. Protoplast Culture
6. Anther Culture



Procedure of Plant tissue culture

- The part(s) of the plant used for culturing is known as explants. The explants are cultured in-vitro on a nutrient medium that caters to fulfil its nutritional requirements. The nutrient medium must provide the following: -

1. **Macronutrients** – This includes elements like nitrogen (N), phosphorus (P), potassium (K), calcium (Ca), sulfur (S) which is required for proper growth and morphogenesis.
2. **Micronutrients** – Elements like iron (Fe), manganese (Mn), zinc (Zn) etc., which are also crucial to the growth of tissues.
3. **Carbon or Energy source** – This is one of the most crucial ingredients of the nutrient media. Sucrose is the most widely used carbon source among other carbohydrates that serve to provide C, H, and O.
4. Vitamins, amino acids, and other inorganic salts.

- Apart from these, the culture media also serves as a medium for supplying phytohormones or plant growth regulators to the issues which bring about their morphogenesis as per requirement. The tissues of the explants first lose their specificity to form a hard brown lump known as callus. The callus then splits to develop a plant organ or a whole new plant depending upon the quantity and composition of phytohormones supplied. The entire process requires strict aseptic conditions to be maintained at all times as a single contamination can ruin an entire batch of plants.

- **Uses of Plant tissue culture:**

- Tissue culture is used to develop thousands of genetically identical plants from one single parent plant known as somaclones, and this process is known as micropropagation. The method offers an advantage over other methods as it can be used to develop disease free plants from disease-rode plants by using their meristems (apical and axillary) as explants.

- Since this method produces new plantlets by the score of thousands, it has been used extensively for the production of commercially important plants including food plants like tomato, banana, apple etc. The most notable example of the application of micropropagation was observed in the farming of orchids as it rose exponentially due to the availability of millions of plantlets due to tissue culture methods.

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DEPARTMENT OF BIOCHEMISTRY

UNIT TEST- I, FEBRUARY- 2023

Class: III B.Sc., Biochemistry

Date: 01.03.2023

Subject: Immunology

Time: 12.00AM to 1.00 PM

Subject Code:

Max. Mark: 25

PART A – (5 X 2 = 10 Marks)

Answer any FIVE questions

CO.3 BL:6 1.Write a note on Erythroblastosis fetalis

CO.4 BL:1 2. State Widal test

CO.3 BL:6. 3. Write two application of ELISA.

CO.3 BL:2 4. Differnce between monoclonal and polyclonal antibodies

CO.3 BL:1 5. Define Haptens

CO.4 BL:1 6. Tell about RIA

CO.4 BL1 7.Define Agglutination

PART B – (1 X 5 = 5 Marks)

Answer any ONE question

CO.1 BL: 3 8. Demonstrate Major and Minor Blood groups

CO.3 BL:6 9. Write a note on (i) Haptens (ii)Isoantigen (iii)Neoantigen

PART C – (1 X 10 = 10 Marks)

Answer any ONE question

CO.4 BL: 4 10.Explain in detail about Antigen Antibody reactions

CO.3 BL: 6 11. Write in detail account on any two immunological techniques.

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DEPARTMENT OF BIOCHEMISTRY

UNIT TEST I, FEBRUARY 2023

Class: III B.Sc., Biochemistry | **Date: 01.03.2023**

Subject: Immunology | **Time:** 12 to 1.00 PM

Subject Code: | **Max. Mark:** 25

PART A – (5 X 2 = 10 Marks)

Answer any FIVE questions

CO.3 BL:6 1.**Write a note on Erythroblastosis fetalis**

Hemolytic disease of the fetus and newborn (HDFN) is also known as alloimmune HDFN or erythroblastosis fetalis. It is caused by the destruction of neonatal red blood cells by maternal immunoglobulin G (IgG) antibodies. The formation of maternal antibodies in response to a fetal antigen is called isoimmunization

CO.4 BL:1 2. **State Widal test**

- Widal Test is an agglutination test which detects the presence of serum agglutinins (H and O) in patients serum with typhoid and paratyphoid fever.
- When facilities for culturing are not available, the Widal test is the reliable and can be of value in the diagnosis of typhoid fevers in endemic areas.
- It was developed by Georges Ferdinand Widal in 1896.

CO.3 BL:6. 3. **Write two application of ELISA.**

The enzyme-linked immunosorbent assay (ELISA) is an immunological assay commonly used to measure antibodies, antigens, proteins and glycoproteins in biological samples. Some examples include: diagnosis of HIV infection, pregnancy tests, and measurement of cytokines or soluble receptors in cell supernatant or serum.

CO.3 BL:2 4. **Differnce between monoclonal and polyclonal antibodies**

Polyclonal antibodies bind to different epitopes while monoclonal will bind to only one type of epitope.

CO.3 BL:1 5. **Define Haptens**

A hapten is a substance that can combine with a specific antibody but lacks antigenicity of its own. Many small molecules of $M_r < 1000$ such as toxins, drugs and

hormones are not capable of invoking immune response when injected directly into animals. They are thus not immunogenic by themselves, and are called haptens.

CO.4 BL:1 6. **Tell about RIA**

A radioimmunoassay (RIA) is an immunoassay that uses radiolabeled molecules in a stepwise formation of immune complexes. A RIA is a very sensitive in vitro assay technique used to measure concentrations of substances, usually measuring antigen concentrations (for example, hormone levels in blood) by use of antibodies.

CO.4 BL1 7.**Define Agglutination**

Agglutination is defined as the formation of clumps of cells or inert particles by specific antibodies to surface antigenic components (direct agglutination) or to antigenic components adsorbed or chemically coupled to red cells or inert particles (passive hemagglutination and passive agglutination, respectively).

PART B – (1 X 5 = 5 Marks)

Answer any ONE question

CO.1 BL: 3 8. **Demonstrate Major and Minor Blood groups**

There are 4 main blood groups (types of blood) – **A, B, AB and O**. Your blood group is determined by the genes you inherit from your parents.

The most common minor blood group antigens that lead to blood incompatibility between the mother and baby include C, c, E, e, Kell, Duffy, Diego, Kidd, and MNSs antigen systems

CO.3 BL:3 9. **Write a note on (i) Haptens (ii)Isoantigen (iii)Neoantigen**

Haptens

A hapten is **a substance that can combine with a specific antibody but lacks antigenicity of its own**. Many small molecules of $M_r < 1000$ such as toxins, drugs and hormones are not capable of invoking immune response when injected directly into animals. They are thus not immunogenic by themselves, and are called haptens.

Isoantigen

isoantigen (plural isoantigens) an immunologically active material (especially a protein or polysaccharide) that is present only in some individuals of a particular species; responsible for the formation of antibodies.

Neoantigen

- Cross-Reactivity: This term describes an antibody's capacity to bind to similar epitopes on other antigens.

Types of Antigen-Antibody Reaction

The types of antigen-antibody reactions are as follows:

- Precipitation Reaction
- Agglutination Reaction
- Complement Fixation
- Immunofluorescence
- ELISA – Enzyme-Linked ImmunoSorbent Assay

CO.3 BL: 6 11. **Write in detail account on any two immunological techniques.**

Immunoelectrophoresis

- Immunoelectrophoresis is a combination of electrophoresis and immune diffusion.
- A glass slide is used which is layered with semisolid agar.
- A well will be formed on the surface of the agar and antigen solution will be added to the well.
- Electrophoresis will be performed for 1 hour.
- Then a rectangular trough will be cut parallel to the direction of migration of antigen. Antibody solution will be added to the trough and it will be left for 18-24 hours for diffusions.
- As a result precipitation band will be formed based on each separated compound.
- This technique is used for the detection of different antigens in human serum and normal and abnormal serum proteins such as Myeloma proteins.

Counter Immunoelectrophoresis

- It is a one-dimensional double elctro-immunodiffusion test.
- The test is based on the movement of antigen and antibody in the opposite direction.
- This test is also performed on a glass slide which will be layered with agar.
- Two different wells will be formed on the surface of the agar. In one well antigen will be added and another well will contain antibodies.
- The electricity will pass through this which accelerates the movement of antigen and antibody towards each other.
- A precipitation line will be formed at a specific point between the two wells.
- This test is a sensitive, standard technique and requires around 30 minutes to perform.
- This technique is used for clinical detection of hepatitis B antigens and antibodies, antigens of Cryptococcus in cerebrospinal fluid.

Rocket Electrophoresis

- It is a one-dimensional single electroimmunodiffusion test.

A new protein that forms on cancer cells when certain mutations occur in tumor DNA. Neoantigens may play an important role in helping the body make an immune response against cancer cells.

PART C – (1 X 10 = 10 Marks)

Answer any ONE question

CO.4 BL: 4 10.Explain in detail about Antigen Antibody reactions

Antigen-Antibody Reaction

Antigens and antibodies combine specifically with each other. Antigen-Antibody reaction is the term used to describe this interaction between them. Ag-Ab reaction is a common acronym for it. These serve as the building blocks of humoral or antibody-mediated immunity.

These reactions serve as the foundation for the detection of both specific and non-specific Ags, such as enzymes that cause non-specific diseases. Serological reactions are referred to as Ag-Ab reactions when they occur in vitro.

Stages of Antigen-Antibody Reaction
There are three stages to the interactions between Ag and Ab.

- The first stage of the reaction entails the formation of the Ag-Ab complex.
- The second stage results in visible phenomena like agglutination, precipitation, etc.
- The third stage involves the destruction of Ag or neutralisation of Ag.

Properties of Antigen-Antibody Reaction

- Significantly specific reaction
- Occurs in a noticeable manner
- Non-covalent reactions (Ionic bonds, Van der Waals forces, Hydrophobic interactions, Hydrogen bonds)
- Antibodies and antigens are not denatured
- Reversible
- Affinity: This refers to how strongly an antigen binds to a certain antigen-binding site on an antibody.
- Avidity: It is a more general concept than affinity. It represents the Ag-Ab complex's total strength. It depends on:

1. The antibody's affinity
2. Antibody and antigen valencies (the number of binding sites)
3. How epitopes and paratopes are structurally arranged.

- It is mostly used for the quantitation of antigens.
- In this case, the antibody is mixed with the agarose gel and this mixture will be used to form a layer on the glass slide.
- Wells will be formed on the surface of the gel and antigens are added to those wells in increasing concentration.
- Electrophoresis will be performed.
- As a result, cone-like precipitation bands (rocket-like structures) will be observed.
- The length of the rocket-like structure is directly connected with the concentration of antigens.

Radioimmunoassay (RIA)

- This technique was first described by Berson and Yallow.
- It is mostly used for the quantitation of hormones, drugs, hepatitis B surface antigen, IgE, and viral antigens.
- The test is based on the competition for a fixed amount of specific antibodies between a known radiolabelled antigen and an unknown test antigen.
- The competition is determined by the level of test antigen present in the reacting system.
- At the end of the antigen-antibody reaction, the antigen will be found in free and bound fractions and their radioactivity will be measured.
- The concentration of the test antigen is calculated from the ratio of bound and total antigen levels using a reference curve.

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DEPARTMENT OF BIOCHEMISTRY

UNIT TEST- I, FEBRUARY- 2023

Class	**: I** M.Sc., Biochemistry	**Date**	: 27.02.2023
Subject	: Enzyme and Enzyme Technology	**Time**	**:** 12.00 to 1.00 PM
Subject Code:		**Max. Mark:** 25	

PART A – (5 X 1 = 5 Marks)

Answer any FIVE questions

CO.2 BL:6 1. Write about active sites of an enzymes

CO.1 BL:1 2. Define enzyme specificity

CO.2 BL:6 3. Write the definition of allosteric enzymes.

CO.2 BL:1 4. Define Km Value of an enzymes

CO.2 BL:1 5. Tell about any two techniques employed in enzyme purification

CO.1 BL:1 6. State unit of enzymes

CO.3 BL:1 7. Tell about "Salting out"

PART B – (2 X 5 = 10 Marks)

Answer any TWOquestion

CO.2 BL:2 8. Discuss the effect of pH and temperature on enzyme activity

CO.2 BL:4 9. Explain the sigmoidal behaviour of enzymes

CO.5 BL:4 10. Explain the Immobilized enzymes

CO.3 BL:6 11. Write about Isolation and purification of enzymes

PART C – (1 X 10 = 10 Marks)

Answer any ONE question

CO.2 BL:4 12. Explain acid base catalysis with an example

CO.5 BL:2 13. Discuss about industrial uses of enzymes.

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PART A – (5 X 1 = 5 Marks)

Answer any FIVE questions

CO.2 BL:6 1. **Write about active sites of an enzymes**

The part of the enzyme where the substrate binds is called the active site (since that's where the catalytic "action" happens). A substrate enters the active site of the enzyme. This forms the enzyme-substrate complex.

CO.1 BL:1 2. **Define enzyme specificity**

The ability of an enzyme to select a specific substrate from a range of chemically similar compounds is known as specificity

CO.2 BL:6 3. **Write the definition of allosteric enzymes.**

Allosteric Enzyme* - An allosteric enzyme is an enzyme that contains a region to which small, regulatory molecules ("effectors") may bind in addition to and separate from the substrate binding site and thereby affect the catalytic activity.

CO.2 BL:1 4. **Define Km Value of an enzymes**

Km value is that **concentration of the substrate at which half of the active sites of the enzyme are occupied by the substrate**. Km value determines the binding capacity or affinity of the enzymes towards a particular substrate. Km is the concentration of substrate at which half of the Vmax is attained.

CO.2 BL:1 5. **Tell about any two techniques employed in enzyme purification**

There are several methods for the purification and isolation of enzymes produced on a large scale in industry [9,17,36,37]: 1. Molecular weight-based separation processes: dialysis and ultrafiltration; gradient centrifugation of density; chromatography of exclusion molecular

CO.1 BL:1 6. **State unit of enzymes**

The enzyme unit, or international unit for enzyme (symbol U, sometimes also IU) is a unit of enzyme's catalytic activity. **1 U (µmol/min)** is defined as the amount of the enzyme that catalyzes the conversion of one micromole of substrate per minute under the specified conditions of the assay method.

CO.3 BL:1 7. **Tell about "Salting out"**

Salting out is **a purification method that utilizes the reduced solubility of certain molecules in a solution of very high ionic strength**. Salting out is typically, but not limited to, the precipitation of large biomolecules such as proteins

PART B – (2 X 5 = 10 Marks)

Answer any TWOquestion

CO.2 BL:2 8. **Discuss the effect of pH and temperature on enzyme activity**

Temperature: Raising temperature generally speeds up a reaction, and lowering temperature slows down a reaction. However, extreme high temperatures can cause an enzyme to lose its shape (denature) and stop working. pH: Each enzyme has an optimum pH range. **Changing the pH outside of this range will slow enzyme activity.**

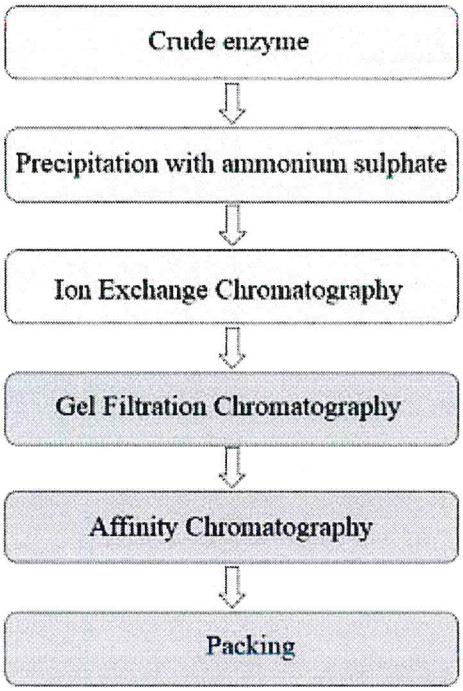
CO.2 BL:4 9. **Explain the sigmoidal behaviour of enzymes**

Sigmoidal kinetic profiles are the result of enzymes that demonstrate positive cooperative binding. cooperativity refers to the observation that binding of the substrate or ligand at one binding site affects the affinity of other sites for their substrates

CO.5 BL:4 10. **Explain the Immobilized enzymes**

The term immobilized enzymes refers to "enzymes physically confined or localized in a certain defined region of space with retention of their catalytic activities, and which can be used repeatedly and continuously." Immobilized enzymes are currently the subject of considerable interest

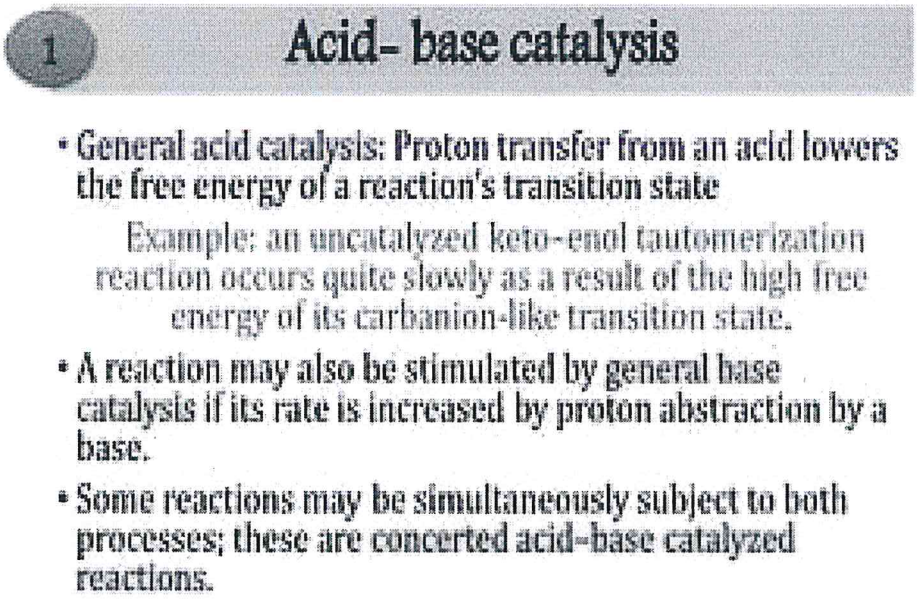
CO.3 BL:6 11. **Write about Isolation and purification of enzymes**



PART C – (1 X 10 = 10 Marks)

Answer any ONE question

CO.2 BL:4 12. **Explain acid base catalysis with an example**



CO.5 BL:2 13. **Discuss about industrial uses of enzymes.**

Sector	Enzymes	Applications	References
Pharmaceuticals	Nitrile hydratase, transaminase, monoamine oxidase, lipase, penicillin acylase	Synthesis of intermediates for production of active pharmaceutical ingredients	[2,4,30–38]
Food Processing	Trypsin, amylase, glucose isomerase, papain, pectinase	Conversion of starch to glucose, production of high fructose corn syrup, production of prebiotics, debittering of fruit juice	[2,5,9–12,39–43]
Detergent	Protease, lipase, amylase, cellulase	Stain removal, removal of fats and oils, color retention,	[44–48]
Biofuels	Lipase, cellulase, xylanase	Production of fatty acid methyl esters, decomposition of lignocellulotic material for bioethanol production	[18,19,44,49–57]
Paper and Pulp	Lipase, cellulase, xylanase	Removal of lignin for improved bleaching, improvement in fiber properties	[2,4,44,58–61]

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DEPARTMENT OF BIOCHEMISTRY
UNIT TEST-I FEBRUARY-2023

Class : **I M.Sc., Biochemistry** **Date: 28.02.2023**
Subject : Cellular Metabolism with Clinical Correlation-I **Time:** 12:00 -1:00 PM
Subject Code : **Max. Mark: 25**

Section A (5 x 1 =5 Marks)

Answer any **FIVE** questions

CO2 BL 6 1. Write the importance of Pentose Phosphate Pathway.
CO 1 BL 2 2. Discuss about the regulatory enzymes of glycolysis.
CO 1 BL 1 3. Define Glycogenesis.
CO 2 BL 4 4. Explain about the understand from the term O- linked glycoproteins.
CO 3 BL 1 5. Give an example for pyrimidine.
CO 1 BL 2 6. Discuss the function of glycogenin
CO 3 BL 4 7. Explain about the regulatory enzymes in purine nucelotide degradation.

Section B (2x 5 = 10 Marks)

Answer any **TWO** questions

CO 1 BL 4 8. Explain feeder pathway for glycolysis.
CO 2 BL 4 9. Explain about the Bacterial cell wall polysaccharide.
CO 3 BL 1 10. List out the various inhibitors of nucleotide biosynthesis.
CO 1 BL 4 11. Explain in detail about glycolysis.

Section C (1 x 10 = 10 Marks)

Answer any **ONE** question

CO 1 BL 2 12. Describe the steps involved in citric acid cycle and its regulation.
CO 3 BL 1 13. Illustrate the Denovo synthesis and regulation of pyrimidine nucleotide.

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DEPARTMENT OF BIOCHEMISTRY
UNIT TEST-I FEBRUARY-2023
ANSWER KEY

Class : **I M.Sc., Biochemistry** **Date: 28.02.2023**
Subject : Cellular Metabolism with Clinical Correlation-I **Time:** 12:00 -1:00 PM
Subject Code : **Max. Mark: 25**

Section A (5 x 1 =5 Marks)

Answer any **FIVE** questions

1. **Write the importance of Pentose Phosphate Pathway.**

The pentose phosphate pathway (PPP) is a fundamental component of cellular metabolism. The PPP is important **to maintain carbon homoeostasis, to provide precursors for nucleotide and amino acid biosynthesis, to provide reducing molecules for anabolism, and to defeat oxidative stress.**

2. **Discuss about the regulatory enzymes of glycolysis.**

The key regulatory enzyme of glycolysis is **phosphofructokinase**. It is inhibited by ATP and citrate and activated by AMP (and ADP), P_i, and fructose 2,6-bisphosphate.

3. **Define Glycogenesis.**

Glycogenesis, the formation of glycogen, the primary carbohydrate stored in the liver and muscle cells of animals, from glucose. Glycogenesis takes place when blood glucose levels are sufficiently high to allow excess glucose to be stored in liver and muscle cells. Glycogenesis is stimulated by the hormone insulin. Insulin facilitates the uptake of glucose into muscle cells, though it is not required for the transport of glucose into liver cells. However, insulin has profound effects on glucose metabolism in liver cells, stimulating glycogenesis and inhibiting glycogenolysis, the breakdown of glycogen into glucose.

4. **Explain about the understand from the term O- linked glycoproteins?**

O-linked glycoproteins begin their glycosylation with the action of the Golgi-specific enzyme, GalNAc transferase, which attaches an N-acetylgalactosamine to the hydroxyl group of a serine or threonine. The determination of which residue to glycosylate appears to be directed by secondary and tertiary structure as previously mentioned, and often occurs in dense clusters of glycosylation. Despite being fairly small additions (usu. <5 residues), the combined oligosaccharide chains attached to an O-linked glycoprotein can contribute over 50% of the mass of a glycoprotein. Two of the better known O-linked glycoproteins are mucin, a component of saliva, and ZP3, a component of the zona pellucida (which protects egg cells). These two

examples also illustrate a key property of glycoproteins and glycolipids in general: the sugars are highly hydrophilic and hold water molecules to them, greatly expanding the volume of the protein.

5. **Give an example for pyrimidine.**

Examples of pyrimidines are **cytosine, thymine, and uracil**. Cytosine and thymine are used to make DNA and cytosine and uracil are used to make RNA.

6. **Discuss the function of glycogenin**

Glycogenin (GYG1 or GYG2) functions **as the primer for glycogen synthesis** and is a self-glycosylating enzyme that uses uridine diphosphoglucose to synthesize a short glucose polymer attached to a surface tyrosine residue.

7. **Explain about the regulatory enzymes in purine nucelotide degradation.**

IMP dehydrogenase and Adenylosuccinate dehydrogenase, lyase plays vital role in degradation of purine nucleotides.

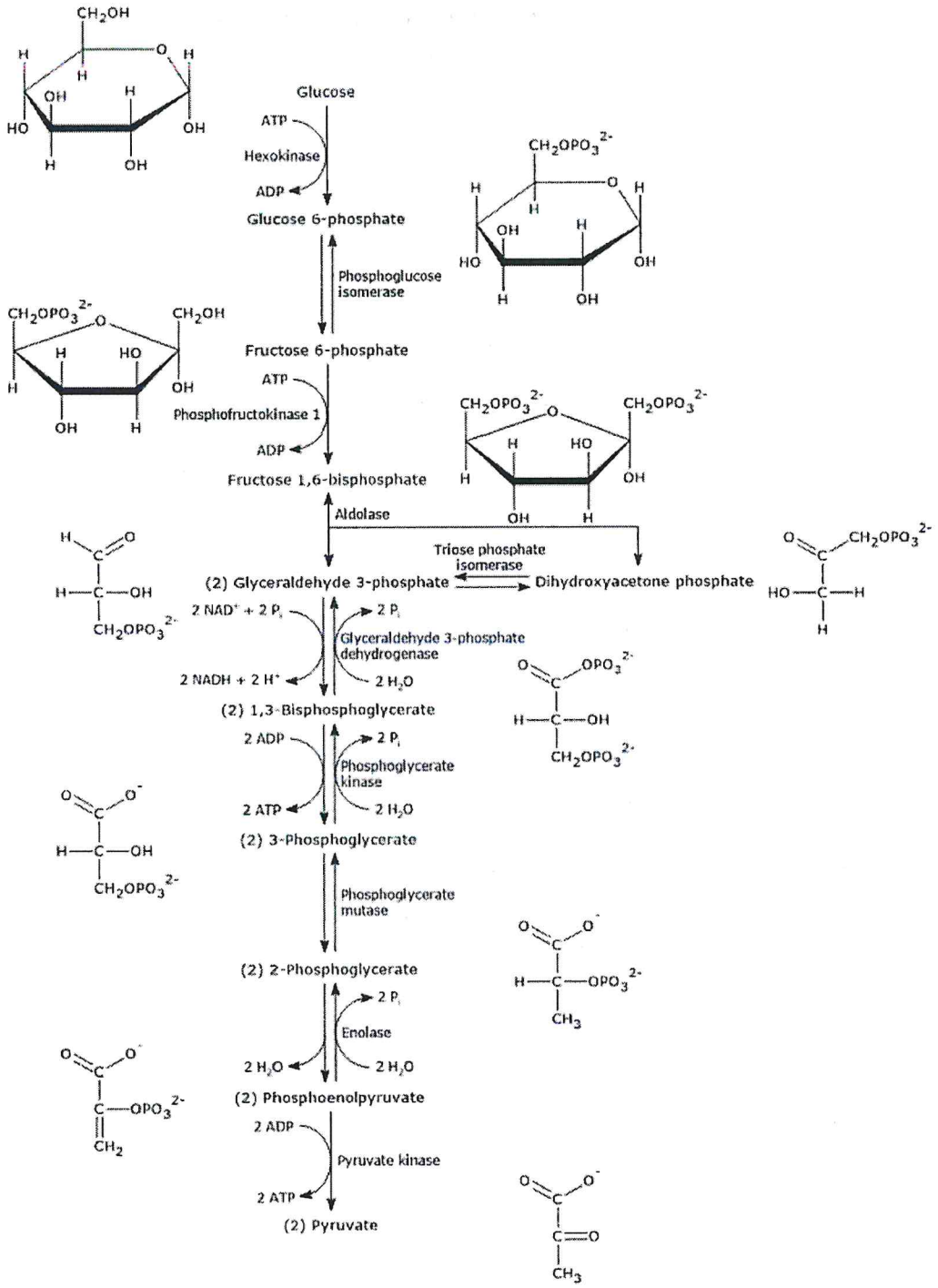
Section B (1 x 5 = 5 Marks)

Answer any **TWO** questions

8. **Explain feeder pathway for glycolysis.**

Feeder pathways for glycolysis

Among the most important are: **glycogen and starch**, two storage polysaccharides; some disaccharides such as sucrose, maltose, lactose and trehalose; the monosaccharides galactose, fructose, and the less common mannose.

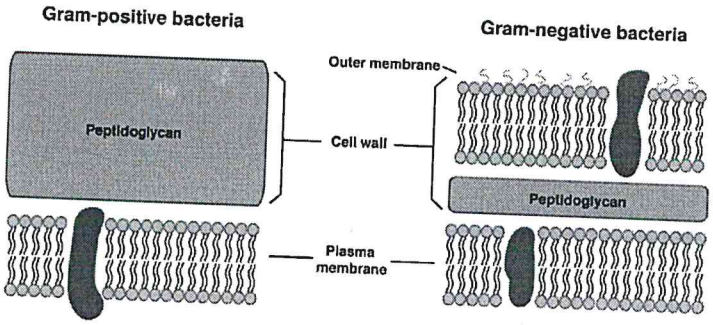


9. Explain about the Bacterial cell wall polysaccharide.

Peptidoglycan is a polysaccharide made of two glucose derivatives, N-acetylglucosamine (NAG) and N-acetylmuramic acid (NAM), alternated in long chains. The chains are cross-linked to one another by a tetrapeptide that extends off the NAM sugar unit, allowing a lattice-like structure to form.

Bacterial Cell wall: Structure, Composition and Types

- Cell wall is an important structure of a bacteria. It give shape,rigidity and support to the cell.
- On the basis of cell wall composition, bacteria are classified into two major group ie. Gram Positive and gram negative.



Types of cell wall

1. Gram positive cell wall

Cell wall composition of gram positive bacteria.

1. Peptidoglycan
2. Lipid
3. Teichoic acid

2. Gram negative cell wall

Cell wall composition of gram negative bacteria

1. Peptidoglycan
2. Outermembrane:
    - Lipid
    - Protein
    - Lipopolysaccharide (LPS)

Composition of cell wall:

1. Peptidoglycan:

- Peptidoglycan is porous cross linked polymer which is responsible for strength of cell wall.
- Peptidoglycan is composed of three components.

1. Glycan backbone

2. **Tetra-peptide** side chain (chain of 4 amino acids) linked to NAM

3. **Peptide cross linkage**

- Glycan backbone is the repeated unit of N-acetyl muramic acid (NAM) and N-acetyl glycosamine (NAG) linked by β-glycosidic bond.
- The glycan backbone are cross linked by tetra-peptide linkage. The tetra-peptide are only found in NAM.
- More than 100 peptidoglycan are known with the diversity focused on the chemistry of peptide cross linkage and interbridge.
- Although the peptidoglycan chemistry vary from organism to organism the glycan backbone ie NAG-NAM is same in all species of bacteria.

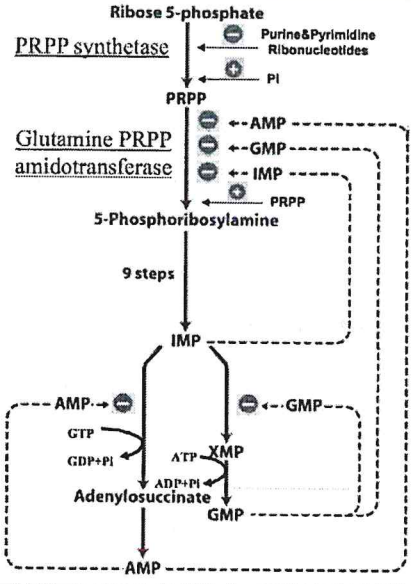
The aminoacids found in tetra-peptide are-

- **L-alanine:** 1st position in both gm+ve and gm-ve bacteria
- **D-glutamic acid:** 2nd position
- **D-aminopimelic acid/ L-lysine:** 3rd position (variation occurs)
- **D-alanine:** 4th position

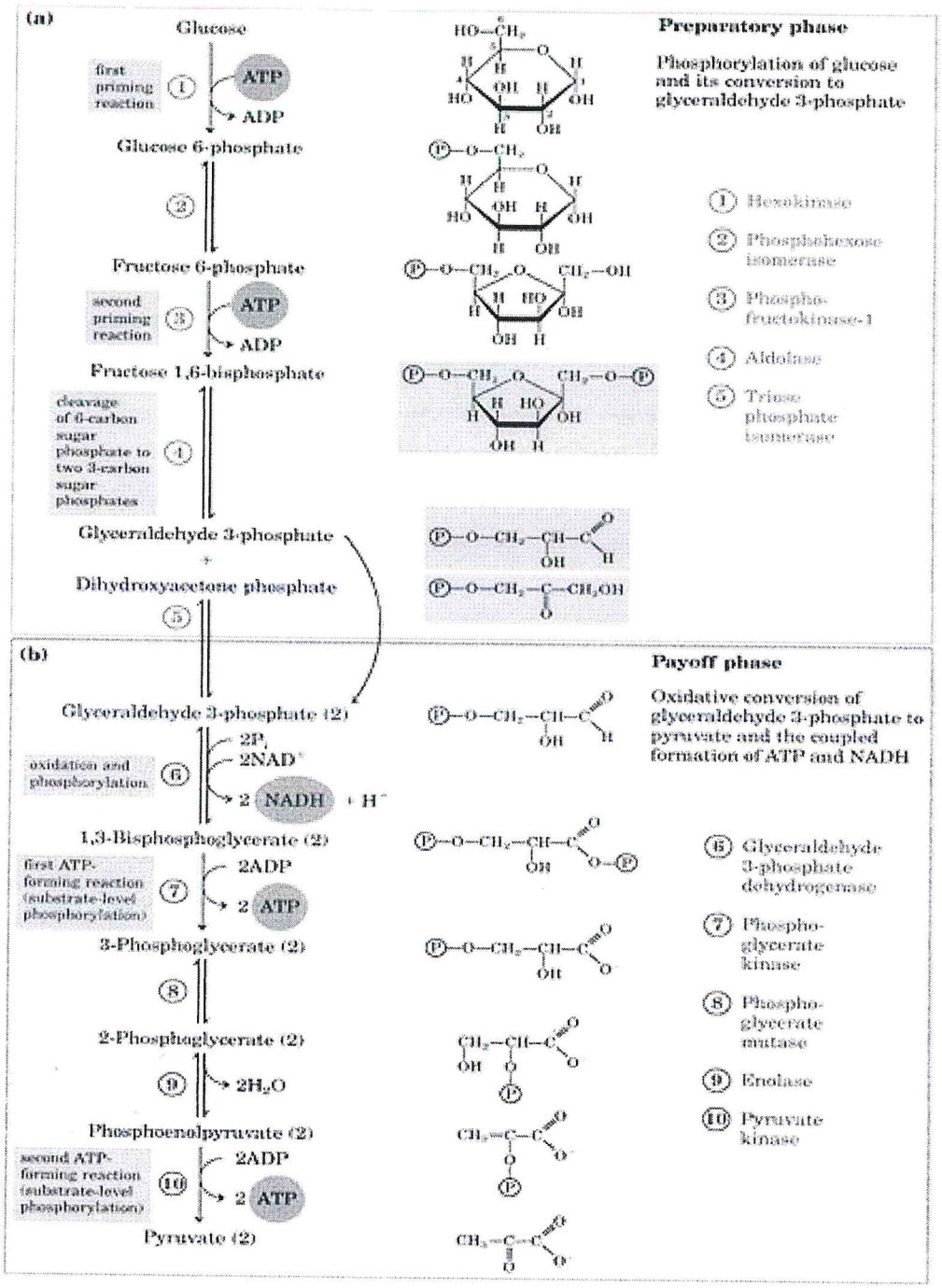
10. List out the various inhibitors of nucleotide biosynthesis.

De novo synthesis of purine nucleotides

- **PRPP synthetase is the rate-limiting step in the synthesis of both purines and pyrimidines.**
- **Glutamine:PRPP amidotransferase catalyzes the first-committed step in purine synthesis.**
- **IMP branch to AMP**
  - **Inhibitor: AMP**
  - **Need for GTP**
- **IMP branch to GMP**
  - **Inhibitor: GMP**
  - **Need for ATP**



11. Explain in detail about glycolysis.



Section C (1 x 10 = 10 Marks)

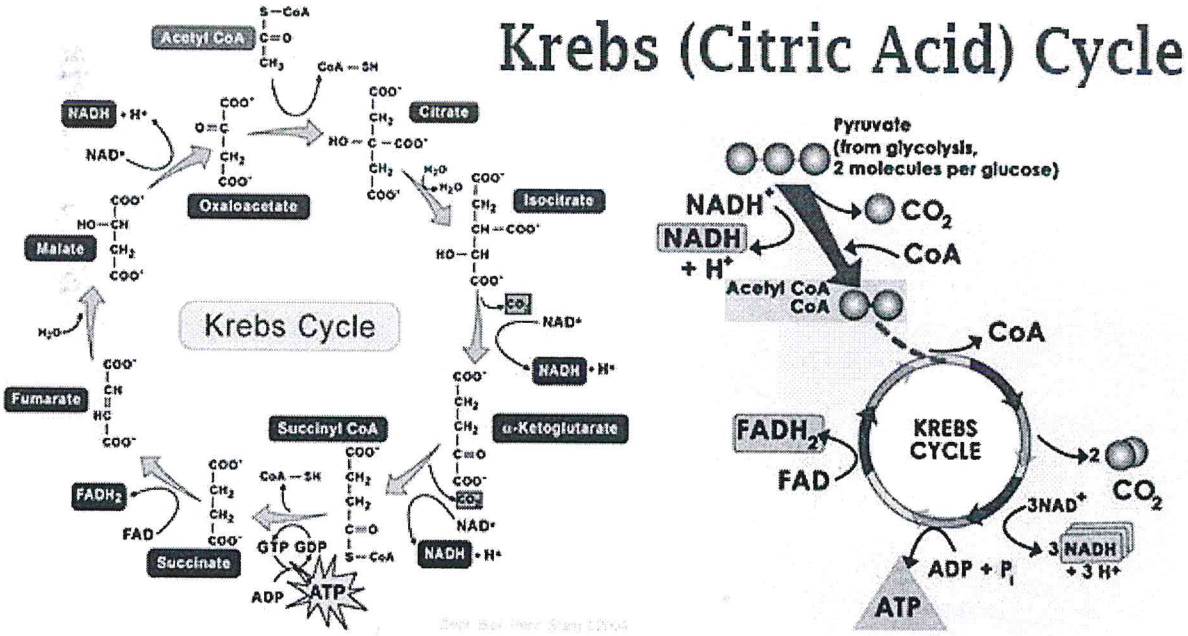
Answer any ONE question

12. Describe the steps involved in citric acid cycle and its regulation.

TriCarboxylic Acid (TCA) cycle. In prokaryotic cells, the citric acid cycle occurs in the cytoplasm; in eukaryotic cells, the citric acid cycle takes place in the matrix of the mitochondria.

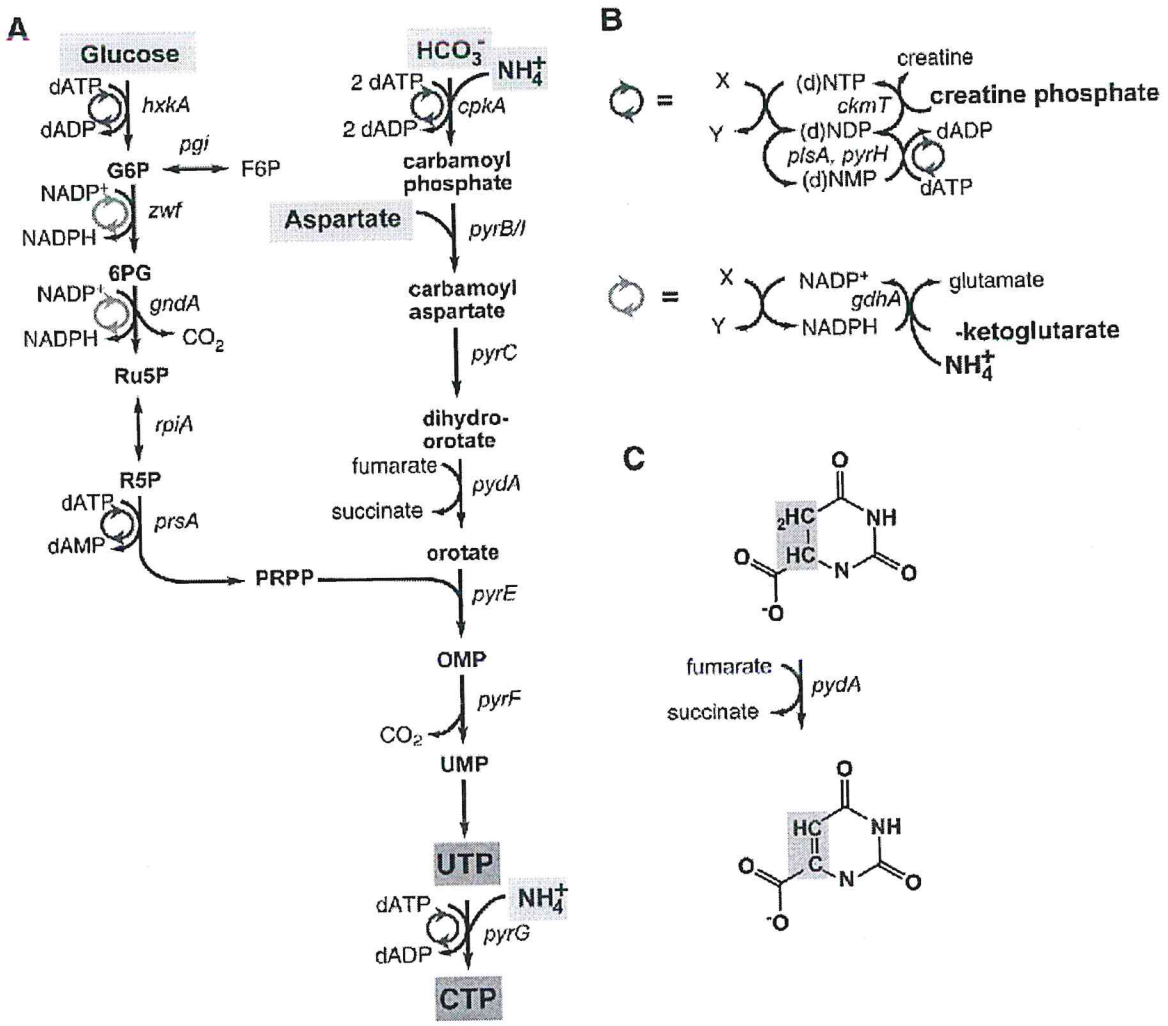
The cycle was first elucidated by scientist "Sir Hans Adolf Krebs" (1900 to 1981). He shared the Nobel Prize for physiology and Medicine in 1953 with Fritz Albert Lipmann, the father of ATP cycle.

The process oxidises glucose derivatives, fatty acids and amino acids to carbon dioxide (CO2) through a series of enzyme controlled steps. The purpose of the Krebs Cycle is to collect (eight) high-energy electrons from these fuels by oxidising them, which are transported by activated carriers NADH and FADH2 to the electron transport chain. The Krebs Cycle is also the source for the precursors of many other molecules, and is therefore an amphibolic pathway (meaning it is both anabolic and catabolic).



13. Illustrate the Denovo synthesis and regulation of pyrimidine nucleotide.

; Nucleotide Synthesis with Cofactor Recycling[a]



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DEPARTMENT OF BIOCHEMISTRY
Unit test -I, February-2023

Class: I M.Sc. Biochemistry **Date: 01.03.2023**
Subject: Cellular Metabolism with Clinical correlation-II **Max. Marks: 25**
Subject Code: **Time: 1 Hour**

Section A (5 x 1 = 5marks)
Answer any **FIVE** questions.

CO 4 BL1.1. Define non- essential amino acids.
CO 4 BL2. 2.State the condition in which tyrosine becomes an essential amino acid.
CO 5 BL1.3. Name the enzyme deficiency for the disease tyrosinemia.
CO 4 BL1.4. Enumerate the biological significance of glutamine synthetase.
CO 1 BL.6. 5. Write the role of acetyl Co A.
CO 2 BL.1 6. List any two phospholipids.
CO 2 BL 1 7. Define Carnitine.

Section B (2 x 5 = 10marks)
Answer any **TWO** questions.

CO 4 BL 6. 8. Write down the role and biological significance of asparagine synthetase.
CO 4 BL 3.9. Illustrate about the biosynthesis of any four non-essential amino acids.
CO 1 BL 4 10. Explain Ketogenesis.
CO 1 BL 4 11. Explain omega oxidation of fatty acids.

Section C (1 x 10 = 10 marks)
Answer any **ONE** question.

CO 5 BL 4.12. Explain in detail about phenyl ketonuria.
CO 1 BL 4 13. Explain beta oxidation of fattyacids.

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Subject: Cellular Metabolism with Clinical correlation-II **Max. Marks: 25**
Subject Code:

Time: 1 Hour

ANSWER KEY
Section A (5 x 1 =5marks)

Answer any **FIVE** questions.

CO 4 BL1.1. Define non- essential amino acids.

Amino acids which can be synthesized in the body are known as non-essential amino acids. e.g, **glycine, alanine glutamic acid** etc.

CO 4 BL2. 2.State the condition in which tyrosine becomes an essential amino acid.

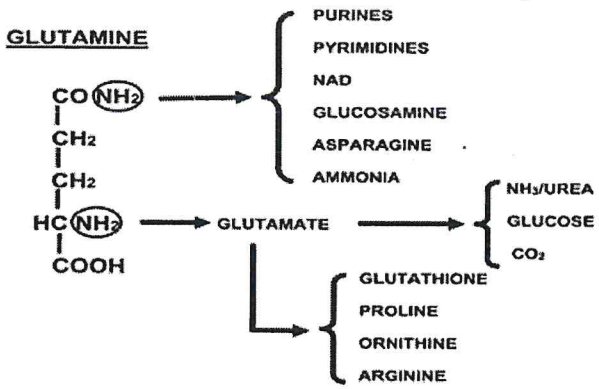
During the inborn error of phenyl alanine metabolism – phenyl ketonuria, tyrosine is not getting synthesised in the system. Hence tyrosine becomes an essential amino acid- should be supplied through the diet.

CO 5 BL1.3. Name the enzyme deficiency for the disease tyrosinemia.

Two distinct genetic defects can cause tyrosinemia. Deficiency of fumarylacetoacetate hydrolase causes tyrosinemia type-I: Deficiency of tyrosine transaminase causes tyrosinemia type-II.

CO 4 BL1.4. Enumerate the biological significance of glutamine synthetase.

Glutamine synthetase is an enzyme catalysing the synthesis of amino acid Glutamine , which is needed for the production of biologically important compounds.



CO 1 BL.6. 5. Write the role of acetyl Co A.

Acetyl-CoA is generated in the mitochondria for oxidation or other possible fates. In the liver, mitochondrial acetyl-CoA is used to synthesize ketone bodies (acetoacetate and β-hydroxybutyrate) as alternative fuel sources for the brain and heart under conditions of carbohydrate scarcity

CO 2 BL.1 6. List any two phospholipids.

1.Lecithin 2. Cephalin 3. Sphingomyelin

CO 2 BL 1 7. Define Carnitine.

Carnitine is a quaternary ammonium compound involved in metabolism in most mammals, plants, a some bacteria. In support of energy metabolism, carnitine transports long-chain fatty acids into mitochondr to be oxidized for free energy production, and also participates in removing products of metabolism from cells. The main function of carnitine is the transfer of long-chain fatty acids to mitochondria for subsequent oxidation . Carnitine also binds acyl residues deriving from the intermediary metabolism of amino acids an help in their elimination functioning as a scavenger

Section B (2 x 5 = 10marks)

Answer any **TWO** questions.

CO 4 BL 6. 8. Write down the role and biological significance of asparagine synthetase.

Role (2 marks)/ Biological significance(3 Marks)

- Asparagine synthetase is a chiefly cytoplasmic enzyme that generates asparagine from aspartate. Th amination reaction is like that promoted by glutamine synthetase. The enzyme is ubiquitous in its distributic in mammalian organs, but basal expression is relatively low in tissues other than the exocrine pancreas.

Mechanisms of the enzyme

- The N-terminal active site catalyzes glutamine hydrolysis to yield glutamate and ammonia.
- The C-terminal active site catalyzes activation of the side-chain carboxylate of aspartate to form an electrophilic intermediate, β-aspartyl-AMP (βAspAMP) , and inorganic pyrophosphate (PPi).
- The tunnel that links the two active sites allows for the passage of an ammonia molecule to act as a common intermediate t.o couple the two half-reactions carried out in the independent active sites of the enzyme.
- Thus, after being released in, and channeled from, the glutaminase site, the ammonia molecule attacl the bound βAspAMP 1 to give asparagine and AMP via a tetrahedral intermediate.

Function

- In plants, inorganic nitrogen is taken up from the environment in forms of nitrate or ammonium
- Assimilation of this nitrogen into asparagine for use in nitrogen recycling, transport, and storage is a essential process for plant development, making asparagine synthetase vital to maintaining these asparagine reserves.
- Specific events in development which depend on asparagine synthetase are nitrogen mobilization in germinating seeds, nitrogen recycling and flow in vegetative cells in response to biotic and abiotic stresses, and nitrogen remobilization from source to sink organs.
- In mammals, asparagine synthetase expression has been found to be linked to cell growth, and its mRNA content is linked to changes in the cell cycle.
- Hamster BHK ts11 cells produce an inactive asparagine synthetase enzyme, and this loss of asparagi synthetase activity directly led to cell cycle arrest in the cells because of a depletion of cellular asparagine.

- Upregulation of asparagine synthetase mRNA was observed as well in these hamster cells. Other experiments demonstrated that quiescent rat thyroid cells entering S phase as a result of thyroid-stimulating hormone treatment was matched with a concurrent increase in asparagine synthetase mRNA content.

Classes

There seem to be two major groups of asparagine synthetase.

- Majority of prokaryotic isolated enzymes (asnA) utilize ammonia as the sole nitrogen source.
- Eukaryotic isolated and some prokaryotic isolated enzymes (asnB) utilize glutamine as the preferred nitrogen source, although these enzymes can also employ ammonia as an alternate substrate.
- The human glutamine dependent AS is encoded by a single gene located in region q21.3 on chromosome 7.
- The lack of ammonia-dependent asparagine synthetase in eukaryotes is presumably because of the need to maintain cellular concentrations of ammonia at exceptionally low levels.

Clinical significance

Cancer-Leukemia

- Cancerous cells exhibit rapid growth and cell division and subsequently have an increased nutritional need.
- The particularly low-level expression of asparagine synthetase in primary acute lymphoblastic leukemia (ALL) and numerous ALL cell lines, as compared to that of normal cells, makes asparagine depletion an effective method of treatment due to the cells' unusual dependency on circulating serum asparagine as a necessary nutrition for growth.
- As a result, L-asparaginase is a common chemotherapy drug utilized in the treatment of ALL and ma have applications in other asparagine synthetase negative cancers, such as lymphomas, due to its asparigina activity to deplete serum asparagine.
- This depletion of serum asparagine leads to a subsequent rapid efflux of cellular asparagine, which is immediately acted upon and destroyed by the L-asparaginase as well.
- Due to the transient response from these susceptible cancers in reaction to the asparagine depletion, tumor growth is significantly inhibited due to nutritional deficiency.
- Most somatic cells express sufficient basal amounts of asparagine synthetase to counteract this asparagine starvation and survive the effects of L-asparaginase.
- In addition, these normal cells can upregulate their expression of asparagine synthetase in response tc the asparagine depletion, further countering some of the toxic effects of the medication on normal cell activity, a desirable trait for chemotherapy drugs.
- However, the opposite effect is visible in cases of asparaginase resistant cancers. In these resistant cancers, the effect of blood asparagine depletion through L-asparaginase instead leads to significant asparagine synthetase overexpression to compensate, effectively nullifying the effect of the chemotherapy drug.
- For example, in mouse models, 24 hours after exposure to L-asparaginase, tumors resistant to the depletion responded with 5- to 19-fold increases in asparagine synthetase expression.
- These resistant tumors also inherently express higher levels of asparagine synthetase activity, even without the application of L-asparaginase to drive further expression. Similar trends are often seen in human

studies as well, with high levels of asparagine synthetase activity being detected in asparaginase-resistant cases of treatment as compared with the negligible activity of susceptible cases.

- As seen in in vitro studies of resistant human leukemia cell lines, even six weeks after the removal of asparagine depleting factors, the increased level of expression of asparagine synthetase failed to return to a basal state, instead remaining elevated and retaining continued drug resistance.
- While the mechanisms underlying the sustained over-expression of ASNS have not been reported in these studies, transcriptome profiling of two T-ALL patients that have relapsed after L-asparaginase treatmer revealed a recurrent promoter swap with KMT2E leading to ASNS over-expression and L-asparaginase resistance.
- It has been further demonstrated in mouse model systems that repeated subculturing of L-asparaginas sensitive tumor cells in sublethal concentrations of L-asparaginase could eventually make them resistant, a potential worry of lower dose chemotherapy treatments effectively encouraging resistant cell development.

Potential biomarker for ovarian cancer

- A correlation between L-asparaginase efficacy and asparagine synthetase protein levels in several human ovarian cell lines has been observed. As mentioned above, this result confirmed similar observati s in human leukemia cell lines. Hence asparagine synthetase might be used as a biomarker in ovarian cancer screening and potential treatment.

Potential role in solid tumor metastasis

- An epithelial to mesenchymal transition was mimicked in metastatic cells by adapting PC-3 prostate cancer cells from adherent to suspension culture and then examined to investigate changes in gene expressio concurrent with this adaption to suspension. It was found that the asparagine synthetase expression was sixfold greater in the suspension cells than in the adherent cells.
- In xenografts from a human breast cancer cell line in an established metastatic mouse model, asparagine synthetase was elevated in circulating tumor cells isolated from the mouse blood compared with the parental cell line.
- When these circulating tumor cells were returned to an in vitro culture and exposed to hypoxia, they showed higher basal expression and greater induction of asparagine synthetase than their parental cell line.
- These circulating tumor cells were also found to have an increased capacity for colony formation in soft agar assays under hypoxic conditions and grew faster when reimplanted as xenografts. The increase prevalence of asparagine synthetase in the metastatic cells suggests that its activity may be beneficial for circulating tumor cell survival.
- Asparagine synthetase deficiency is a condition that causes neurological problems in affected individuals starting soon after birth. Most people with this condition have an unusually small head size (microcephaly) that worsens over time due to loss (atrophy) of brain tissue.

CO 4 BL 3.9. Illustrate about the biosynthesis of **any four** non-essential amino acids.

Explanation(2 marks)(Reaction 3 marks)

In humans, only half of the standard amino acids (Glu, Gln, Pro, Asp, Asn, Ala, Gly, Ser, Tyr, Cys) can be synthesized& classified the nonessential amino acids. Within this group, the first three, glutamate, glutamine and proline, have a shared anabolic pathway. It begins with glutamate dehydrogenase, which adds ammonia

to α-ketoglutarate in the presence of NADPH to form glutamate. This is a key reaction for all amino acid synthesis: glutamate is a nitrogen (amino group) donor for the production of all the other amino acids.

Glutamine synthetase catalyzes the formation of glutamine from glutamate and ammonia. This is an importar biochemical reaction for a completely different reason: it is the primary route for ammonia detoxification.

Proline is synthesized from glutamate in a two-step process that begins with the reduction of glutamate to a semialdehyde form that spontaneously cyclizes to D-pyrroline-5-carboxylate. This is reduced by pyrroline carboxylate reductase to proline.

Alanine and Aspartate are the products of glutamate-based transamination of pyruvate and oxaloacetate, respectively.

Asparagine is synthesized through one of two known pathways. In bacteria, an asparagine synthetase combines aspartate and ammonia. However, in mammals, the aspartate gets its amino group from glutamine.

The synthesis of serine begins with the metabolic intermediate 3-phosphoglycerate (glycolysis). Phosphoglycerate dehydrogenase oxidizes it to 3-phosphohydroxypyruvate. An amino group is donated by glutamate in a reaction catalyzed by phosphoserine transaminase, forming 3-phosphoserine, and finally the phosphate is removed by phosphoserine phosphatase to produce serine.

Serine is the immediate precursor to glycine, which is formed by serine hydroxymethyltransferase. This enzyme requires the coenzyme tetrahydrofolate (THF), which is a derivative of vitamin B9 (folic acid).

Serine is also a precursor for cysteine, although the synthesis of cysteine actually begins with the essential amino acid methionine. Methionine is converted to S-adenosylmethionine by methionine adenosyltransferas This is then converted to S-adenosylhomocysteine by a member of the SAM-dependent methylase family. The sugar is removed by adenosylhomocysteinase, and the resultant homocysteine is connected by cystathionine synthase to the serine molecule to form cystathionine. Finally, cystathionine-g-lyase catalyzes the production of cysteine.

Tyrosine is another amino acid that depends on an essential amino acid as a precursor. In this case, phenylalanine oxygenase reduces phenylalanine to produce the tyrosine.

CO 1 BL 4 10. Explain Ketogenesis.
Definition (1M)
Location (1M)
Pathway (3M)

CO 1 BL 4 11. Explain omega oxidation of fattyacids.

Definition (1M)
Location (1M)
Pathway (3M)

Section C (1 x 10 = 10 marks)
Answer any **ONE** question.

CO 5 BL 4.12. Explain in detail about phenyl ketonuria.
Deficiency&Types- 4 marks
Clinical significance-4 marks
Diagnosis &Treatment-2 marls

CO 1 BL 4 13. Explain beta oxidation of fattyacids.
Definition (2M)
Location (2M)
Pathway (2M)
Regulation (2M)
Clinical Correlation (2M)

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DEPARTMENT OF BIOCHEMISTRY
UNIT TEST- I FEBRUARY-2023

Class : **I M.Sc., Biochemistry** **Date: 02.03.2023**
Subject : **Energy Drug Metabolism** **Time: 12.00AM to 1.00PM**
Subject Code : **Max. Mark: 25**

Section A (5 x 1 =5)
Answer any FIVE questions.

CO6 BL6 1. Write about the detoxication.
CO3 BL2 2. Discuss about Xenobiotics.
CO1 BL1 3. List out the different types of detoxication mechanism.
CO4 BL1 3. List out the Aromatic nitro-compounds.
CO2 BL1 5. Name any two inhibitors of the respiratory chain complex -I
CO1 BL1 6. List out the enzymes involved in biological oxidation.
CO2 BL6 7. Write the role of F0 - F1 ATPase

Section B - (2 x 5 = 10)
Answer any TWO questions.

CO2 BL6 8. Write short notes about the characteristic features of cytochrome- P_{450} System.
CO5 BL1 9. Enumerate the biomedical importance of Monooxygenase.
CO2 BL2 10. Explain Glycerol phosphate shuttle.
CO2 BL2 11. Discuss the mechanism of ATP synthesis.

Section C – (1 x 10 = 10)
Answer any ONE question.

CO3 BL4 12. Explain in detail about the detoxication reaction take place in Phase I of xenobiotics.
CO2 BL2 13. Discuss on enzyme complexes and the Sequence of events in the ETC.

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UNIT TEST- I FEBRUARY-2023

Class : I M.Sc., Biochemistry **Date: 02.03.2023**
Subject : Energy Drug Metabolism **Time: 12.00 to 1.00PM**
Subject Code : **Max. Mark: 25**

Answer Key

Section A (5 x 1 =5)
Answer any FIVE questions.

1. **Write about the detoxication.**
   - Detoxification means a biochemical processes, that hereby noxious substance are reduced to less harmful and more easily excreted in urine.
   - Some of them may be **Exogenous**, which include those substances, when are not ordinarily ingested or utilized by the organism.
   - Some of them may be **Endogenous,** which include those substances.

2. **Discuss about Xenobiotics.**
   - Foreign molecules, which enter the body are called xenobiotics. Humans are now subjected increasingly to exposure to various foreign chemicals, where they may be drugs, food additives or pollution or carcinogens.
   - In some cases, the reactions to which xenobiotics are subjected may increase their biologic activity and even toxicity, instead of making less toxic.

3. **List out the different types of detoxication mechanism.**
   - Mechanism of detoxications are mainly of four types
     - Oxidation
     - Reduction
     - Hydrolysis
     - Conjugation
   - Sometime detoxication may occur independently or may be combination of these process. For example, in many cases, in humans, oxidation and other reactions may be followed by conjugation.
   - In man detoxication is principally carried out in liver, but to some extent it can be carried out in kidneys also.

4. **List out the Aromatic nitro-compounds.**
   - p-nitrobenzaldehyde is reduced to corresponding amines and excreted after conjugation.

- Acetyl salicylic acid (Asprin) → salicylic acid + acetic acid.
- Salicylic acid → can reduce benedict's qualitative reagent
- Atropine (Tropyl tropate) → Tropic acid + tropin
- Digitalis (A cardiac glycoside) → Sugar + Aglycone (non-sugar component)
- Procaine → p-amino benzoic acid + Diethylamino ethanolgene.

5. Name any two inhibitors of the respiratory chain complex -I
   *Rotenone, *Amytal
6. List out the enzymes involved in biological oxidation.
   Oxidases, Dehydrogenases, hydro peroxidases and Oxygenases

7. Write the role of F0 - F1 ATPase
   F0F1-ATPase/ATP synthase (F-type ATPase, complex V) is present in the inner membrane of eukaryotic mitochondria and **acts as the powerhouse of the cell by synthesizing ATP.** It can also operate in the reverse direction, hydrolysing ATP and pumping protons under certain conditions.
   When F1 and F0 are coupled via electrostatic and hydrophobic interactions, **the F0F1 complex functions as an ion-translocating ATPase or as ATP synthase.** After removal of F1 from the membrane, F1 only catalyzes the hydrolysis of ATP, whereas F0 promotes passive ion translocation across the membrane.

Section B - (2 x 5 = 10)
Answer any TWO questions.

8.Write short notes about the characteristic features of cytochrome- P_{450} System.

- Present in endoplasmic reticulum (ER), microsomal fraction of liver (highest concentration). At least six closely related species of cyt-P_{450} in ER of liver described.
- Chemically they are haemoproteins. enzyme requires NADPH.
- Cyt-P_{450} system contains lipids and most common lipid is phosphatidyl choline (lecithin). It is an inducible enzyme.

9.Enumerate the biomedical importance of Monooxygenase.

- Recently another cytochrome P450 species has been found called as cytochrome P448. This species has been found to be specific for metabolism of polycyclic aromatic hydrocarbons (PAHs). Hence this species has also been named as aromatic hydrocarbon hydroxylase (AHH).
- **Importance:** It has been found to be very important enzyme for metabolism of PAHs and in carcinogens produced by these agents.

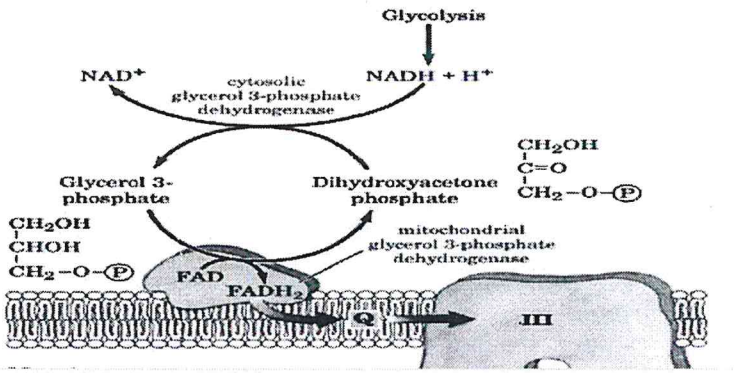
- **Studies have shown that:** In the lungs of cigarette smokers the enzyme may be involved in conversion of inactive PAHs (pro-carcinogens) present in cigarette smoke to active carcinogens by hydroxylation reactions. Smokers and thus fetus is exposed to potentially harmful metabolites.

10. Explain Glycerol phosphate shuttle.

- In muscle and brain
- Each NADH converted to $FADH_2$ inside mitochondrion
  - $FADH_2$ enters later in the electron transport chain
  - Produces 1.5 ATP
- Gycerol phosphate shuttle
  - 2 NADH per glucose -→ 2 $FADH_2$
  - 2 $FADH_2$ X 1.5 ATP / $FADH_2$.....3.0 ATP
  - 2 ATP in glycoysis .....2.0 ATP
  - From pyruvate and Krebs
    - 12.5 ATP X 2 per glucose .....25.0 ATP

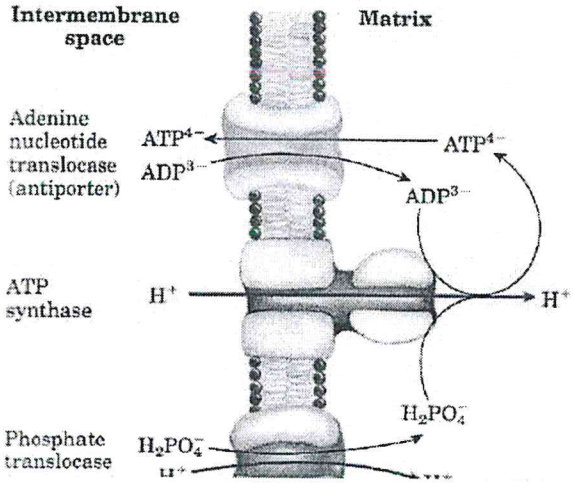
Total = 30.0 ATP/ glucose

In muscle and brain, the glycerol-P shuttle brings cytoplasmic NADH to the ETS



11. Discuss the mechanism of ATP synthesis.

Explanation (2.5 marks) /Diagram-2.5 marks)



Section C – (1 x 10 = 10)
Answer any ONE question.

12.Explain in detail about the detoxication reaction take place in Phase I of xenobiotics.

- **Phase I:** Hydroxylation, the major reaction, catalyzed by mono-oxygenase or cytochrome P_{450} species. Other types of reactions in phase I included oxidation, and reduction.
- **Oxidation reactions.**

1. Oxidation:

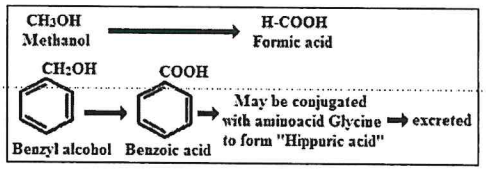
- A large number of foreign substance are destroyed in the body by oxidation.
- Aliphatic as well as aromatic alcohols via aldehyde formation.
- In addition certain amines, anilides and drugs also can undergo oxidation.

Examples are:

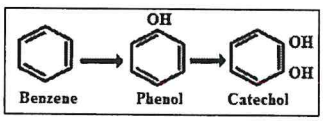
1. **Methyl groups:** are oxidized to form – COOH through formation of aldehyde.



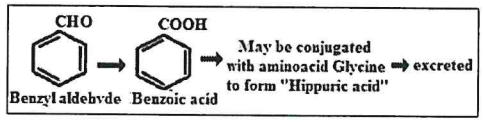
2. **Primary Aliphatic and Aromatic Alcohols:** are oxidized to corresponding acids.



3. **Aromatic Hydrocarbons:** are oxidized to phenol and other phenolic compounds. Again they are conjugated with glucuronic acid or sulphuric acid and excreted as corresponding glucuronides and sulphates.

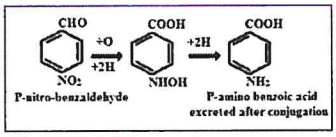


4. **Aldehydes:** are oxidized to form the corresponding acids.



5. Anilides: are oxidized to the corresponding phenols eg. Acetanilide is present as a constituent of analgesic drugs, which relieves pain, it is oxidized in the body to form p-acetyl amino phenol.

Acetanilide → P-acetyl amino phenol



6. Amines:

Many primary aliphatic amines undergo oxidation to the corresponding acids (N is converted to urea). Aromatic amines like aniline is oxidized to corresponding phenol.

Benzylamine → Benzoic acid + Urea

7. Sulphur compounds:

The sulphur present in organic sulphur compounds is oxidized to SO_4 which in turn may be excreted in inorganic or organic form or a neutral (unoxidized) sulphur.

Aniline → P-amino phenol

8.Drugs:

Certain drugs can be oxidized in the body and are excreted as hydroxy derivative or salts.

Examples are

Meprobamate: a tranquilizer used in psychiatric disorders is excreted largely as the oxidation product hydroxy meprobamate.

Meprobamate → OH- meprobamate

Chlorol: used as a hypnotic. Most of the chloral under goes reduction and conjugation; but partly it can be oxidized to form tri-chloroacetic acid which is excreted as its salt.

Chloral→Trichloroacetic acid

- **Reduction reactions.**

2. Reduction:

Reduction usually does not occur extensively in man.

Examples are:

- **Certain aldehydes:**
  - chloral, a hypnotic, principally undergoes reduction in the body to form corresponding alcohol, which is then conjugated with D-glucuronic acid and excreted as corresponding glucuronides.
  - $CCl_3CHO \rightarrow CCl_3CH_2OH$
  - Chloral-tri-chloro-ethanol (+D-Glucuronic acid excreted as corresponding glucuronides)

13. Discuss on enzyme complexes and the Sequence of events in the ETC.

Definition of ETC(1 marks)/Diagram(2 marks)/ Enzyme complexes(4marks)/ Sequence of events(3 marks)

The electron transport chain is **a series of four protein complexes that couple redox reactions, creating an electrochemical gradient that leads to the creation of ATP in a complete system named oxidative phosphorylation**. It occurs in mitochondria in both cellular respiration and photosynthesis.

Electron Transport Chain Components/ Electron carriers

Electrons in the chain are transferred from substrate to oxygen through a series of electron carriers.

There are about 15 different chemical groups that accept or transfer electrons through the electron chain.

a. FMN (Flavin Mononucleotide)

At the beginning of the electron transfer chain, the electrons from NADH are transferred to the flavin Mononucleotide (FMN) reducing it to FMNH2.

$NAD + H+ + FMN \rightarrow NAD + FMNH2$

The transfer of electrons is catalyzed by the action of NADH dehydrogenase.

The electrons are further transferred to a series of iron-sulfur complexes (Fe-S) which have a higher relative affinity towards the electrons.

b. Ubiquinone (Co-enzyme-Q)

Between the flavoproteins and cytochromes are other electron carriers termed ubiquinone (UQ). Ubiquinone is the only electron carrier in the respiratory chain that is not bound attached to a protein. This allows the molecule to move between the flavoproteins and the cytochromes.

Once the electrons are transferred from FMNH2 via the Fe-S centers to the ubiquinone, it becomes UQH2 and the oxidized form of flavoprotein (FMN) is released.

$FMNH2 + UQ \rightarrow FMN + UQH2$

c. Cytochromes

The next electron carriers are cytochromes that are red or brown colored proteins containing a heme group that carries the electrons in a sequence from ubiquinone to the molecular oxygen.

However, each cytochrome, like Fe-S centers, only transfers a single electron whereas other electron carriers like FMN and ubiquinone transfer two electrons.

There are five types of cytochromes between ubiquinone and the molecular oxygen, each designated as a, b, c, and so on.

These are named on the basis of their ability to absorb light of different wavelengths (cytochrome a absorbs the longest wavelength, b absorbs the next longest wavelength and so on).

Electron Transport Chain Equation

The electron transport chain consists of a series of oxidation-reduction reactions that lead to the release of energy. A summary of the reactions in the electron transport chain is:

$NADH + 1/2O2 + H+ + ADP + Pi \rightarrow NAD+ + ATP + H2O$

Electron Transport Chain Complexes

A chain of four enzyme complexes is present in the electron transport chain that catalyzes the transfer of electrons through different electron carriers to the molecular oxygen.

a. Complex I (Mitochondrial complex I)

Complex I in the electron transport chain is formed of NADH dehydrogenases and the Fe-S centers that catalyzes the transfer of two electrons from NADH to ubiquinone (UQ).
At the same time, the complex translocates four H+ ions through the membrane, creating a proton gradient.
$NADH + H+ + CoQ \rightarrow NAD+ + CoQH2$

NADH is first oxidized to nAD+ by reducing FMN to FMNH2 in a two-step electron transfer. FMNH2 is then oxidized to FMN where the two electrons are first transferred to Fe-S centers and then to ubiquinone.

b. Complex II (Mitochondrial complex II)
Complex II consists of succinic dehydrogenase, FAD, and Fe-S centers.
The enzyme complex catalyzes the transfer of electrons from other donors like fatty acids and glycerol-3 phosphate to ubiquinone through FAD and Fe-S centers.
This complex runs parallel to the Complex II, but Complex II doesn't translocate H+ across the membrane, as in Complex I.
$Succinate + FADH2 + CoQ \rightarrow Fumarate + FAD+ + CoQH2$

c. Complex III (Mitochondrial complex III)
Complex III consists of cytochrome b, c, and a specific Fe-S center.
The enzyme complex, cytochrome reductase, catalyzes the transfer of two electrons from reduced CoQH2 to two molecules of cytochrome c.
Meanwhile, the protons (H+) from the ubiquinone are release across the membrane aiding to the proton gradient.
The CoQH2 is oxidized back to CoQ while the iron center (Fe3+) in the cytochrome c is reduced to Fe2+.
$CoQH2 + 2\ cytc\ c\ (Fe3+) \rightarrow CoQ + 2\ cytc\ c\ (Fe2+) + 4H+$

d. Complex IV (Mitochondrial complex IV)
Complex IV consists of cytochrome a and a3, which is also termed cytochrome oxidase.
This is the last complex of the chain and is involved in the transfer of two electrons from cytochrome c to molecular oxygen (O2) forming water.
In the meantime, four protons are translocated across the membrane aiding the proton gradient.
$4\ cytc\ c\ (Fe\ 2+) + O2 \rightarrow 4cytc\ c\ (Fe3+) + H2O$

Electron Transport Chain (ETC)

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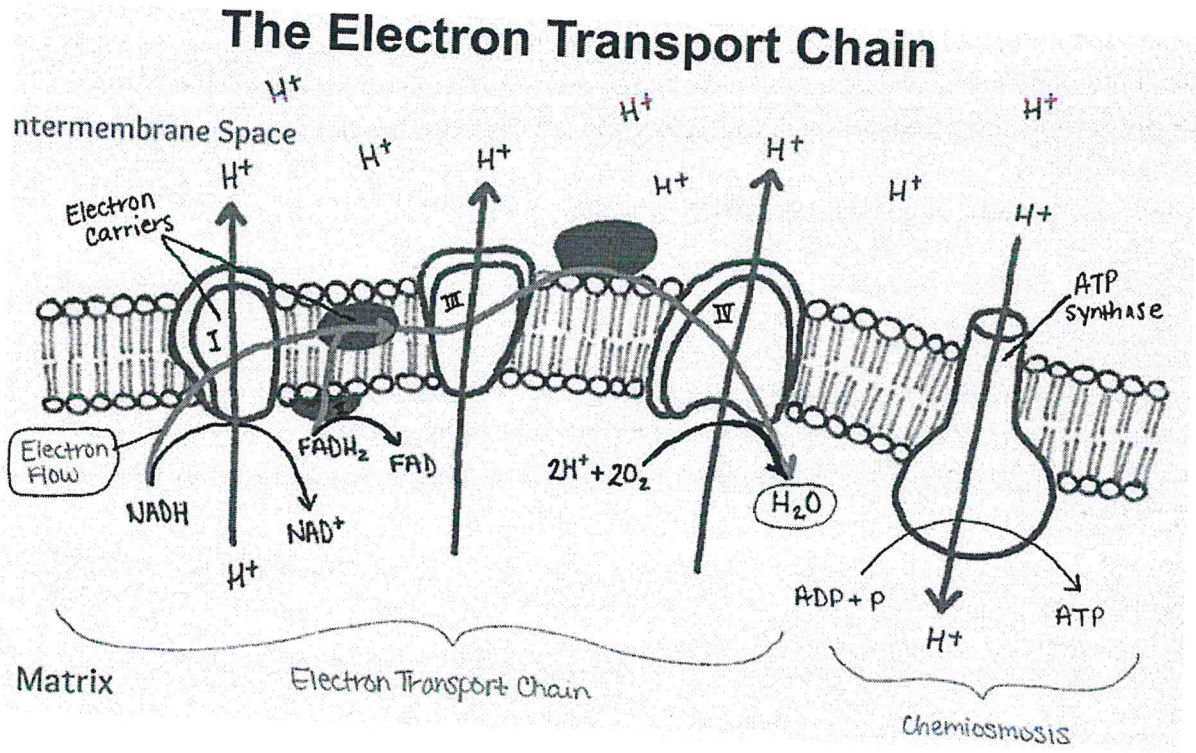

Electron Transport Chain Steps

The following steps are involved in electron transfer chains which involve the movement of electrons from NADH to molecular oxygen:

1. Transfer of electrons from NADH to Ubiquinone (UQ)

NADH is produced in different other cycles by the α-ketoglutarate dehydrogenase, isocitrate dehydrogenase, and malate dehydrogenase reactions of the TCA cycle, by the pyruvate dehydrogenase reaction that converts pyruvate to acetyl-CoA, by β-oxidation of fatty acids, and by other oxidation reactions.

NADH produced in the mitochondrial matrix is transferred into the intermembrane space.

The NADH then transfers the electrons to FMN present in the intermembrane space via the complex I (NADH dehydrogenase).

FMN then passes the electrons to the Fe-S center (one electron to one Fe-S center) which then transfers the electrons, one at a time to CoQ forming semiquinone and then ubiquinol.

The electron transfer creates energy which is used to pump two protons across the membrane creating a potential gradient.

The protons move back to the matrix through the pore in the ATP synthase complex, forming energy in the form of ATP.

2. Transfer of electrons from FADH2 to CoQ

The oxidation of succinate to fumarate results in the reduction of FAD to FADH2.

The electrons from FADH2 enter the electron transport chain catalyzed by complex II, succinic dehydrogenase.
Like in complex I, the electrons reach CoQ through a series of Fe-S centers.
However, complex II doesn't pump any protons across the membrane.
3. Transfer of electrons from CoQH2 to cytochrome c
The reduced CoQH2 transfer electrons through cytochrome b and c1 which finally reaches cytochrome c.
Complex II (cytochrome reductase) catalyzes this process where the Fe3+ present in the cytochrome is reduced to Fe2+.
Each cytochrome transfers one electron each and thus two molecules of cytochrome are reduced for the transfer of electrons for every NADH oxidized.
Energy is produced during the transfer of electrons which is utilized to pump protons across the membrane aiding to the potential gradient.
The protons move back to the matrix through the pore in the ATP synthase complex, forming energy in the form of ATP like in the first step.
4. Transfer of electrons from cytochrome c to molecular oxygen

The final step in the electron transfer chain is catalyzed by complex IV (cytochrome oxidase) where electrons are transferred from cytochrome c to molecular oxygen.
Since two electrons are required to reduce one molecule of oxygen to water, for each NADH oxidized half of oxygen is reduced to water.
Similarly, the Fe2+ of the cytochrome c is oxidized to Fe3+. The energy released during this process is used to pump protons across the membrane.
The transfer of protons back to the matrix results in the formation of ATP.

Electron Transport Chain Products
The end products of the electron transport chain are:

30-32 ATPs and 44 moles of H2O

Stage	Direct products (net)	Ultimate ATP yield (net)
Glycolysis	2 ATP	2 ATP
2 NADH		3-5 ATP
Pyruvate oxidation	2 NADH	5 ATP
Citric acid cycle	2 ATP/GTP	2 ATP
6 NADH		15 ATP
2 FADH2		3 ATP
Total		30-32 ATP

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DEPARTMENT OF BIOCHEMISTRY
UNIT TEST- I, FEBRUARY-2023

Class : I M.Sc., Biochemistry **Date: 03.03.2023**
Subject : Tissue Engineering **Time: 12.00AM to 1.00PM**
Subject Code : **Max. Mark: 25**

Section A (5 x 1 =5)
Answer any FIVE questions

CO1 BL6 1. Define growth.
CO1 BL2 2. Discuss Morphogenesis.
CO2 BL1 3. Write a note on elements of tissue engineering.
CO2 BL1 3. Differentiate between *in-vitro* and *in-vivo.*
CO2 BL1 5. Write about the haematopoietic stem cells.
CO3 BL1 6. Write any two applications of Bioartificial Liver.
CO5 BL1 7. Write the applications of liver dialysis unit?

Section B - (2 x 5 = 10)
Answer any TWO questions

CO4 BL6 8. Write short notes about the basis of Tissue engineering.
CO5 BL1 9. Enumerate the synthesis of tissue engineering scaffolds.
CO2 BL4 10. Write a short note on growth and differentiation.
CO2 BL1 11. Give a brief note on artificial womb.

Section C – (1 x 10 = 10)
Answer any ONE question

CO3 BL3 12. Enumerate and discuss about the different types of factors that facilitate the growth of tissues in tissue engineering.
CO2 BL2 13. Describe the several strategies for bone regeneration.

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DEPARTMENT OF BIOCHEMISTRY
UNIT TEST- I FEBRUARY-2023

Class : I M.Sc., Biochemistry **Date: 03.03.2023**
Subject : Tissue Engineering **Time: 12.00AM to 1.00PM**
Subject Code : **Max. Mark: 25**

Answer Key

Section A (5 x 1 =5)
Answer any FIVE questions

1. **Define growth.**
   - **Cell growth** is described as a process of **permanent increase in size** and **mass.** It resulted in the formation of the synthesis of specific cell components. The process of cell growth is slightly different in plants compared to animals. Both plants and animals grow via two key processes during cell growth:
   - **Cell division** - mitosis. & **Cell differentiation** - development of specialized features creating specialized.
   - **Body tissues grow** by increasing the number of cells that make them up. Cells in many tissues in the body divide and grow very quickly until we become adults. When we are adults, many cells mature and become specialized for their particular job in the body.

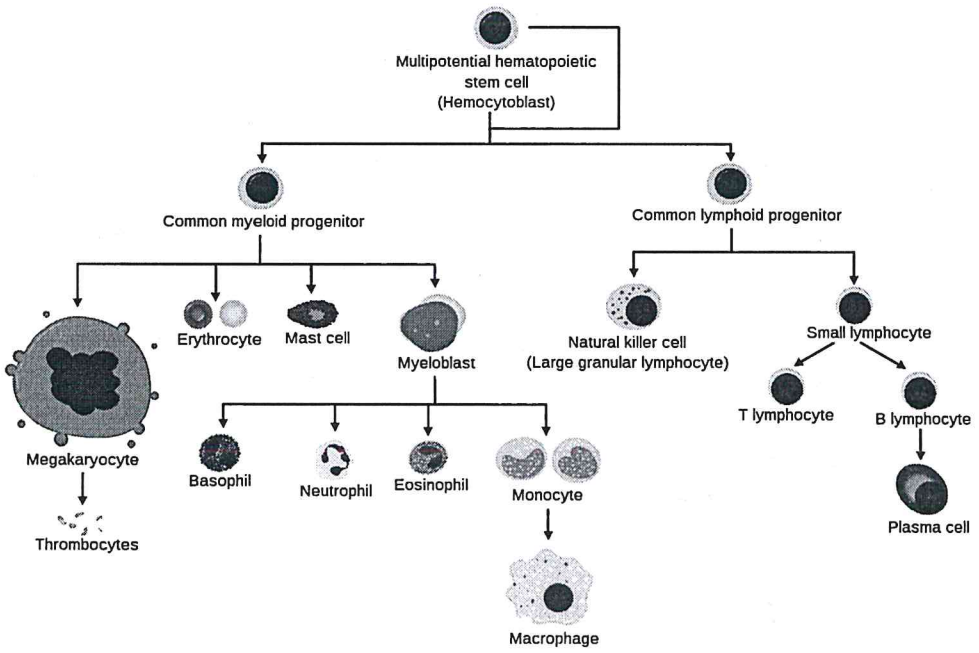
2. **Discuss Morphogenesis.**
   - Morphogenesis is a **biological process** that causes **a tissue or organ to develop** its shape by controlling the spatial distribution of cells during embryonic development.
   - Morphogenesis (from the Greek morphe **shape** and genesis **creation**, literally beginning of the shape) is the biological process that causes an organism to develop its shape.
   - **Fundamental Process of Morphogenesis:** Formation and shaping of an organism through embryonic processes. This includes the differentiation of cells, tissues and organs. Development of organ systems according to genetic **"blueprints"** based on potential organism and environmental conditions.
   - This process controls the organized spatial distribution of cells during the **embryonic development of an organism**. It is one of three fundamental aspects of developmental biology with the control of Cell growth and Cellular differentiation. Morphogenesis can also occur in the **mature organism**. Cancer is an example of highly abnormal and pathological tissue morphogenesis. Morphogenesis also describes the development of **unicellular organism,** that do not have an embryonic stage in their life cycle.

3. **Write a note on elements of tissue engineering.**
   - Start building material (e.g. extracellular matrix biodegradable polymer).
   - Shape it as needed.

- Seed it with living cells
- Bathe it with growth factors.
- Cells multiply and fill up the scaffold and grow into three-dimensional tissue.
- Implanted in the body.
- Cells recreate their intended tissue functions.
- Blood vessels attach themselves to the new tissue.
- The scaffold dissolves
- The newly grown tissue eventually blends in with its surroundings.

4. **Differentiate between *in-vitro* and *in-vivo*.**
   - **In vivo refers to when research or work is done with or within an entire, living organism**. Examples can include studies in animal models or human clinical trials. In vitro is used to describe work that's performed outside of a living organism.
   - *In vitro*, *in vivo*, and *in silico* are the three types of experimental models used in biological science laboratories. The **main difference** between *in vitro* and *in vivo* is that *in vitro* **refers to the experimental procedures performed outside a living organism whereas** *in vivo* **refers to the experimental procedures performed within a living organism**. *In silico* refers to the experiments performed on the computer. *In vivo* experiments are performed under physiological conditions while *in vitro* experiments are performed under controlled laboratory conditions.

5. **Write about the haematopoietic stem cells.**
   - An immature cell that can develop into all types of blood cells, including white blood cells, red blood cells, and platelets. Hematopoietic stem cells are found in the peripheral blood and the bone marrow. Also called blood stem cell.



6. CO3 BL1 6. Write any two applications of Bioartificial Liver.

Bioartificial Liver: Beneficial to patients, improvement of clinical and biochemical parameters, significant survival improvement in animal studies and subpopulation of human Acute Liver Failure.

7. CO5 BL1 7. Write the applications of liver dialysis unit?

A liver support system or diachysis is a type of therapeutic device to assist in performing the functions of the liver. Such systems focus either on removing the accumulating toxins (liver dialysis), or providing additional replacement of the metabolic functions of the liver through the inclusion of hepatocytes to the device (bioartificial liver device). Liver dialysis has shown promise for patients with hepatorenal syndrome. It is similar to hemodialysis and based on the same principles, but hemodialysis does not remove toxins bound to albumin that accumulate in liver failure. Like a bioartificial liver device, it is a form of artificial extracorporeal liver support.

Section B - (2 x 5 = 10)
Answer any TWO questions

8. **Write short notes about the basis of Tissue engineering.**

- The biochemical basis of cell differentiation is the cell's synthesis of a specific set of **proteins, carbohydrates** and **lipids**. This synthesis is catalyzed by proteins called **enzymes**. Many cells undergo growth in response to normal **(physiological)** or abnormal **(pathological)** stimuli. During this process of cell growth and differentiation, the cells are divided and change their **functional or phenotypic characteristics**. the cell differentiates itself from its parental cell by a **specific observable morphology or function**. Which is distinguishes from its parental cells. the cell changes from one cell type to another. Most commonly this is a **less specialized** type **becoming a more specialized** type.

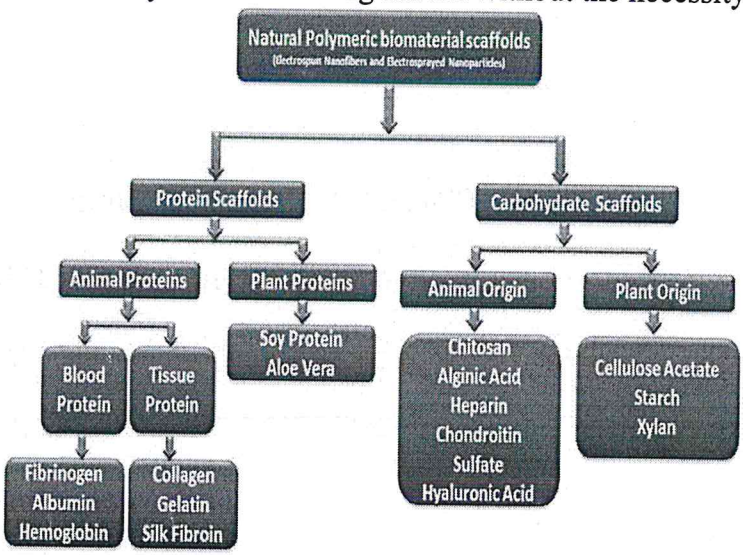
- Cell differentiation occurs numerous times during the development of a multicellular organism as it changes from a simple zygote to **a complex system or tissues and cell types**. All cells presumably derive from **stem cells** and obtain their functions as they mature. Cellular composition is often modeled as a **hierarchical scheme** with stem cells at the top of the hierarchy.

- Multicellular organisms are composed of a large number of cells. These are specialized to **carry out specific roles in the body**. It is the process by which unspecialized cells become altered and adapted to form a **special function in the body**. Differentiation is the process by which the cells become specialized and take on a **specific role in an organism**.

- During human development, a single cell (a fertilized egg) differentiates into every different kind of specialized cell type found in the body, **including blood, muscle**, and **nerve cells**. Each human life begins life as a fertilized egg (Zygote)

and divides to become approximately **37.2 trillion** (37 200 000 000 000) with almost **200 different cell types**.

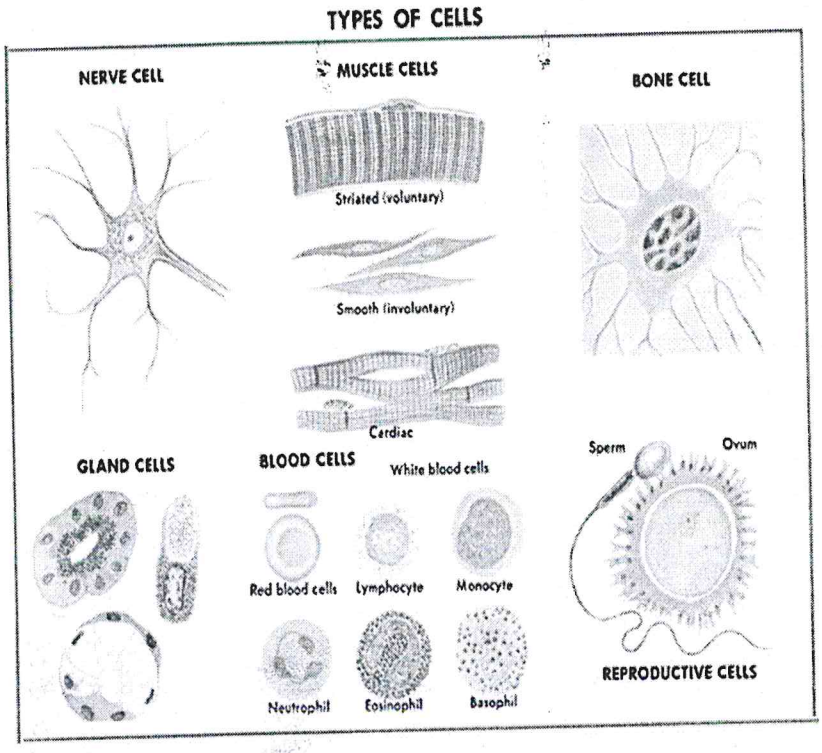
9. **Enumerate the synthesis of tissue engineering scaffolds.**
   - Cells are often implanted or seeded into an artificial structure capable of supporting 3D tissue formation. These structures, typically called scaffolds. Scaffolds usually serve at least one of the following purposes. Allow cell attachment and migration. Deliver and retain cells and biochemical factors Enable diffusion of viral cell nutrients and expressed products. Exert certain mechanical and biological influences to modify the behavior of the cell phase.
   - Scaffold is a support that allows the seeded cells to interact and establish into a new organ. It should be **biocompatible** and **biodegradable.** To achieve the goal of tissue reconstruction, scaffolds must meet some specific requirements. A high porosity and an adequate pore size are necessary to facilitate cell seeding and diffusion throughout the whole structure of both cells and nutrients.
   - Biodegradability is often an essential factor since scaffolds should preferably be absorbed by the surrounding tissues without the necessity of a surgical removal.
   -



10. **Write a short note on growth and differentiation.**
    - The biochemical basis of cell differentiation is the cell's synthesis of a specific set of proteins, carbohydrates and lipids. This synthesis is catalyzed by proteins called enzymes. Many cells undergo growth in response to normal (physiological) or abnormal (pathological) stimuli. During this process of cell growth and differentiation, the cells are divided and change their functional or phenotypic characteristics. the cell differentiates itself from its parental cell by a specific observable morphology or function. Which is distinguishes from its parental cells. the cell changes from one cell type to another. Most commonly this is a less specialized type becoming a more specialized type.

    - Cell differentiation occurs numerous times during the development of a multicellular organism as it changes from a simple zygote to a complex system or

tissues and cell types. All cells presumably derive from stem cells and obtain their functions as they mature. Cellular composition is often modeled as a hierarchical scheme with stem cells at the top of the hierarchy.



CO2 BL1 11. Give a brief note on artificial womb.

Introduction (1M)
Nutrition, oxygen supply and waste disposal (1M)
Uterine wall (1M)
Interface (artificial placenta) (1M)
Amniotic tank (artificial amniotic sac) (1M)

Section C – (1 x 10 = 10)
Answer any ONE question

12.Enumerate and discuss about the different types of factors that facilitate the growth of tissues in tissue engineering.

- **Growth factors:** Growth factors are a collective term originally referred to substances produced by the body that function to regulate cell division, to promote cell growth and cell survival. Growth factors are naturally occurring proteins in our bodies that promote the growth, organization and maintenance of cells and tissues, including the skin.
- They are essential for wound healing and skin repair. Some growth factors are also produced in the laboratory and used in biological therapy. Growth factors comprises

of molecules that function as growth stimulators but also as growth inhibitors (sometimes referred to as negative growth factors).

- **Growth factors that** stimulate **cell migration** or as **chemotactic agent** or inhibit **cell migration** or **invasion to tumor cells**, **Growth factors that** modulate **differentiated functions of cells**, factors involved **in apoptosis,** factors involved in **angiogenesis**, or factors that promote **survival of cells** without influencing growth and differentiation.

1. **Epidermal Growth Factor (EPG)**
2. **Platelet-Derived Growth Factor (PDGF)**
3. **Fibroblast Growth Factors (FGFs)**
4. **Transforming Growth Factors-b (TGFs-b)**
5. **Transforming Growth Factor-a (TGF-a)**
6. **Erythropoietin (Epo)**
7. **Insulin-Like Growth Factor-I (IGF-I)**
8. **Insulin-Like Growth Factor-II (IGF-II)**
9. **Interleukin-1 (IL-1)**
10. **Interleukin-2 (IL-2)**
11. **Interleukin-6 (IL-6)**
12. **Interleukin-8 (IL-8)**
13. **Tumor Necrosis Factor-a (TNF-a)**
14. **Tumor Necrosis Factor-b (TNF-b)**
15. **Interferon-g (INF-g)**
16. **Colony Stimulating Factors (CSFs)**

CO2 BL2 13. Describe the several strategies for bone regeneration.

Introduction Bone Biology: Structure and Composition (2M)
Composite Materials (2M)
Scaffold Functionalization (2M)
Bone Regeneration: Replacement and Tissue Engineering (2M)
Bone Regeneration: Cellular Component (2M)

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SRM ARTS AND SCIENCE COLLEGE, KATTANKULATHUR

DEPARTMENT OF BIOCHEMISTRY

UNIT TEST- I, FEBRUARY- 2023

Class : **II M.Sc., Biochemistry** **Date** : **27.02.2023**

Subject : **Hormones** **Time** : **12 to 1.00 PM**

Subject Code : **MEN4A** **Max. Mark: 25**

PART A – (5 X 1 = 5 Marks)

Answer any FIVE questions

CO.1 BL: 1 1. List out the hormone secreted from the anterior lobe of pituitary gland.

CO.1 BL: 1 2. Examine the Melanocyte stimulating hormone.

CO.1 BL: 1 3. Quote the Lactogenic hormones.

CO.1 BL: 1 4. State the mechanism of hormone action based on hydrophilic and lipophilic molecules.

CO.2 BL: 1 5. Define gastrin.

CO.2 BL: 2 6. Discuss glucagon is also known as anti-insulin hormone?

CO.2 BL: 6 7. Write about islets of langerhans.

PART B – (2 X 5 = 10 Marks)

Answer any ONE question

CO.6 BL: 6 8. Write short notes on biochemical functions, and pathophysiology of Growth hormone.

CO.1 BL: 1 9. Enumerate the positive feedback and negative feedback mechanisms of hormone actions.

CO.2 BL: 1 10. Enumerate the structure and functions of somatostatin

CO.2 BL: 6 11. Write short notes on biochemical functions, and pathophysiology of insulin.

PART C – (1 X 10 = 10 Marks)

Answer any ONE question

CO.1 BL: 4 12. Explain in detail about the classification of hormones.

CO.3 BL: 4 13. Explain about GI hormones.

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DEPARTMENT OF BIOCHEMISTRY
Unit Test I FEBRUARY-2023

Class : **II M.Sc., Biochemistry** **Date** : **27.02.2023**

Subject : **Hormones** **Time** : **12 to 1.00 PM**

Subject Code : **MEN4A** **Max. Mark: 25**

Answer Key

Section A (5 x 2 =10)
Answer any FIVE questions

1. **List out the hormone secreted from the anterior lobe of pituitary gland.**
   - Anterior lobe is the largest and shares about 70% of the total weight of hypophysis. It originates from an embryonic invagination of the pharangeal epithelium called **rathke's pouch.** It consists of glandular epithelial cells of varying shapes and sizes, this tissue is composed of irregular clumps of secretary cells supported by fine connective tissue fiber and surrounded by a rich vascular network.
   - Based on histological staining techniques **3 types of cells** may be differentiated.
     i. **Acidophil (or) α-cells:**
        1. Stained strongly with acidic dyes (acid fuchsine)
        2. Secrete **growth hormone** and **prolactin.**
     ii. **Basophils (or) β-cells**:
        1. Stained strongly with basic dyes (aniline blue).
        2. Secrete **luteinizing hormone, follicle stimulating hormone** and **thyroid stimulation hormone.**
     iii. **Neutrophils or chromophobe cells:**
        1. Do not stained with either
        2. Believed to secrete **adrenocortico tropic hormone.**

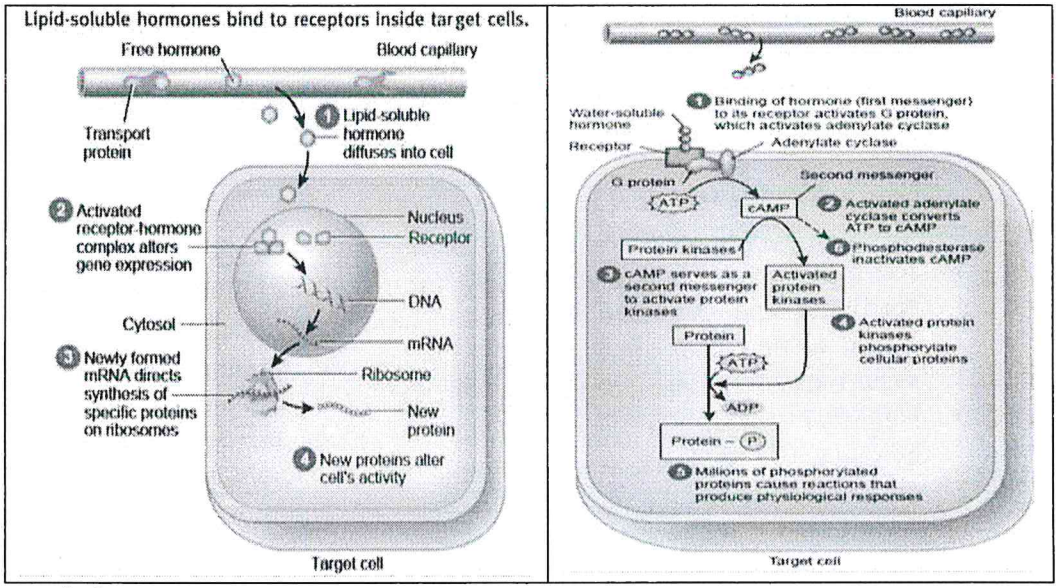
2. **Examine the Melanocyte stimulating hormone?**
   - Pars intermediate or middle lobes of pituitary gland secrete Melanocyte stimulating hormone (MSH). Three different MSH molecules α, β, and γ are contained with POMC among these α and β are non-human and γ or βLβH or αMSH are human species. Pars intermedia secrete two types of melanocytes stimulating hormones (MSH) namely. α-MSH - 13 amino acids residues. β-MSH - 18 amino acids residues. MSH-Stimulate melanogenesis by the dispersion of intracellular melanin granules resulting in darkening of the skin.
   - MSH affect pigment dispersion in the melanophorea of lower vertebrates, thus being responsible for producing characteristic colour patterns.
   - Patients with insufficient production of glucocorticoids have hyperpigmentation associated with increased plasma MSH activity addison's disease.

3. **Quote the Lactogenic hormones?**

- Secreted by lactotropes, acidophilic cells in the anterior pituitary gland during the last few days of pregnancy and during the entire period of milk production (lactation) in women after the birth of the baby.
- **Biochemical functions:** In association with estrogen, LTH promotes growth of the mammary gland and induces secretion of milk (lactation), at the time of child birth. It starts only after parturition and expulsion of placenta, the release of milk from breast is primed. Hence it is also called as **lactogenic hormone.**
- **LTH** influences the development of the corpus luteum in the ovary and stimulate the production progesterone in female. Hence called as **luteotropic hormone.**
- In pigeons it stimulates enlargement of corps glands and formation of milk (crop sac milk production in birds). In some birds, LTH promotes nesting behavior in both sexes. **Prolactin** has an influencing role in changing the maternal behavior that is essential for the survival of helpless newborn.
- **Pathophysiology:** Tumors of PRL cause Amenoraohoea (cessation of menses). Galactorrhaea (milk discharge in women). It also stimulates glucose uptake and lipogenesis. Along with androgens it causes the development of secondary male sex character. Excessive PRL has been associated with Gynecomastia (breast enlargement) and Impotence in man (deficiency or lack of erection of penies).

4. State the mechanism of hormone action based on hydrophilic (water soluble) and lipophilic (poorly soluble in water) hormones.

- The hormones fall into two general classes based on their solubility in water.
- **Hydrophilic Hormone:** (Water soluble hormone).
    - They are transported simply dissolved in blood.
    - **Examples:** Catecholamine (epinephrine & norepinephrine) & peptide/protein hormones.
- **Lipophilic Hormone:** (They are poorly soluble in water hormone).
    - They cannot be dissolved in the blood. They bind to plasma protein and remain in the blood in a protein-bound form. They are lipid soluble.
    - **Examples:** Thyroid hormone, steroid hormone & vitamin D_3



5. Define gastrin?

- Gastrin is a peptide hormone primarily responsible for enhancing gastric mucosal growth, gastric motility, and secretion of hydrochloric acid (HCl) into the stomach. It is present in G cells of the gastric antrum and duodenum.
- Normal values are generally less than 100 pg/mL (48.1 pmol/L). Normal value ranges may vary slightly among different laboratories.

6. Why glucagon is also known as anti-insulin hormone?

- Glucagon works to counterbalance the actions of insulin. About four to six hours after you eat, the glucose levels in your blood decrease, triggering your pancreas to produce glucagon. This hormone signals your liver and muscle cells to change the stored glycogen back into glucose.

7. What are islets of Langerhans?

- The islets of Langerhans are a cluster of cells within the pancreas that are responsible for the production and release of hormones that regulate glucose levels.

Section B (1 x 5 = 10)

Answer any ONE question

8. Write short notes on biochemical functions, and pathophysiology of Growth hormone.

- It is secreted by somatotrope (acidophilic cells). It is most abundant cells in anterior pituitary gland.
- Biochemical functions include, Growth and development, Lipid metabolism, Protein synthesis, Carbohydrate metabolism and stimulates mineral metabolism.
- Pathophysiology, **Hyper secretion (Hyperpituitarism):** If the secretion of this hormone increases during **early life**, it produces abnormal growth of bones, resulting in abnormal increase in height or length of the body, the condition is

called **Gigantism.** In adults excessive production of this hormone leads to **acromegaly.**

- **Hypo secretion (Hypopituitarism);** If the secretion of this hormone is decreased during early life, it leads into cessation of growth and results in **dwarfism.**

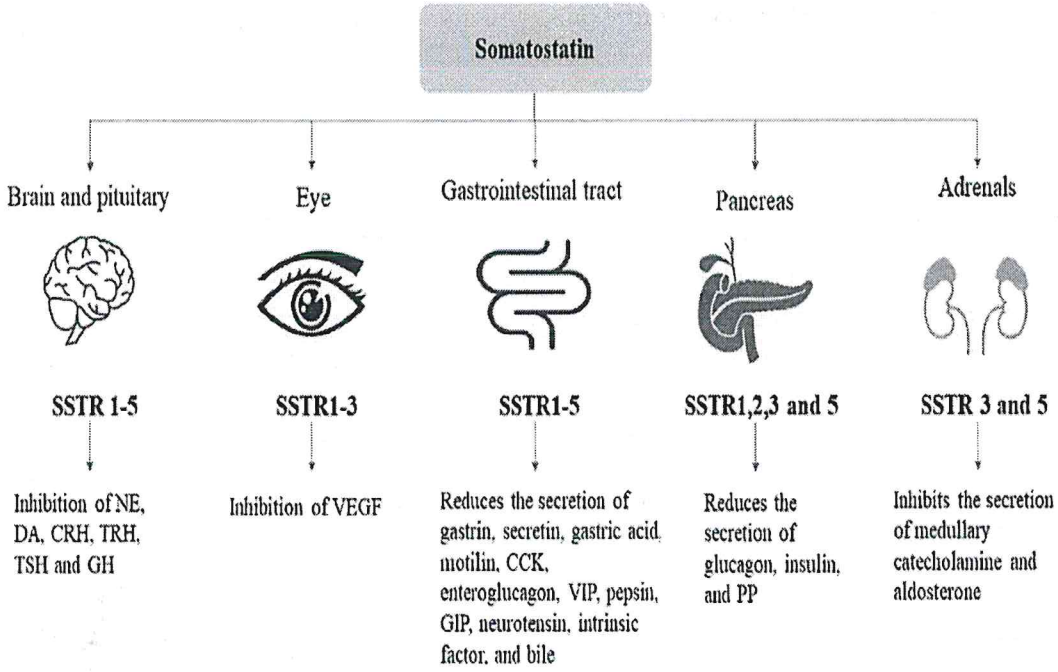
9. Enumerate the positive feedback and negative feedback mechanisms of hormone actions.

- Feedback systems are classified into two different types namely **positive feedback** and **negative feedback**. These terms positive and negative are not meant to denote a good or bad response, but rather the types of response the system has to the presence of the effector.
- **Negative feedback:** The secretion of most of the hormones is regulated by **negative feedback.** It means that some consequence of hormone secretion acts directly or indirectly on the secretory cell in a negative way to inhibit further secretion.
- In negative feedback systems, the effector of a process reduces the effect of the stimulus, which in turn decreases the output of the product. It is a very common process in living systems because it helps organisms maintain homeostasis in an optimal internal environment.
- Many different key parameters of living things are **temperature, pH,** and **hormone levels** for example must stay within a particular range for those organisms to thrive.
- **Positive feedback:** In positive feedback systems, the effector of a process bolsters the stimulus, which increases the production of the product. Positive feedback means that some consequence of hormonal secretion acts on the secretory cells to provide augmented (increased) drive for secretion.

Rather than being self-limiting, as with negative feedback, the drive for secretion becomes progressively more intense. Positive feedback systems are unusual in biology because they terminate with some cataclysmic (dreadful), explosive event. Example, Blood clotting in living things, and Process of labor and child birth in mammals.

10.Describe the structure and functions of somatostatin.

- Somatostatin is a hormone produced by many tissues in the body, principally in the nervous and digestive systems.
- It regulates a wide variety of physiological functions and inhibits the secretion of other hormones, the activity of the gastrointestinal tract and the rapid reproduction of normal and tumour cells.



11. Write short notes on biochemical functions, and pathophysiology of insulin.

The major purpose of insulin is to regulate the body's energy supply by balancing micronutrient levels during the fed state

Insulin is critical for transporting intracellular glucose to insulin-dependent cells/tissues, such as liver, muscle, and adipose tissue

Insulin is the pivotal hormone regulating cellular energy supply and macronutrient balance, directing anabolic processes of the fed state.

Insulin is essential for the intra-cellular transport of glucose into insulin-dependent tissues such as muscle and adipose tissue.

Insulin enables glucose to enter cells in the body, particularly muscle and liver cells. Here, insulin and other hormones direct whether glucose will be burned for energy or stored for future use.

When insulin levels are high, the liver stops producing glucose and stores it in other forms until the body needs it again.

Section C (1 x 10 = 10)

Answer any ONE question

12. Explain in detail about the classification of hormones

- Hormones are classified into five categories based on highlight the following points they are

1. **Steroid Hormones:** These are made up of lipids, which basically derived from cholesterol, e.g. Testosterone, Estrogen, Progesterone etc.
2. **Amine Hormones:** These hormones are made up of amines. Amine hormone is derivative of the amino acid tyrosine. e.g. T_3, T_4, epinephrine, norepinephrine.
3. **Peptide Hormones:** These hormones are made up of few amino acid residues only and present as simple linear chain. e.g. Oxytocin and vasopressin both consist of only 9-amino acid residues only.

4. **Protein Hormones:** These hormones are also made amino acid residues which are much more in numbers. They represent primary, secondary and tertiary configuration. e.g. Insulin, glucagon, STH etc.
5. **Glycoprotein Hormones:** These hormones are glycoprotein in nature. They are conjugated protein where carbohydrate groups are mannose, galactose, fucose etc.e.g. LH, FSH, TSH etc.

1. **Eicosanoids Hormones:** The eicosanoids are small fatty acid derivatives with a variety of arachidonic acid. e.g. Prostaglandins.

13. Write a note on Gastro intestinal hormones.

- The gastrointestinal hormones can be divided into three main groups based upon their chemical structure.
    - Gastrin–cholecystokinin family: gastrin and cholecystokinin.
    - Secretin family: secretin, glucagon, vasoactive intestinal peptide and gastric inhibitory peptide.
    - Somatostatin family.
    - Motilin family.
    - Substance P.

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DEPARTMENT OF BIOCHEMISTRY
UNIT TEST-I FEBRUARY- 2023

CLASS: II M.Sc., **DATE: 28.02.2023**
SUB: CLINICAL BIOCHEMISTRY-II **Time:** 12 to 1.00 PM
SUB CODE: MEN4B **MAX MARKS: 25**

PART-A (5X1=5 Marks)
Answer any **FIVE** questions.

CO2 BL 6:1. Write the clinical significance of γ-GT.
CO2 BL 6:2. Write the normal level of aspartate transaminase and alanine transaminase.
CO2 BL 1:3. Name any two enzymes used as therapeutic agents.
CO2 BL 1:4. State about essential fructosuria.
CO3 BL 6:5. Write the cause of Maple Syrup Urine disease. Why is it called so?
CO3 BL 1:6. Name the metabolic defects of phenyl alanine hydroxylase?
CO1 BL1:7. Enumerate the deficient enzyme of Van Gierke's Disease.

PART-B (2X5=10 Marks)
Answer any **TWO** questions.

CO2 BL2:8. Summarize the clinical significance of isoenzymes of LDH.
CO3 BL2:9. Discuss about the salient features, diagnosis, and treatment of galactosemia.
CO3 BL2:10. Describe the causes, signs, and symptoms of alkaptonuria.
CO3 BL6:11. Write about phenyl ketonuria.

PART-C (1x10=10 Marks)
Answer any **ONE** question.

CO3 BL6:12. Write in detail about glycogen storage diseases.
CO2 BL3:13. Illustrate the enzyme pattern in myocardial infarction and liver disease.

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DEPARTMENT OF BIOCHEMISTRY
UNIT TEST-I JANUARY2023

CLASS: II MSc
SUB: CLINICAL BIOCHEMISTRY-II **TIME:1 HOUR**
SUB CODE: MEN4B **MAX MARKS: 25**

ANSWER KEY
PART-A (5X1=5 Marks)
Answer any FIVE questions.

1. Write the clinical significance of γ-GT.

A gamma-glutamyl transferase (GGT) test **measures the amount of GGT in the blood.** GGT is an enzyme found throughout the body, but it is mostly found in the liver. When the liver is damaged, GGT may leak into the bloodstream.

GGT test is most often used to:

- Help diagnose liver disease.
- Figure out if liver damage is due to liver disease or a bone disorder
- Check for blockages in the bile ducts.
- Screen for or monitor alcohol use disorder &drug abuse.

2. Write the normal level of aspartate transaminase and alanine transaminase.

The normal range of aspartate transaminase is 8 to 33 U/L.

alanine transaminase is 7-56 U /L

3. Name any two enzymes used as therapeutic agents.

Enzymes used as therapeutic agents are cytochrome oxidase, creatine kinase, streptokinase, urokinase, trypsin, chymotrypsin, and serratiopeptidase

4. State about essential fructosuria.

Essential Fructosuria is characterized by the presence of fructose in the urine after ingesting fructose. It arises as a result of a deficiency of the hepatic enzyme fructokinase and is an autosomal recessive genetic disorder.

5. Write the cause of Maple Syrup Urine disease. Why it is called so?

- Deficiency of branched chain amino acids
- Urine of the patient smells like maple syrup.

6. What are the metabolic defects of phenyl alanine hydroxylase?

- Phenyl ketonuria; phenyl alaninemia

7. Enumerate the deficient enzyme of Van Gierke's Disease.

Answer any **TWO** questions.

8. Summarize the clinical significance of isoenzymes of LDH.

An LDH isoenzymes test is used **to find out the location, type, and severity of tissue damage**. It can help diagnose a number of different conditions including recent heart attack. Anaemia.

LDH **serves as a general indicator of acute and chronic diseases**. Elevation in serum LDH activity follows isoenzyme patterns that are characteristic of various diseases. LDH increase can serve as a prognostic marker of cancer progression for different types of cancer.
LDH exists as five isozymes, **LDH-1 through LDH-5**, each composed of four subunits. Differential LDH isozyme levels are used diagnostically. Isozyme LDH-1 (4H) has four heart subunits and is the major isozyme in heart.

The quantification of LDH is of clinical interest as a serum concentration of LDH isozymes reflect tissue-specific pathological conditions. Hence, LDH can be used as a marker for diverse tissue injuries owing to its isozyme form, and its ubiquitous presence. Upon tissue damage, the cells release LDH in the bloodstream. Depending upon the type of tissue injury, the enzyme can remain elevated for up to 7 days in the bloodstream. The elevated LDH in serum as a result of organ destruction occurs due to significant cell death that results in loss of cytoplasm. Causes of tissue damage can be diseases such as acute myocardial infarction, anemia, pulmonary embolism, hepatitis, acute renal failure, etc. LDH can be used as a satisfactory marker for the staging of a disease (S-classification), monitor prognosis or response to treatment, and evaluate body fluids other than blood. The decrease in LDH levels during treatment is indicative of a better prognosis and/or good response to treatment in conditions such as acute myocardial infarction or liver injury. In acute myocardial infarction, LDH-1 isozyme remains elevated from the second day up to the 4th day. Similarly, in liver injury, LDH-5 is elevated. A significant increase in LDH-5 higher than LDH-4 is a marker of hepatocellular injuries such as hepatitis or cirrhosis.

LDH serves as a general indicator of acute and chronic diseases. Elevation in serum LDH activity follows isoenzyme patterns that are characteristic of various diseases.

- LDH increase can serve as a prognostic marker of cancer progression for different types of cancer. LDH also serves as one of the important diagnostic markers of cutaneous lymphoma. The concentration of LDH-5 is demonstrated as a predictor of radiotherapy and chemotherapy response in cancer patients. LDH is useful in evaluating metastatic cancer patients. Contrarily, LDH-5 serves as a marker for radio-sensitization.

- The enzymes can function to monitor progressive conditions such as muscular dystrophy or HIV infection.

- In sports medicine, LDH potentially indicates muscle response to training, with an increase in skeletal and cardiac muscles after 3-5 hours of training.

- If LDH-1 is found to be greater than LDH-2, it indicates myocardial infarction, with a 'flipped' ratio of LDH-1/LDH-2 greater than 1. The increase in LDH persists for

Causes:Alkaptonuria is caused by mutation of the homogentisate 1,2-dioxygenase (HGD) gene. The HGD gene contains instructions for creating (encoding) an enzyme known as homogentisate 1,2-dioxygenase. This enzyme is essential for the breakdown of homogentisic acid.

Symptoms: Alkaptonuria is an inherited condition that causes urine to turn black when exposed to air. The three major features of Alkaptonuria are the presence of dark urine, ochronosis, a buildup of dark pigment in connective tissues such as cartilage and skin, and arthritis of the spine and larger joints

11.Short note on phenyl ketonuria

Clinical significance& symptoms (2marks), Types-2marks, Diagnosis&treatment-1 mark

. Phenylketonuria (PKU) is the most common metabolic disorder in amino acid metabolism The incidence of PKU is 1 in 10,000 birth due to the deficiency of the hepatic enzyme, phenylalanine hydroxylase caused by an autosomal recessive gene This enzyme deficiency impairs the synthesis of tetrahydrobiopterin required for the action of phenylalanine hydroxylase. The net outcome in PKU is that phenylalanine is not converted to tyrosine.

Phenylalanine metabolism in PKU 1 Phenylketonuria primarily causes the accumulation of phenylalanine in tissues and blood, and results in its increased excretion in urine. Due to disturbances in the routine metabolism, phenyl alanine is diverted to alternate pathways, resulting in the excessive production of phenylpyruvate, phenylacetate, phenyl lactates and phenyl glutamine. All these metabolites are excreted in urine in high concentration in PKUI Phenylacetate gives the urine a mousey odour.

Diagnosis /symptoms

Untreated phenylketonuria can lead to brain damage, intellectual disabilities, behavioural symptoms, or seizures.

Treatment consists of diet modifications.

Treatment includes a strict diet with limited protein.

PART-C (1x10=10 Marks)

Answer any **ONE** question.

12. Write in detail about glycogen storage diseases

Glycogen storage diseases are a group of disorders characterized as the name states by the accumulation of Glycogen in various tissues. Glycogen is a branched chain polymer of glucose and is one of the dynamic sources of glucose storage in muscle and liver. This is the natural pattern but when there is excessive storage of glycogen in these tissues due to enzyme deficiencies it will manifest with clinical symptoms and signs that is associated within these two main storage areas.Glycogen storage disease type I

Type I glycogen storage disease (GSD I) is the commonest most severe childhood form and typically presents in early infancy.GSD I is inherited as an autosomal recessive condition and although there are no accurate estimates of the incidence for GSD I, for the GSDs as a group it is approximately one in 20,000 infants.

approximately ten days. It increases at 12 hours and peaks at 24-48 hours. A very high level thus indicates acute myocardial infarction.

- Greater than a 50 times increase in LDH-1 and LDH-2 indicates megaloblastic anemia.
- Increased LDH-5 in serum is a marker for muscular dystrophy.
- Ten times increase in serum LDH indicates toxic hepatitis with jaundice.
- An increase in LDH-3 is associated with the massive destruction of platelets as in pulmonary embolism.

- LDH is used to assess the nature, or pathological accumulation of pleural, peritoneal, or pericardial fluids. Serum LDH, compared to serous fluid LDH, helps in distinguishing exudate from transudate effusions.
- In patients with non-seminomatous testicular cancer LDH is used as a staging (S classification) marker.
- Abnormally low levels of LDH are very rare and usually not considered harmful.

9. What is galactosemia? Discuss its salient features, diagnosis, and treatment.

Definition (1 mark), enzyme defect (1 mark), inheritance (1 mark), clinical significance, signs &symptoms (2 marks)

An inherited disorder in which there is inability to convert galactose to glucose in normal manner. Enzyme defects:

i. Galactose 1- p-uridyl transferase
ii. Galactokinase Inheritance: autosomal recessive.

Clinicallysignificance

. Infants appear normal at birth but later failure to thrive, becomes lethargic, may vomit,hypoglycemia.

. After 2 to 3 months liver may show fatty infiltration and lead to cirrhosis of liver.

. Excess of galactose in lens is reduced to galactitol by the enzyme aldose reductase.

. Excess of galactose inhibits glucose -6p-dehydrogenase leading to less NADPH which results to less of reduced glutathione.

Biochemical and urinary findings:

Increased blood galactose level,blood sugar level decreases (hypoglycemia)

Increased excretion of galactose in urine (galactosuria)

Prognosis: not fatal can survive to puberty and adulthood

10.Describe the causes, signs and symptoms of alkaptonuria.

Definition: Alkaptonuria, or black urine disease, is a very rare inherited disorder that prevents the body fully breaking down two protein building blocks (amino acids) called tyrosine and phenylalanine. It results in a build-up of a chemical called homogentisic acid in the body.

Causes:Alkaptonuria is caused by mutation of the homogentisate 1,2-dioxygenase (HGD) gene. The HGD gene contains instructions for creating (encoding) an enzyme known as homogentisate 1,2-dioxygenase. This enzyme is essential for the breakdown of homogentisic acid.

Symptoms: Alkaptonuria is an inherited condition that causes urine to turn black when exposed to air. The three major features of Alkaptonuria are the presence of dark urine, ochronosis, a buildup of dark pigment in connective tissues such as cartilage and skin, and arthritis of the spine and larger joints

11.Short note on phenyl ketonuria

Clinical significance& symptoms (2marks), Types-2marks, Diagnosis&treatment-1 mark

. Phenylketonuria (PKU) is the most common metabolic disorder in amino acid metabolism The incidence of PKU is 1 in 10,000 birth due to the deficiency of the hepatic enzyme, phenylalanine hydroxylase caused by an autosomal recessive gene This enzyme deficiency impairs the synthesis of tetrahydrobiopterin required for the action of phenylalanine hydroxylase. The net outcome in PKU is that phenylalanine is not converted to tyrosine.

Phenylalanine metabolism in PKU 1 Phenylketonuria primarily causes the accumulation of phenylalanine in tissues and blood, and results in its increased excretion in urine. Due to disturbances in the routine metabolism, phenyl alanine is diverted to alternate pathways, resulting in the excessive production of phenylpyruvate, phenylacetate, phenyl lactates and phenyl glutamine. All these metabolites are excreted in urine in high concentration in PKUI Phenylacetate gives the urine a mousey odour.

Diagnosis /symptoms

Untreated phenylketonuria can lead to brain damage, intellectual disabilities, behavioural symptoms, or seizures.

Treatment consists of diet modifications.

Treatment includes a strict diet with limited protein.

PART-C (1x10=10 Marks)

Answer any **ONE** question.

12. Write in detail about glycogen storage diseases

Glycogen storage diseases are a group of disorders characterized as the name states by the accumulation of Glycogen in various tissues. Glycogen is a branched chain polymer of glucose and is one of the dynamic sources of glucose storage in muscle and liver. This is the natural pattern but when there is excessive storage of glycogen in these tissues due to enzyme deficiencies it will manifest with clinical symptoms and signs that is associated within these two main storage areas.Glycogen storage disease type I

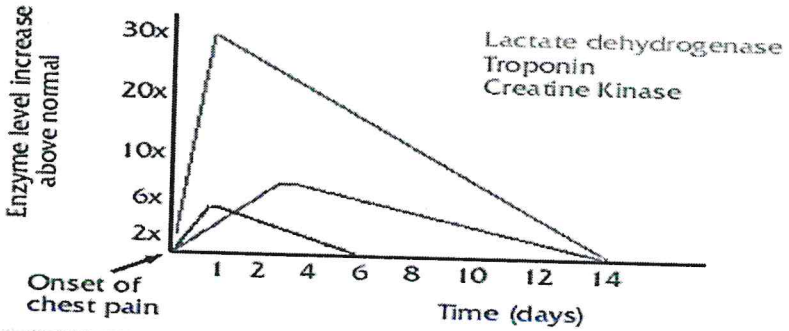
Type I glycogen storage disease (GSD I) is the commonest most severe childhood form and typically presents in early infancy.GSD I is inherited as an autosomal recessive condition and although there are no accurate estimates of the incidence for GSD I, for the GSDs as a group it is approximately one in 20,000 infants.

13.Illustrate the enzyme pattern in myocardial infarction and liver disease

Mention about CK -MB& CK total,SGOT, SGPT, LDH(7 **marks)** & compare the rise graphically after myocardial infarction.**(3 marks)**

Creatine kinase: Myocardial muscle creatine kinase (CK-MB) is found mainly in the heart.CK-MB levels increase within 3-12 hours of onset of chest pain, reach peak values within 24 hours, and return to baseline after 48-72 hours.

Cardiac enzyme changes with MI



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DEPARTMENT OF BIOCHEMISTRY
UNIT TEST-I FEBRUARY-2023

Class : II M.Sc., Biochemistry
Subject : Signal Transduction
Subject Code : MEN4A

Date: 01.03.2023
(12.00 to 1.00PM)
Max. Mark: 25

Section A (5 x 1 =5)
Answer any FIVE questions

CO6 BL6 1. Write about the secondary messenger?
CO3 BL2 2. Discuss about Ligand?
CO1 BL1 3. List out the different types of receptors binds the hormones?
CO4 BL2 4. Describe JAK-STAT signaling pathway.
CO4 BL6 5. Explain about NF-κB.
CO4 BL6 6. Explain the role of SOS in Ras mediated RTK pathway.
CO5 BL1 7. List out the ligands that activate nuclear receptor.

Section B - (2 x 5 = 10)
Answer any TWO questions

CO2 BL6 8. Write short notes on Receptors for Tyrosine kinase activity (RTKs).
CO5 BL1 9. Enumerate Phosphatidyl Inositol Signal Pathway.
CO4 BL2 10. How is the vision process dependent on G-protein coupled receptor?
CO5 BL6 11. Discuss about nuclear receptors based on its mechanism of action.

Section C – (1 x 10 = 10)
Answer any ONE question

CO3 BL4 12. Explain in detail about the cAMP-Dependent Pathway.
CO3 BL2 13. Describe the signaling through JAK-STAT pathway.

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Answer Key

Section A (5 x 1 =5)
Answer any FIVE questions

1. **Write about the secondary messenger?**
   - Second messengers are intracellular signaling molecules released by the cell in response to exposure to extracellular signaling molecules, the first messengers. Second messengers trigger physiological changes at cellular level such as proliferation, differentiation, migration, survival, apoptosis and depolarization.

2. **Discuss about Ligand?**
   - A ligand binds to a receptor, leading indirectly to activation of adenylyl cyclase, which converts ATP to cAMP. cAMP binds to protein kinase A and activates it, allowing PKA to phosphorylate downstream factors to produce a cellular response.

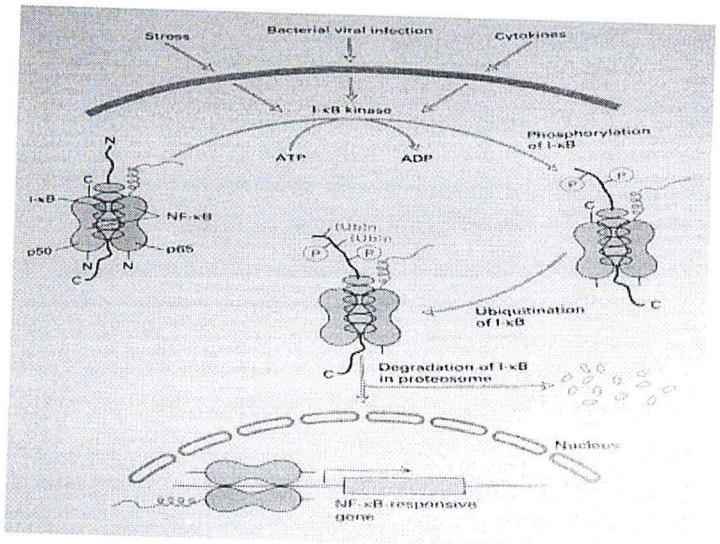
3. **List out the different types of receptors binds the hormones?**
   - Receptors can be roughly divided into two major classes: Intracellular receptors. Extracellular receptors.
   - Extra cellular receptors are integral transmembrane proteins and make up most receptors. They span the plasma membrane of the cell, with one part of the receptor on the outside of the cell and the other on the inside. Signal transduction occurs as a result of a ligand binding to the outside region of the receptor (the ligand does not pass through the membrane). Different types of Extracellular receptors are
     - G-Protein-coupled receptors
     - Receptors with kinase activity
     - Integrin receptors
     - Toll gate receptors.
     - Ligand-gated ion channel receptors.
   - Intracellular receptors are receptor proteins found on the inside of the cell, typically in the cytoplasm or nucleus. In most cases, the ligands of intracellular receptors are small, hydrophobic (water-hating) molecules, since they must be able to cross the plasma membrane in order to reach their receptors. Different types of Intra cellular receptors are
     - Progesterone.
     - Eicosanoid Receptor.
     - Glucocorticoid Receptor.
     - Steroid Hormone.
     - Glucocorticoids.

- Proteome.
- Ligand.

4. **Describe JAK-STAT signaling pathway.**
   - The **JAK-STAT** signalling pathway transmits information as chemical signals from outside the cells through the cell membrane, and promote gene expression on DNA in the cell nucleus, which results in DNA transcription and activation in the cell.
   - The JAK-STAT system is a major signalling alternative to the second messenger system and is an example of **nRTK.**
   - The JAK-STAT system consists of three main components they are as follows
   - **A receptor** (Green), which penetrates the cell membrane.
   - **Janus kinase** (JAK) (Yellow), which bound to the receptor.
   - **Signal Transducer & Activator of Transcription** (STAT) (Blue), which carries the signal into the nucleus and DNA.
   - Many **JAK-STAT** signalling pathways are expressed in white blood cells and are therefore involved in regulation of the immune system.

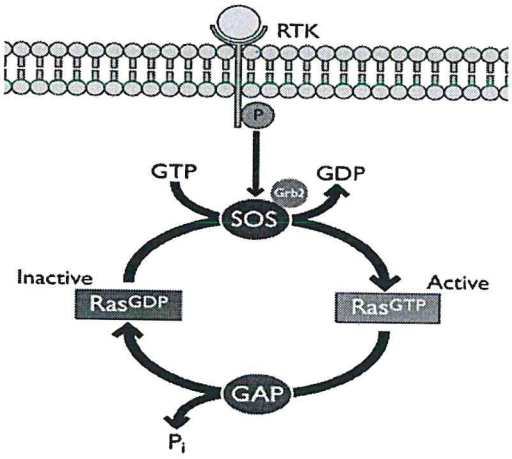
5. **Explain about NF-κB.**

Nuclear factor kappa B (NF-κB) is an ancient protein transcription factor (Salminen et al., 2008) and considered a regulator of innate immunity (Baltimore, 2009). The NF-κB signaling pathway links pathogenic signals and cellular danger signals thus organizing cellular resistance to invading pathogens.



6. **Explain the role of SOS in Ras mediated RTK pathway.**

The coupling of RTK to Ras is mediated by the Ras-specific nucleotide-exchange factor Son of Sevenless (Sos), which activates Ras by inducing the exchange of GDP for GTP .



7. List out the ligands that activate nuclear receptor.

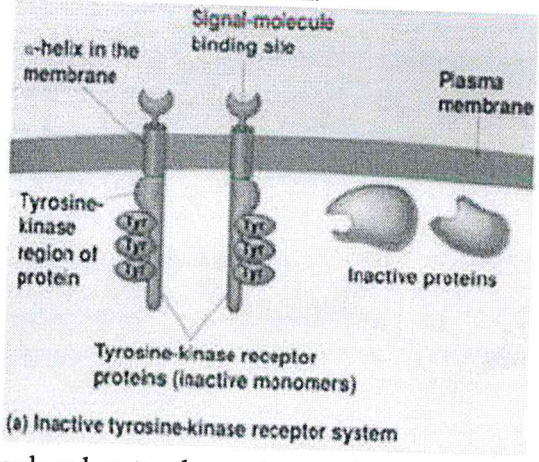
Ligands that bind to and activate nuclear receptors include lipophilic substances such as endogenous hormones, vitamins A and D, and xenobiotic hormones. Because the expression of a large number of genes is regulated by nuclear receptors, ligands that activate these receptors can have profound effects on the organism.

Section B - (2 x 5 = 10)
Answer any TWO questions

8.Write short notes on Receptors for Tyrosine kinase activity (RTKs).

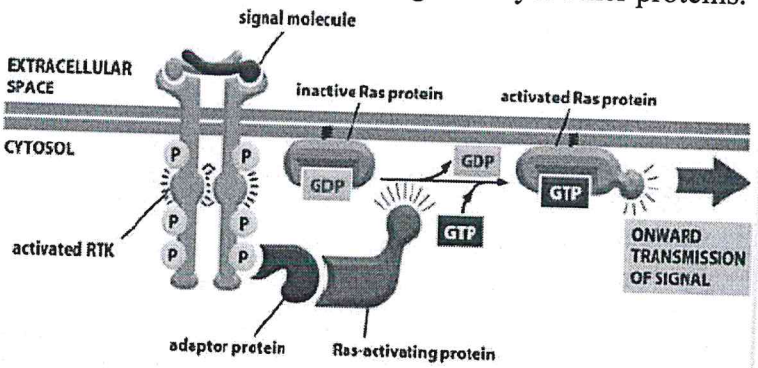
- They are high affinity cell surface receptor for many polypeptide **growth factors, cytokines,** and **hormones**. The receptor has a **tyrosine kinase activity.** The signal binding domain of the receptor tyrosine kinase is on the cell surface (transmembrane domain), while the **tyrosine kinase enzymatic activity** residues is in the cytoplasmic part of the proteins (non-transmembrane domain).
- A transmembrane alpha helix connects these two regions of the receptor. Receptor tyrosine kinases have been shown not only to be key regulators of normal cellular processes but also to have a critical role in the development and progression of many types of **cancer.**
- Mutations in receptor tyrosine kinases lead to activation of a series of signaling cascades which have numerous effects on protein expression. As is the case with G protein coupled receptors (GPCRs), proteins that bind GTP play a major role in signal transduction from the activated RTK into the cell.
- In the case, the G proteins they are members of the **Ras, Rho** and **Raf** families referred to collectively as **small G proteins.** The most important groups of signals that bind to receptor tyrosine kinases are

- **Peptide growth factors** like nerve growth factor (NGF) and epidermal growth factor (EGF). **Peptide hormone** like insulin.



(a) Inactive tyrosine-kinase receptor system

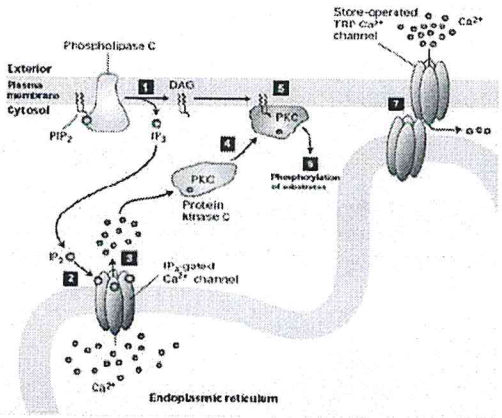
- Binding of signal molecules to the extracellular domains of receptor tyrosine kinase molecules causes two receptor molecules to **dimerize.** This brings the cytoplasmic tails of the receptors close to each other and causes the **tyrosine kinase** activity of these tails to be **turned on.**
- The activated tails then phosphorylate each other on several tyrosine residues. This is called **autophosphorylation.** The phosphorylation of tyrosine on the receptor tails triggers the **assembly of an intracellular signalling complex** on the tails. The newly phosphorylated tyrosine serves as binding sites for a variety of signalling proteins that then pass the message onto yet other proteins.



- An important protein that is subsequently activated by the signalling complexes on the **receptor tyrosine kinases** is called **RAS.** These protein kinases are members of a group called the **MAP kinases** (Mitogen Activated Protein Kinases).
- The final kinase in this cascade phosphorylates various target proteins, including **transcriptional activators** (eg, myc) that regulate gene expression. **RAS** is the most commonly mutated proto-oncogene in human tumours.
- Indeed, approximately 30% of all human tumours contain mutated versions of the **RAS gene,** and the frequency is even higher in some specific cancers (eg., colon and pancreatic adenocarcinomas).

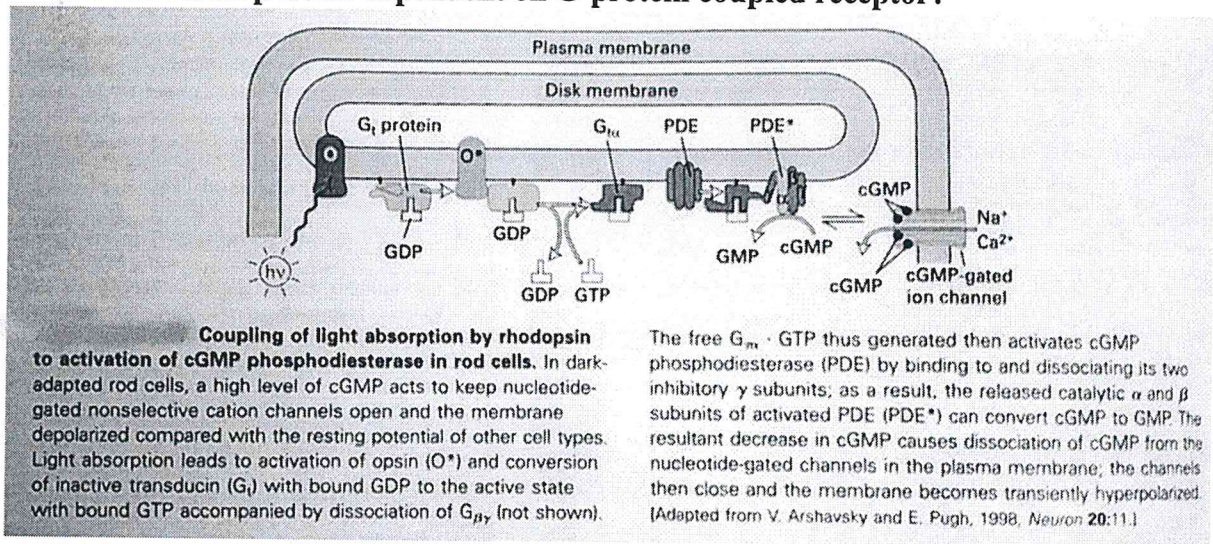
9. Enumerate Phosphatidyl Inositol Signal Pathway.

a. In the phosphatidylinositol signal pathway, the extracellular signal molecule binds with the G-protein receptor (Gp) on the cell surface and activates phospholipase C, which is located on the plasma membrane.
b. **IP_3** binds with the **IP_3 receptor** in the membrane of the smooth endoplasmic reticulum and mitochondria to open **Ca^{2+}** channels. Diacylglycerol **(DAG)** helps activate **protein kinase C (PKC),** which phosphorylates many other proteins, changing their catalytic activities, leading to cellular responses.



c. The effects of Ca^{2+} are also remarkable: It cooperates with DAG in activating PC and can activate the CaM kinase pathway, in which calcium-modulated protein calmodulin (CaM) binds Ca^{2+}, undergoes a change in conformation, and activates CaM kinase.
d. The kinase then phosphorylates target enzymes, regulating their activities. The two signal pathways are connected together by **Ca^{2+}-CaM**, which is also a regulatory subunit of adenylyl cyclase and phosphodiesterase in the cAMP signal pathway.

10. How is the vision process dependent on G-protein coupled receptor?

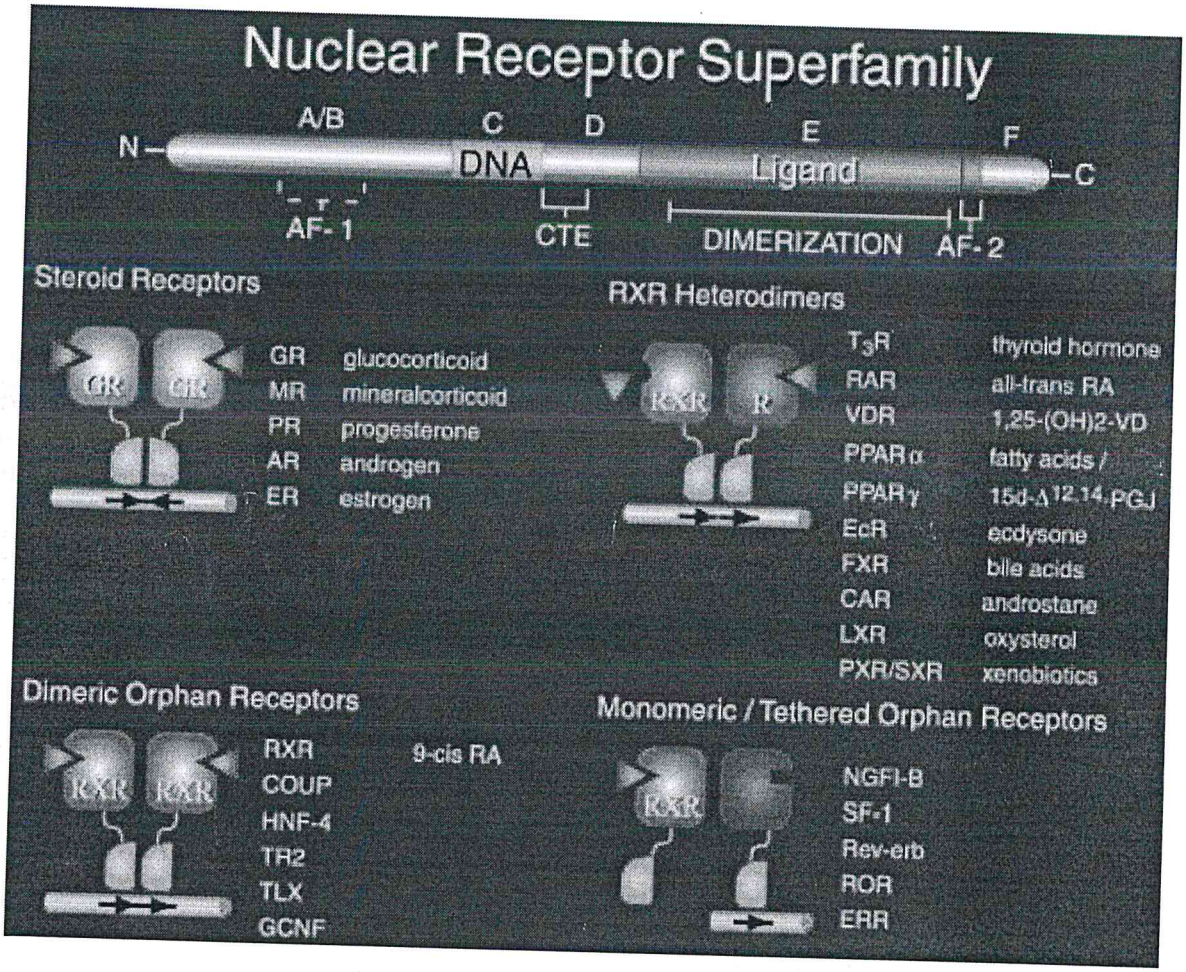


Coupling of light absorption by rhodopsin to activation of cGMP phosphodiesterase in rod cells. In dark-adapted rod cells, a high level of cGMP acts to keep nucleotide-gated nonselective cation channels open and the membrane depolarized compared with the resting potential of other cell types. Light absorption leads to activation of opsin (O*) and conversion of inactive transducin (G_t) with bound GDP to the active state with bound GTP accompanied by dissociation of $G_{\beta\gamma}$ (not shown). The free G_{α} · GTP thus generated then activates cGMP phosphodiesterase (PDE) by binding to and dissociating its two inhibitory γ subunits; as a result, the released catalytic α and β subunits of activated PDE (PDE*) can convert cGMP to GMP. The resultant decrease in cGMP causes dissociation of cGMP from the nucleotide-gated channels in the plasma membrane; the channels then close and the membrane becomes transiently hyperpolarized. [Adapted from V. Arshavsky and E. Pugh, 1998, *Neuron* **20**:11.]

11. Discuss about nuclear receptors based on its mechanism of action.

Nuclear receptors are multifunctional proteins that transduce signals of their cognate ligands. Nuclear receptors (NRs) may be classified into two broad classes according to their mechanism of action and subcellular distribution in the absence of ligand.

Small lipophilic substances such as natural hormones diffuse through the cell membrane and bind to nuclear receptors located in the cytosol (type I NR) or nucleus (type II NR) of the cell. Binding causes a conformational change in the receptor which, depending on the class of receptor, triggers a cascade of downstream events that direct the NRs to DNA transcription regulation sites which result in up or down-regulation of gene expression. They generally function as homo/heterodimers. In addition, two additional classes, type III which are a variant of type I, and type IV that bind DNA as monomers have also been identified.

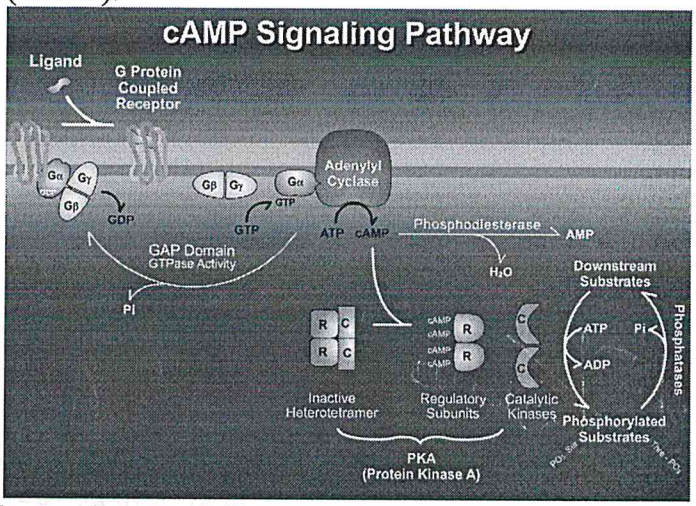


Section C – (1 x 10 = 10)
Answer any ONE question

12. Explain in detail about the cAMP-Dependent Pathway.

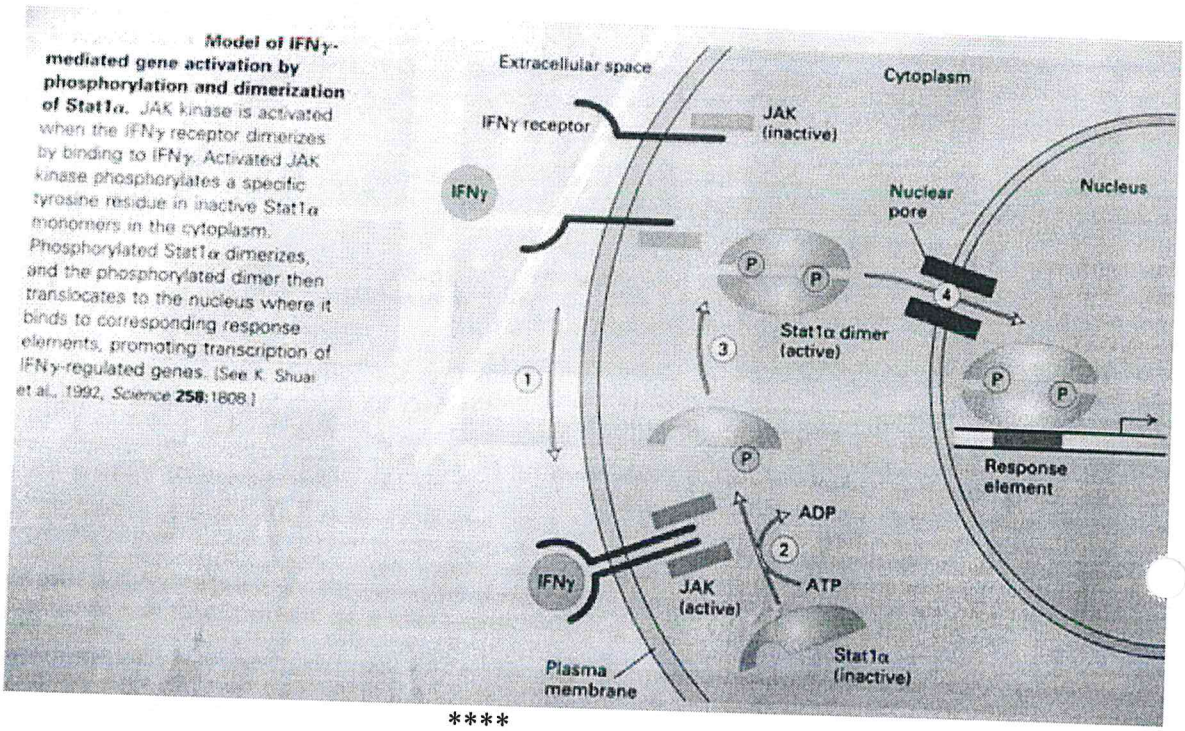
a. In the field of molecular biology cAMP-dependent path way is also known as the adenylyl cyclase pathway. It is as **G-protein-coupled receptor-triggered** signalling cascade used in cell communication.
b. Increases in concentration of the 2nd messenger cAMP may lead to the activation of following.
c. Cyclic nucleotide-gated ion channels. Exchange proteins activated by cAMP (EPAC) such as RAPGEF3. Popeye domain containing proteins (Popdc). Protein kinase A (PKA) enzyme.
d. The PKA enzyme is also known as cAMP-dependent enzyme because it gets activated only if cAMP is present. Once PKA activated, it phosphorylates a number of other proteins including
e. Enzymes that convert **glycogen** into **glucose.** Enzymes that **promote muscle contraction in the heart** leading to an increase in heart rate. **Transcription factors**, which regulate gene expression. In a cAMP-dependent pathway, the activated G_α alpha subunit binds and activates an enzyme called adenylyl cyclase, which in turn, catalyse the conversion of ATP into cyclic adenosine monophosphate (cAMP).

f.



g. **Molecules that activate cAMP pathway include:**
h. **Cholera toxin-** increase cAMP levels. **Caffeine** and **theophylline** - inhibit cAMP phosphodiesterase, which degrades cAMP - thus enabling higher levels of cAMP levels of cAMP than would otherwise be had. **Pertussis toxin** - which increase cAMP levels by inhibiting Gi to its GDP (inactive) form. This leads to an increase in adenylyl cyclase activity, thereby increasing cAMP levels, which can lead to an increase in insulin and therefore hypoglycaemia.
i. **Deactivation:**
j. The G_s alpha subunit slowly catalyses the hydrolysis of GTP to GDP, which in turn deactivates the G_s protein, shutting off the cAMP pathway. The pathway may also be deactivated sown stream by directly inhibiting adenylyl cyclase or dephosphorylating the proteins phosphorylated by PKA.
k. Molecules that inhibit the cAMP pathway include. cAMP phosphodiesterase dephosphorylates cAMP into AMP reducing the cAMP levels. G_i protein, which is a G protein that inhibits adenylyl cyclase reducing cAMP levels.

13. Describe the signaling through JAK-STAT pathway.



Model of IFNγ-mediated gene activation by phosphorylation and dimerization of Stat1α. JAK kinase is activated when the IFNγ receptor dimerizes by binding to IFNγ. Activated JAK kinase phosphorylates a specific tyrosine residue in inactive Stat1α monomers in the cytoplasm. Phosphorylated Stat1α dimerizes, and the phosphorylated dimer then translocates to the nucleus where it binds to corresponding response elements, promoting transcription of IFNγ-regulated genes. (See K. Shuai et al., 1992, *Science* **258**:1808.)

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DEPARTMENT OF BIOCHEMISTRY

UNIT TEST- I, FEBRUARY- 2023

Class : II M. Sc Biochemistry **Date** : 02.03.2023

Subject : Immunochemistry **Time** : 12 to 1.00 PM

Subject Code: MENAE **Max. Mark:** 25

PART A – (5 X 1 = 5 Marks)

Answer any FIVE questions

CO.3 BL:6 1. Write a note on RIA.

CO.3 BL:1 2. State Cross reactivity

CO.2 BL:1 3. Define Incompatible blood transfusion.

CO.3 BL:1 4. State about "Serum sickness disorder"

CO.5 BL:1 5. Tell aboutAtopy

CO.6 BL:1 6. Enumerate Mono Clonal Antibody.

CO.5 BL:1 7. Tell about "Hyperacute rejection reactions"

PART B – (2 X 5 = 10 Marks)

Answer any TWOquestion

CO.2 BL:2 8. Describe Major and Minor blood groups

CO.3 BL:4 9. Explain briefly about Humoral Immunity

CO.2 BL:6 10. Write about types of Antigen

CO.3 BL:6 11. Write a note on the following

(i) Erythroblastosisfetalis (iii) ELISA

(ii) Polyclonal antibody (iv) Agglutination

PART C – (1 X 10 = 10 Marks)

Answer any ONE question

CO.2 BL:2 12. Discuss about "Antigen –Antibody Reaction"

CO.3 BL:2 13. Describe about the Cell mediated immune response

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DEPARTMENT OF BIOCHEMISTRY

UNIT TEST I, FEBRUARY 2023

Class	: II M. Sc Biochemistry	**Date**	: 02.03.2023
Subject	: Immunochemistry	**Time**	: 12 to 1.00 PM
Subject Code:	MENAE	**Max. Mark:**	25

PART A – (5 X 1 = 5 Marks)

Answer any FIVE questions

CO.3 BL:6 1. **Write a note on RIA.**

Radioimmunoassaytechnique (RIA) is very sensitive in vitrotechnique used tomeasure the concentrationofantigens (eg, hormone levels in the blood) through the use ofantibodiesdirectedagainst these antigens. Radioimmunoassay (RIA) is basedon the principleofallimmunoassayswhich is the recognitionofanantigenpresent in a sample by antibodiesdirectedagainst this antigen.

CO.3 BL:1 2. **State Cross reactivity**

Cross-reactivity in allergic reactions occurs when the proteins in one substance (typically pollen) are similar to the proteins found in another substance (typically a food). For example, if you are allergic to birch tree pollen, you may also find that eating apples causes a reaction for you.

CO.2 BL:1 3. **Define Incompatible blood transfusion.**

An ABO incompatibility reaction **can occur if you receive the wrong type of blood during a blood transfusion**. It's a rare but serious and potentially fatal response to incompatible blood by your immune system.

CO.3 BL:1 4. **State about "Serum sickness disorder"**

Serum sickness is **a reaction that is similar to an allergy**. The immune system reacts to medicines that contain proteins used to treat immune conditions. It can also react to antiserum, the liquid part of blood that contains antibodies given to a person to help protect them against germs or poisonous substances

CO.5 BL:1 5. **Tell aboutAtopy**

Atopy is a predisposition to respond immunologically to diverse antigens/allergens, leading to CD4+ Th2 differentiation and overproduction of immunoglobulin E (IgE). The clinical consequence of this is the propensity to develop hypersensitivity reactions to allergens.

CO.6 BL:1 6. **Enumerate Mono Clonal Antibody.**

Monoclonal antibodies (also called moAbs or mAbs) are proteins made in laboratories that act like proteins called antibodies in our bodies. Antibodies are parts of your immune system. They seek out the antigens (foreign materials) and stick to them in order to destroy them.

CO.5 BL:1 7. **Tell about "Hyperacute rejection reactions"**

Hyperacute rejection is caused by the presence of antidonor antibodies existing in the recipient before transplantation. These antibodies induce both complement activation and stimulation of endothelial cells to secrete Von Willebrandprocoagulant factor, resulting in platelet adhesion and aggregation

PART B – (2 X 5 = 10 Marks)

Answer any TWOquestion

CO.2 BL:2 8. **Describe Major and Minor blood groups**

The 2 major classifications of blood are the ABO system and the Rh system. The 4 blood groups are A, B, AB and O. Each of these will be either Rh-positive or Rh-negative.

The most common minor blood group antigens that lead to blood incompatibility between the mother and baby include C, c, E, e, Kell, Duffy, Diego, Kidd, and MNSs antigen systems

CO.3 BL:4 9. **Explain briefly about Humoral Immunity**

Humoral Immunity Definition

Humoral adaptive immunity is a form of *adaptive immunity* whereby *B-lymphocytes* and plasma cells (effector b cells) produce antibodies against foreign agents (antigens) and stimulate *T-lymphocytes* to attack them. This type of immunity is mediated by antibodies. These antibodies also stimulate the release of chemical mediators (for example interferons, complement proteins, etc) which enhance antigen destruction.

The reason it's named humoral immunity or humoral mediated immunity is because of its *mechanism of action.* Humoral immunity works by a mechanism requiring the substances found in body fluids, i.e. *humor*.

It's also called *"antibody-mediated immunity"* as antibody production is one of the notable features of this immunity development. By its nature, this immunity is *"specific"* as a specific primary humoral immune response is generated against each particular antigen or foreign material.

The main purpose of this immunity is to protect the extracellular spaces of the body as intracellular pathogens spread from one host cell to another via the extracellular fluids.

As gathered from multiple research studies, extracellular spaces are highly prone to invasion by several pathogenic species. Even intracellular pathogens are known to use the extracellular route when navigating from one cell to another cell.

Hence, it becomes even more important to exploit this chance of evading pathogenic attacks, and the human body knows well to make the most of it.

That's the reason antibody production in humoral immunity by B cells and then its subsequent secretion plays such a big role in immunity development. Look at the humoral immunity diagram below to learn the basic steps involved.

CO.2 BL:6 10. **Write about types of Antigen**

- Exogenous Antigens. Exogenous antigens are the external antigens that enter the body from outside, e.g. inhalation, injection, etc.
- Endogenous Antigens.
- Autoantigens.
- Tumour Antigens.
- Native Antigens.
- Immunogen.
- Hapten.

CO.3 BL:6 11. **Write a note on the following**

(i) Erythroblastosisfetalis (iii) ELISA

(ii) Polyclonal antibody (iv) Agglutination

(i)Erythroblastosisfetalis

Hemolytic disease of the fetus and newborn (HDFN) is also known as alloimmune HDFN or erythroblastosisfetalis. It is caused by the destruction of neonatal red blood cells by maternal immunoglobulin G (IgG) antibodies. The formation of maternal antibodies in response to a fetal antigen is called isoimmunization.

(ii)**Polyclonal antibody**

Polyclonal antibodies (pAbs) are **a complex mixture of several antibodies that are usually produced by different B-cell clones of an animal.** These antibodies recognize and bind to many different epitopes of a single antigen and hence can form lattices with the antigens

(iii) ELISA

Enzyme-linked immunosorbent assay (ELISA) is a labeled immunoassay that is considered the gold standard of immunoassays. This immunological test is very sensitive and is used to detect and quantify substances, including antibodies, antigens, proteins, glycoproteins, and hormones.

(iv) Agglutination

Agglutination is defined as the formation of clumps of cells or inert particles by specific antibodies to surface antigenic components (direct agglutination) or to antigenic components adsorbed or chemically coupled to red cells or inert particles

PART C – (1 X 10 = 10 Marks)

Answer any ONE question

CO.2 BL:2 12.**Discuss about "Antigen –Antibody Reaction"**

Antigen-antibody interaction, or **antigen-antibody reaction,** is a specific chemical interaction between antibodies produced by B cells of the white blood cells and antigens during immune reaction. The antigens and antibodies combine by a process called agglutination. It is the fundamental reaction in the body by which the body is protected from complex foreign molecules, such as pathogens and their chemical toxins. In the blood, the antigens are specifically and with high affinity bound by antibodies to form an antigen-antibody complex. The immune complex is then transported to cellular systems where it can be destroyed or deactivated.

The first correct description of the antigen-antibody reaction was given by Richard J. Goldberg at the University of Wisconsin in 1952.[1][2] It came to be known as "Goldberg's theory" (of antigen-antibody reaction).

There are several types of antibodies and antigens, and each antibody is capable of binding only to a specific antigen. The specificity of the binding is due to specific chemical constitution of each antibody. The antigenic determinant or epitope is recognized by the paratope of the antibody, situated

at the variable region of the polypeptide chain. The variable region in turn has hyper-variable regions which are unique amino acid sequences in each antibody. Antigens are bound to antibodies through weak and noncovalent interactions such as electrostatic interactions, hydrogen bonds, Van der Waals forces, and hydrophobic interactions.

The principles of specificity and cross-reactivity of the antigen-antibody interaction are useful in clinical laboratory for diagnostic purposes. One basic application is determination of ABO blood group. It is also used as a molecular technique for infection with different pathogens, such as HIV, microbes, and helminth parasites.

CO.3 BL:2 13. **Describe about the Cell mediated immune response**

Once they have completed their development in the thymus, T cells enter the bloodstream and are carried by the circulation. On reaching a peripheral lymphoid organ they leave the blood again to migrate through the lymphoid tissue, returning to the bloodstream to recirculate between blood and peripheral lymphoid tissue until they encounter their specific antigen. Mature recirculating T cells that have not yet encountered their antigens are known as naive T cells. To participate in an adaptive immune response, a naive T cell must first encounter antigen, and then be induced to proliferate and differentiate into cells capable of contributing to the removal of the antigen. We will term such cells armed effector T cells because they act very rapidly when they encounter their specific antigen on other cells. The cells on which armed effector T cells act will be referred to as their target cells.

In this chapter, we will see how naive T cells are activated to produce armed effector T cells the first time they encounter their specific antigen in the form of a peptide:MHC complex on the surface of an activated antigen-presenting cell (APC). The most important antigen-presenting cells are the highly specialized dendritic cells, whose only known function is to ingest and present antigen. Tissue dendritic cells ingest antigen at sites of infection and are activated as part of the innate immune response. This induces their migration to local lymphoid tissue and their maturation into cells that are highly effective at presenting antigen to recirculating T cells. These mature dendritic cells are distinguished by surface molecules, known as co-stimulatory molecules, that synergize with antigen in the activation of naive T cells. Macrophages, which we described in Chapter 2 as phagocytic cells that provide a first line of defense against infection, can also be activated to express co-stimulatory and MHC class II molecules. This enables them to act as antigen-presenting cells, although they are less powerful than dendritic cells at activating naive T cells. B cells can also serve as antigen-presenting cells in some circumstances. Once a T-cell response has been initiated, macrophages and B cells that have taken up specific antigen also become targets for armed effector T cells. Dendritic cells, macrophages, and B cells are often known as professional antigen-presenting cells.

Effector T cells, as we learned in Chapter 5, fall into three functional classes that detect peptide antigens derived from different types of pathogen. Peptides from intracellular pathogens that multiply in the cytoplasm are carried to the cell surface by MHC class I molecules and presented to CD8 T cells. These differentiate into cytotoxic T cells that kill infected target cells. Peptide

antigens from pathogens multiplying in intracellular vesicles, and those derived from ingested extracellular bacteria and toxins, are carried to the cell surface by MHC class II molecules and presented to CD4 T cells. These can differentiate into two types of effector T cell, called T_H1 and T_H2. Pathogens that accumulate in large numbers inside macrophage and dendritic cell vesicles tend to stimulate the differentiation of T_H1 cells, whereas extracellular antigens tend to stimulate the production of T_H2 cells. T_H1 cells activate the microbicidal properties of macrophages, and induce B cells to make IgG antibodies that are very effective at opsonizing extracellular pathogens for uptake by phagocytic cells.

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SRM ARTS AND SCIENCE COLLEGE, KATTANKULATHUR
DEPARTMENT OF BIOCHEMISTRY
UNIT TEST- I, FEBRUARY-2023

Class : I M.Sc., Biochemistry **Date: 03.03.2023**
Subject : Nutritional Biochemistry **Time: 12 to 1.00 PM**
Subject Code : **Max. Mark: 25**

Section A (5 x 1 =5)
Answer any FIVE questions

CO6 BL:5 1. Comment on nutrients.

CO1 BL:6 2. Write the sources of Protective Foods.

CO2 BL:6 3. Write the role of dietary Fibre.

CO3 BL:1 4.Define balanced diet.

CO1 BL:5 5. Comment on functional foods.

CO4 BL:6 6.Write the substances rich in vitamin D

CO2 BL:1 7.Define malnutrition.

Section B - (2 x 5 = 10)
Answer any TWO questions

CO4 BL: 1,6 8. Define minerals. Write the sources of RDA and functions of Iron and Iodine.

CO1 BL:4 9.Explain about ICMR classification of food groups.

CO2 BL4 10. Write about protective food groups.

CO2 BL2 11. Explain about bomb calorimetry.

Section C – (1 x 10 = 10)
Answer any ONE question

CO6 BL: 4 10.Explain in detail about obesity.

CO1 BL: 5 11. Comment on energy yielding nutrients.

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DEPARTMENT OF BIOCHEMISTRY
UNIT TEST- II, MARCH-2023

Class : I M.Sc., Biochemistry **Date: 25.04.2023**
Subject: Nutritional Biochemistry **Time: 12 to 1.00 PM**
Subject Code : **Max. Mark: 25**

Answer Key

Section A (5 x 1 =5)
Answer any FIVE questions

1. **Define** food additives.
   - Substance or mixture of substance, other than a basic foodstuff, which is present in a food as a result of any aspect of production, processing storage or packaging. The term does not include change contaminants.

2. **Discuss the role of dietary fiber.**
   - It consists of nondigestible carbohydrates and lignin that are intrinsic and intact in plants. Added fiber consists of isolated nondigestible carbohydrates that have beneficial physiological effects in humans.

3. **Write a note on essential fatty acids.**
   - Oleic acids, Linoleic acid, Linolenic acid arachidonic acid,

4. **Write a note on essential amino acids.**
   - Histidine, isoleucine, leucine, lysine, methionine, phenylalanine, threonine, tryptophan, and valine.

5. **Write a note on calorific value.**

The calorific value of food refers to the amount of energy that can be obtained by the body when a particular food is consumed and metabolized. It is typically measured in units of energy per unit of mass, such as kilocalories per gram (kcal/g) or kilojoules per gram (kJ/g).

The calorific value of food is determined by its macronutrient content, which includes carbohydrates, fats, and proteins. Carbohydrates and proteins provide around 4 kilocalories per gram (kcal/g), while fats provide around 9 kilocalories per gram (kcal/g). Therefore, foods that are high in fat tend to have a higher calorific value than those that are high in carbohydrates or proteins. Calorific value of food is an important factor to consider when managing calorie intake and maintaining a healthy diet. Consuming more calories than the body needs can lead to weight gain and other health problems, while consuming too few calories can lead to malnutrition and other health issues.

6. **State the functions of calcium in our body.**

Calcium plays several important functions in our body, some of which include:

Building and maintaining strong bones and teeth: Calcium is a key component of bones and teeth, providing strength and structure to these tissues.

Facilitating muscle and nerve function: Calcium plays a crucial role in muscle contractions and nerve impulse transmission. It helps regulate the contraction and relaxation of muscles, including the heart muscle, and supports proper communication between nerve cells.

Supporting blood clotting: Calcium is involved in the blood clotting process, helping to activate various clotting factors and promote the formation of clots to prevent excessive bleeding.

Enabling enzyme function: Calcium is required for the activation and function of several enzymes in the body, which are involved in a variety of metabolic processes.

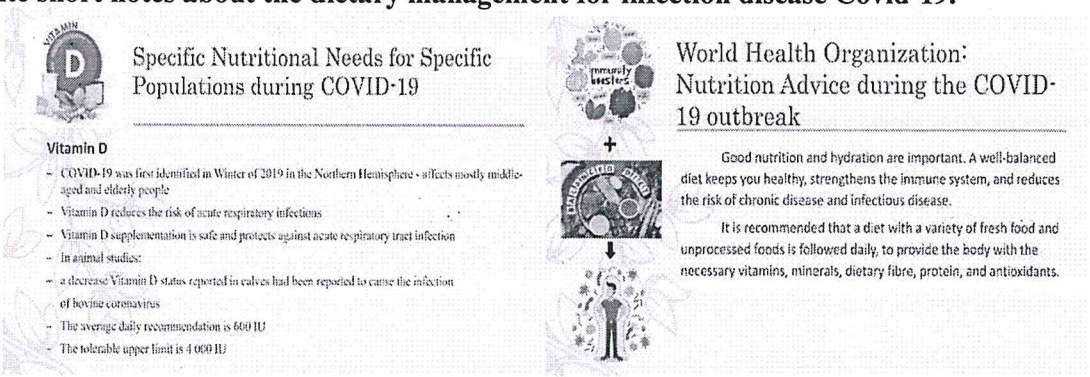
Calcium is an essential nutrient that is important for many aspects of our health and wellbeing.

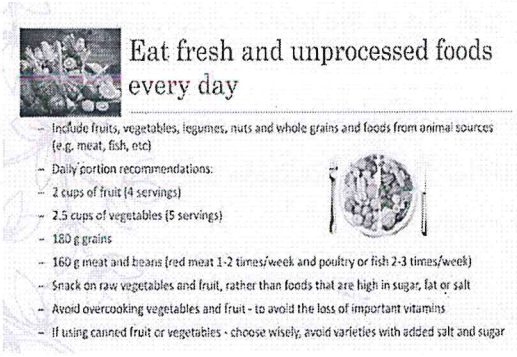
7. **Discuss about malnutrition.**

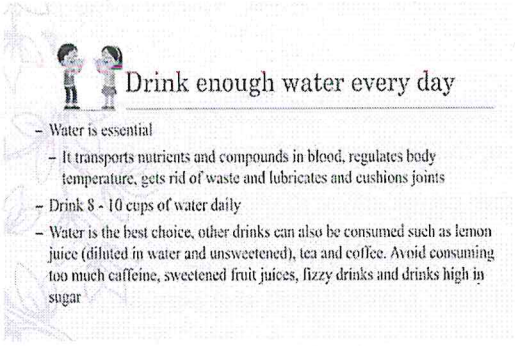
Malnutrition is a state of poor nutrition that can result from an inadequate or imbalanced intake of nutrients. It can lead to a range of health problems, including stunted growth, weakened immune function, obesity, type 2 diabetes, cardiovascular disease, and certain types of cancer. Malnutrition can affect people of all ages and is particularly common among children and elderly individuals who may have limited access to food or who may not be able to absorb or utilize nutrients effectively.

Section B - (2 x 5 = 10)
Answer any TWO questions

8. **Write short notes about the dietary management for infection disease Covid-19.**







9. Enumerate the effects of tobacco on health.

- Tobacco comes in different forms cigarettes, chewing tobacco, pipes and water pipes, cigars, etc.
- Is addictive more than heroin or cocaine. Makes your cloth, hair and breath smell bad. Turs your teeth and ginger yellow. Increase risk of stroke, hypertension and heart attacks. Increase risk of developing diabetes. Impairs fertility. Pregnancy problems.

10. Write short notes on kwashiorkor.

Kwashiorkor is a type of protein-energy malnutrition that occurs when a child's diet lacks adequate protein, despite sufficient caloric intake. It is most commonly seen in developing countries where diets are often lacking in protein-rich foods. Here's a breakdown of the biochemistry behind Kwashiorkor:

1. Overview: Kwashiorkor is a severe form of protein malnutrition that leads to stunted growth, edema, and other serious health complications. It is caused by a lack of essential amino acids in the diet, which are needed for the synthesis of proteins in the body.
2. Protein Metabolism: Proteins are broken down into amino acids during digestion and absorbed into the bloodstream. These amino acids are then used by the body to synthesize new proteins, which are essential for growth and repair of tissues. In Kwashiorkor, there is a lack of essential amino acids, leading to a decreased rate of protein synthesis and tissue repair.
3. Liver Function: The liver plays a critical role in protein metabolism, as it is responsible for producing many of the essential amino acids needed for protein synthesis. In Kwashiorkor, the liver may become enlarged and fatty, as it tries to compensate for the lack of essential amino acids in the diet.
4. Hormonal Imbalances: Hormones such as insulin and growth hormone are involved in protein metabolism, and their levels may be altered in Kwashiorkor. Insulin levels may be low due to a lack of dietary carbohydrates, while growth hormone levels may be elevated as the body tries to promote protein synthesis and tissue repair.
5. Edema: Edema, or swelling, is a hallmark of Kwashiorkor. It is caused by a decrease in the concentration of serum proteins, such as albumin, due to a lack of protein in the diet. This leads to a

decrease in osmotic pressure, which allows fluid to leak out of the blood vessels and accumulate in the tissues.

6. Immune Function: Protein is also essential for the function of the immune system, and a lack of protein in the diet can lead to impaired immune function. This can increase the risk of infections, which can further compromise the health of children with Kwashiorkor.

In conclusion, Kwashiorkor is a serious form of protein-energy malnutrition that results from a lack of essential amino acids in the diet. The biochemistry of Kwashiorkor involves disruptions in protein metabolism, liver function, hormonal balance, and immune function, all of which can have serious health consequences.

11. Describe the metabolic functions of vitamin A.

Vision: Vitamin A plays a key role in the formation of rhodopsin, a pigment found in the retina that helps detect light and facilitate vision in low light conditions.

Immune function: Vitamin A is essential for maintaining the integrity and function of epithelial tissues, which are the first line of defense against infection. It also supports the function of immune cells, including T cells and B cells.

Gene expression: Vitamin A is involved in the regulation of gene expression, particularly in the differentiation of cells and tissues during development.

Skin health: Vitamin A helps regulate the growth and differentiation of skin cells, and is essential for maintaining the health of the skin and preventing dryness and flakiness.

Reproduction: Vitamin A is involved in the development and maintenance of reproductive tissues, including the testes, ovaries, and placenta. It also plays a role in the production of sperm and the regulation of menstrual cycles in women.

Growth and development: Vitamin A is essential for normal growth and development, particularly in the development of bones and teeth.

Antioxidant activity: Vitamin A acts as an antioxidant, helping to protect cells from damage caused by free radicals and oxidative stress.

Brain function: Vitamin A plays a role in the development and function of the nervous system, including the formation of myelin, which helps transmit nerve impulses.

Blood cell production: Vitamin A is involved in the production of red blood cells, and a deficiency in vitamin A can lead to anemia.

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Answer key

PART A

1. Comment on nutrients.

   Nutrients are chemical compounds in food that are used by the body to function properly and maintain health. Examples include proteins, fats, carbohydrates, vitamins, and minerals

2. Write the sources of Protective Foods

   Vegetables and Fruits are called protective foods. Our body requires Vitamins and Minerals for various vital processes of life and for formation of blood, bones and teeth.

3. Write the role of dietary Fibre.

   Dietary fiber increases the weight and size of your stool and softens it. A bulky stool is easier to pass, decreasing your chance of constipation. If you have loose, watery stools, fiber may help to solidify the stool because it absorbs water and adds bulk to stool. Helps maintain bowel health.

4. Define balanced diet.

   Balanced diet: A balanced diet is one that contains all of the essential elements that the human body needs. Carbohydrates, lipids, vitamins, minerals, proteins.

5. Comment on functional foods.

   Functional foods are foods that offer health benefits beyond their nutritional value. In addition to nutrient-rich ingredients like fruits and veggies, the category also includes foods fortified with vitamins, minerals, probiotics, and fiber.Functional foods are generally separated into two categories: conventional and modified.Conventional foods are natural, whole-food ingredients that are rich in important nutrients like vitamins, minerals, antioxidants, and heart-healthy fats.Meanwhile, modified foods have been fortified with additional ingredients, such as vitamins, minerals, probiotics, or fiber, to increase a food's health benefits.

6. Write the substances rich in vitamin D.

   Foods such as cow's milk, soy milk, orange juice, cereals, and oatmeal are sometimes fortified with *vitamin D.*

7. Define malnutrition.

Malnutrition refers to deficiencies, excesses or imbalances in a person's intake of energy and/or nutrients.

PART B

8. Define minerals. Write the sources RDA and functions of Iron and Iodine.

Definition (1M)

RDA (1M)

Metabolic Functions (2M

9. Explain about ICMR classification of food groups.

Classification (1M)

Sources of Food Groups (2M)

Functions of food groups (2M)

10. Write about protective food groups

Definition (2M)

Example (1M)

Functions (2M)

11. Explain about bomb calorimetry.

Definition (2M)

Description (2M)

Calculation (1M)

PART C

12. Explain in detail about obesity.

Definition (2M)

Biological Functions (4M)

Deficiency manifestations (4M)

13. Comment of energy yielding nutrients.

Definition (2M)

RDA (1M)

Biological Functions (4M)

Deficiency manifestations (4M)

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DEPARTMENT OF BIOCHEMISTRY

UNIT TEST II, APRIL 2023

Class: I B.Sc., Biochemistry

Subject: Cell Biology

Subject Code: SB22A

Date: 12.04.2023

Time: 12 to 1.00 PM

Max. Mark: 25

Section A (5 x 2 =10)
Answer any **FIVE** questions

CO 1 BL2 1. Differentiate between plant cell and animal cell.
CO 1 BL4 2. Compare prokaryotic and eukaryotic cells.
CO 3 BL1 3. Define uniport.
CO 3 BL2 4. Discuss about the tight junction.
CO 5 BL1 5. Define apoptosis.
CO 5 BL4 6. Explain any two cancer causing agents.
CO 5 BL1 7. Define radiotherapy.

Section B (1 x 5 = 10)
Answer any **ONE** question

CO 3 BL6 8. Write a note on water channels.
CO 3 BL2 9. Discuss in detail about sodium potassium channel.

Section C (1 x 10 = 10)
Answer any **ONE** question

CO 3 BL2 10. Explain the fluid mosaic model of plasma membrane.
CO 5 BL4 11. Explain in detail about the cause, diagnosis and treatment modalities of cancer.

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DEPARTMENT OF BIOCHEMISTRY

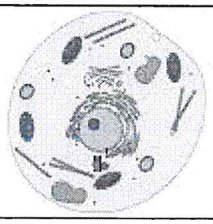
UNIT TEST II, APRIL 2023

Answer key

Class: I B.Sc. Biochemistry **Max. Mark: 25**
Subject: Cell Biology **Time: 1 Hour**
Subject Code: SB22A

Section A (5 x 2 =10)
Answer any **FIVE** questions

1. Differentiate between plant cell and animal cell.

Plant Cell	Animal Cell
	
Plant cell is large and has a fixed rectangular shape.	Animal cell is small and irregular or round in shape.
Cell wall is present.	Cell wall is absent.
The nucleus lies on one side of the cell.	The nucleus lies in the center.
Mitochondria are present in fewer numbers.	Mitochondria are present in large numbers.
Plastids are present.	Plastids are absent.
Centrosomes are absent.	Centrosomes are present.
One large central vacuole is present.	Many small vacuoles are present.

2. Compare prokaryotic and eukaryotic cells.

Eukaryotic vs. Prokaryotic Cells

Characteristics	Eukaryotic Cells	Prokaryotic Cells
Definition	Any cell that contains a clearly defined nucleus and membrane bound organelles	Any unicellular organism that does not contain a membrane bound nucleus or organelles
Examples	Animal, plant, fungi, and protist cells	Bacteria and Archaea
Nucleus	Present (membrane bound)	Absent (nucleoid region)
Cell Size	Large (10-100 micrometers)	Small (less than a micrometer to 5 micrometers)
DNA Replication	Highly regulated with selective origins and sequences	Replicates entire genome at once
Organism Type	Usually multicellular	Unicellular
Chromosomes	More than one	One long single loop of DNA and plasmids
Ribosomes	Large	Small
Growth Rate/Generation Time	Slower	Faster
Organelles	Present	Absent
Ability to Store Hereditary Information	All eukaryotes have this ability	All prokaryotes have this ability
Cell Wall	Simple: Present in plants and fungi	Complex: Present in all prokaryotes
Plasma Membrane	Present	Present
Cytoplasm	Present	Present

3. Define uniport.

When a particular type of molecule moves across a membrane, through carrier protein, independent of other molecule, the diffusion is called uniport. An example of a uniporter is the glucose transporter (GLUT) in found in erythrocytes (referred to as GLUT1 to separate from other mammalian glucose transporters). This allows glucose to enter the cell via facilitated diffusion and it does so at approximately 50,000 times the rate that it would via simple diffusion.

4. Discuss about the tight junction.

As the name suggests, tight junctions are the junctions or the seal or joint between two cells in the epithelial membrane. In simple words, these are *tight cell junctions that prevent leakage*.

Tight junctions (also called *zonula occludens* or *occluding junctions*) are a type of cell junction characterized by forming an adhesion complex between two neighboring cells serving as a tight seal between the cells. The tight junctions are essentially a protein complex between two cells.

The tight junction or the seal prevents the leakage of content and controls the paracellular transport and permeability. Thus, tight junctions create a continuous semipermeable membrane connection in the cellular membrane

5. Define apoptosis.

The term apoptosis can be defined as a natural biological process of programmed cell death in which the cells destroy themselves for maintaining the smooth functioning of the body.

6. Explain any two cancer causing agents.

Cancer-causing agents can be categorized into several groups, including oncogenic viruses, chemicals, and radiation. Particulate matter, which consists of minute solid particles and liquid droplets in the air (e.g., dust, secondhand smoke, and other forms of air pollution), and fibres, such as asbestos, erionite, and glass wool, are other causes of cancer.

7. Define radiotherapy.

Radiation therapy defined as one cancer treatment that uses high-energy x-ray or other particles to destroy cancer cells.

Section B (1 x 5 = 10)

Answer any **ONE** question

8. Write a note on water channels

Diagram (2M)
Description (2M)
Functions (1M)

9. Discuss in detail about sodium potassium channel.
Definition (2M)

Description (2M)
Functions (1M)

Section C (1 x 10 = 10)
Answer any **ONE** question

10. Explain the fluid mosaic model of plasma membrane.
Diagram (2M)
Description (5M)
Functions (3M)

11. Explain in detail about the cause, diagnosis and treatment modalities of cancer.
Definition (2M)
Explanation (5M)
Treatment modalities (3M)

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DEPARTMENT OF BIOCHEMISTRY
UNIT TEST - II, April 2023

CLASS: I B.Sc BIOCHEMISTRY — Time: 1 Hour
SUBJECT: Allied Chemistry-II — Max: 25 Marks
SUB.CODE: SD3AC — Date: 13 /04/2023

Section - A (5 X 2 = 10)
(Answer any **FIVE** questions)

CO6 BL: 4 1. Give an expression for normality of a solution

CO6 BL: 1 2. What is meant by standard solution?

CO6 BL: 1 3. What are secondary standard substances? Give example

CO6 BL: 4 4. Explain the principle of volumetric analysis

CO6 BL: 1 5. Write a note on Distillation

CO6 BL: 1 6. Write a note on crystallization

CO6 BL: 1 7. What are the requisite properties of a primary standard?

Section - B (5 X 1 = 5)
(Answer any **ONE** question)

CO6 BL: 2 8. Describe various types of distillation processes?

CO6 BL: 4 9. Explain the Paper chromatographic technique

Section - C (10 X 1 = 10)
(Answer any **ONE** question)

CO6 BL:4 10. Discuss the principle and applications of column chromatography.

CO6 BL:4 11. Explain the principle and applications of thin layer chromatography.

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DEPARTMENT OF BIOCHEMISTRY
UNIT TEST - II, April 2023

CLASS: I B.Sc BIOCHEMISTRY
SUBJECT: Allied Chemistry-II
SUB.CODE: SD3AC

Time: 1 Hour
Max: 25 Marks
Date: 13 /04/2023

ANSWER KEY

Section - A (5 X 2 = 10)

(Answer any **FIVE** questions)

1. Give an expression for normality of a solution

   Gram equivalent weight / Liter of solution

2. What is meant by standard solution? Known concentration solution.
3. What are secondary standard substances? Give example These are not available in 100% purity. They have to be standardized with a primary standard. HCl, NaOH.
4. Explain the principle of volumetric analysis

   V1 N1 = V2 N2

   Where V1 & V2 - Volume of solutions. N1 & N2 - Normality of solutions.

5. Write a note on Distillation

   Distillation is the process of separating components of a mixture based on different boiling points.

6. Write a note on crystallization

   Crystallisation occurs when the solution solvent evaporates, and the concentration of the solute reaches saturation point. At this stage, the solute begins to precipitate out of solution

7. What are the requisite properties of a primary standard?

   It should be soluble in water and stable in solution. ✓ It should not be hygroscopic or deliquescent. ✓ It should react with the other reagents quantitatively

Section - B (5 X 1 = 5)
(Answer any **ONE** question)

8. Describe various types of distillation processes?

   Simple distillation The simple distillation process is applied when the boiling points of two liquids are significantly different from each other • Fractional distillation • Steam distillation

9. Explain the Paper chromatographic technique.

   Paper chromatography is one of the types of chromatography procedures which runs on a piece of specialized paper. Paper Chromatography consists of two phases: one mobile phase and one stationery phase. The stationery phase a paper and the mobile gas is solvent.

Section - C (10 X 1 = 10)
(Answer any **ONE** question)

10. Discuss the principle and applications of column chromatography.

    In this type of chromatography silica or alumina is used as stationery phase and a suitable solvent is used as a mobile phase. The column is packed with the slurry of silica or alumina. Here the each compound in the mixture or sample is separated depending on the polarity of the molecules.

11. Explain the principle and applications of thin layer chromatography

    Thin layer Chromatography consists of two phases: one mobile phase and one stationery phase. The stationery phase is a thin layer of silica or alumina coated on glass, plastic or metal. And the mobile gas is a suitable solvent.

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DEPARTMENT OF BIOCHEMISTRY

UNIT TEST II, APR2023

Class: II B.Sc., Biochemistry **Date:** 12.04.2023

Subject: Biomolecules and Biochemical techniques **Time:** 12 to 1.00 PM

Subject Code: SB24A **Max. Mark:** 25

PART A – (5 X 2 = 10 Marks)

Answer any FIVE questions

CO.1 BL:6 1.Write a brief note on chylomicrons.

CO.1 BL:1 2. Tell about the importance of sphingolipids

CO.1 BL:1. 3.Define steroids

CO.2 BL:6 4.Write the functions of cholesterol

CO.5 BL:1 5.Define Beer lambert's law.

CO.5 BL: 1 6.State stokes shift.

CO.5 BL: 6 7.Write a note on Flame photometry

PART B – (1 X 5 = 5 Marks)

Answer any ONE question

CO.1 BL: 2 8. Discuss the classification of lipoprotein

CO.5 BL:6 9. Write the principle, instrumentation and applications of UV spectroscopy.

PART C – (1 X 10 = 10 Marks)

Answer any ONE question

CO.2 BL: 2 10.Describe the properties and functions of sterol

CO.5 BL: 6 11. Write the principle and application of atomic absorption spectroscopy.

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DEPARTMENT OF BIOCHEMISTRY

UNIT TEST II, APR 2023

Class: II B.Sc., Biochemistry **Date:** 01.04.2023

Subject: Biomolecules and Biochemical techniques **Time:** 12 to 1.00 PM

Subject Code: SB24A **Max. Mark:** 25

ANSWER KEY

PART A – (5 X 2 = 10 Marks)

Answer any FIVE questions

CO.1 BL:6 1.**Write a brief note on chylomicrons.**

Chylomicrons are large triglyceride-rich lipoproteins produced in enterocytes from dietary lipids—namely, fatty acids, and cholesterol. Chylomicrons are composed of a main central lipid core that consists primarily of triglycerides, however like other lipoproteins, they carry esterified cholesterol and phospholipids.

CO.1 BL:1 2. **Tell about the importance of sphingolipids.**

Sphingolipids are enriched in the Central Nervous System (CNS) and display multiple biological functions. They participate in tissue development, cell recognition and adhesion, and act as receptors for toxins.

CO.1 BL:1. 3.**Define steroids**

steroid, any of a class of natural or synthetic organic compounds characterized by a molecular structure of 17 carbon atoms arranged in four rings. Steroids are important in biology, chemistry, and medicine. The steroid group includes all the sex hormones, adrenal cortical hormones, bile acids, and sterols of vertebrates, as well as the molting hormones of insects and many other physiologically active substances of animals and plants.

CO.2 BL:6 4.**Write the functions of cholesterol.**

Cholesterol plays an essential role in digestion, building cells and cell membranes, and synthesizing hormones and is valuable for synthesising vitamin D. Cholesterol also helps in the production of bile acids, which play a vital role in the human digestive system.

CO.5 BL:1 5.**Define Beer lambert's law.**

Beer Lambert law consists of the following two laws:
Lambert's Law :This law is concerned with the thickness of the medium.
Beer's Law :This law is concerned with the concentration of the solution via which monochromatic radiation passes.

CO.5 BL: 1 6.**State stokes shift.**

The Stokes shift is the term used to describe the difference in the wavelength at which a molecule emits light is relative to the wavelength at which the molecule was excited

CO.5 BL: 6 7. **Write a note on Flame photometry.**

Flame photometry is defined as the measurement of intensity of the light emitted when any alkali or earth metal is introduced into the flame. Because of the emission of radiation, it is also known as flame emission spectroscopy.

PART B – (1 X 5 = 5 Marks)

Answer any ONE question

CO.1 BL: 2 8. **Discuss the classification of lipoprotein.**

High-Density Lipoproteins (HDL)

HDL has a density range between 1.063 and 1.121 g/mL and size between 5 and 12 nm. In a healthy individual, it is composed of approximately 33% protein, 29% phospholipid, and 8% triacylglycerol.

The role of HDL is to collect fat molecules such as phospholipids, cholesterol, and triglycerides in the cells of the body and transport it to the liver to be broken down. HDL is sometimes known as "good" cholesterol because high concentrations of this lipoprotein usually correspond to healthier blood vessels and lower risk of atherosclerosis.

Low-Density Lipoproteins (LDL)

The density of LDL is between 1.019 and 1.063 g/mL and ranges in diameter from 18 to 28 nm. In a healthy individual, it is composed of approximately 25% protein, 21% phospholipid, and 4% triacylglycerol.

LDL is important for the transport of fat molecules such as phospholipids, cholesterol, and triglycerides around the body. It is sometimes known as "bad" cholesterol because elevated concentrations of LDL are an indicator of an underlying disease such as atherosclerosis and other cardiac diseases.

Subtypes of LDL are large buoyant LDL (lb-LDL) and small dense LDL (sd-LDL).

Intermediate Density Lipoproteins (IDL)

The density of IDL is between 1.006 and 1.019 g/mL and ranges in diameter from 25 to 50 nm. In a healthy individual, it is composed of approximately 31% triacylglycerol, 22% phospholipid, and 18% protein. This type of lipoprotein is not usually present in the blood when fasting.

Very Low-Density Lipoproteins (VLDL)

VLDL has a density between 0.950 and 1.006 g/mL and ranges in diameter from 30 to 80 nm. In a healthy individual, it is composed of approximately 50% triacylglycerol, 18% phospholipid, and 10% protein.

This lipoprotein is responsible for the transportation of synthesized triglyceride from the liver to the adipose tissue for storage.

CO.5 BL:6 9. **Write the principle, instrumentation and applications of UV spectroscopy.**

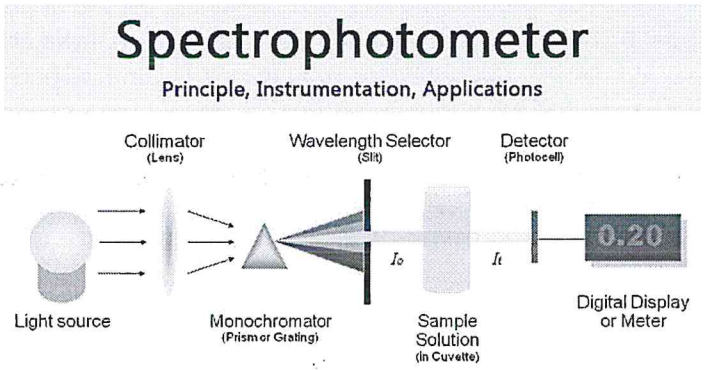
Principle of Spectrophotometer

The spectrophotometer technique is to measure light intensity as a function of wavelength. It does this by diffracting the light beam into a spectrum of wavelengths, detecting the intensities with a charge-coupled device, and displaying the results as a graph on the detector and then on the display device.

In the spectrophotometer, a prism (or) grating is used to split the incident beam into different wavelengths.

By suitable mechanisms, waves of specific wavelengths can be manipulated to fall on the test solution. The range of the wavelengths of the incident light can be as low as 1 to 2nm.

The spectrophotometer is useful for measuring the absorption spectrum of a compound, that is, the absorption of light by a solution at each wavelength.



Applications

- Some of the major applications of spectrophotometers include the following:
- Detection of concentration of substances
- Detection of impurities
- Structure elucidation of organic compounds
- Monitoring dissolved oxygen content in freshwater and marine ecosystems
- Characterization of proteins
- Detection of functional groups
- Respiratory gas analysis in hospitals
- Molecular weight determination of compounds
- The visible and UV spectrophotometer may be used to identify classes of compounds in both the pure state and in biological preparations.

PART C – (1 X 10 = 10 Marks)

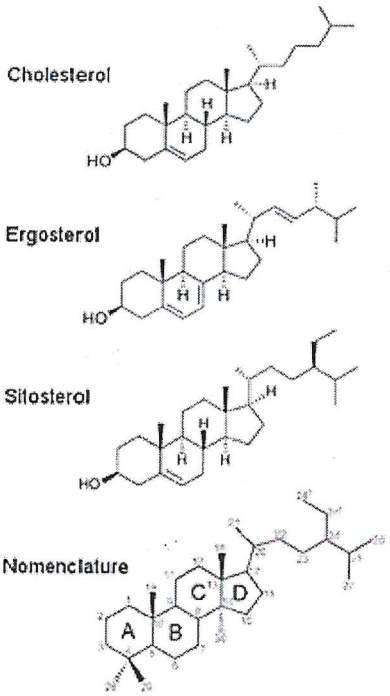
Answer any ONE question

CO.2 BL: 2 10.**Describe the properties and functions of sterol.**

Sterols are a class of hydrophobic ringed lipid molecules found in biological membranes throughout eukarya. Sterols can comprise greater than 50% of the membrane lipid content in cells, and are known to alter membrane fluidity and structure . Though the mechanisms of these effects are still under debate, sterols have been shown to induce altered lipid phases in bilayer systems, generally increasing the order of acyl chains while maintaining lipid translational fluidity. Their actions are thought to be essential to the formation of lipid rafts with various effects on cell biology and serve as precursors to steroid hormones in animals.

Common Sterols

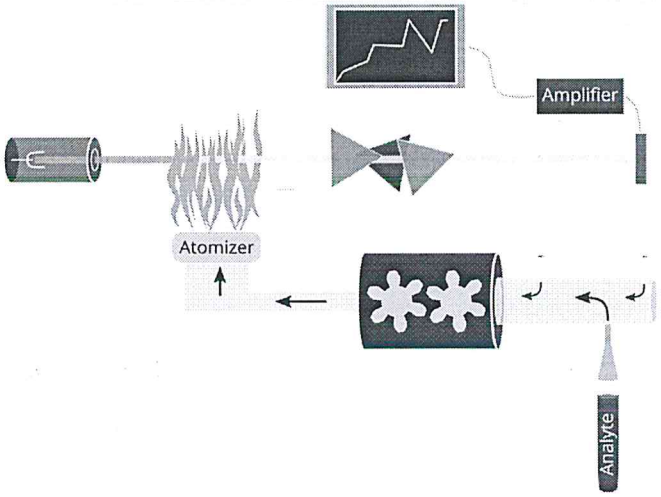
Many different sterols are found in biological membranes and are specific to certain phyla. Subtle differences in their structure can change their effect on membrane structure and dynamics as discussed below. Cholesterol is the most common sterol in animal membranes accounting for approximately 20-30% of sterols found therein [2]. It is characterized by a single double bond in ring B (C5-C6) and the lack of a branching carbon at position 24. Ergosterol is found in the membranes of fungi and protists and differs from cholesterol by containing two more carbon-carbon double bonds (one in ring B, another between carbons 22 and 23 in the tail region) and a methyl group at position 24.Sterols from plants are known as phytosterols. Common phytosterols include campesterol, stigmasterol and sitosterol, though hundreds of different compounds have been isolated from plants. Hopanoids are pentacyclic compounds that share a similar structure with sterols and are often found in prokaryotic membranes, where they are thought to have an effect on membrane stability and structure similar to sterols.



CO.5 BL: 6 11. **Write the principle and application of atomic absorption spectroscopy.**

WORKING PRINCIPLE

Atoms of the analyte have a fixed number of electrons. If the light of a specific wavelength is passed through a flame containing that atom, electrons present in different energy levels, known as orbitals, absorb a certain wavelength and excite to higher energy levels. The extent of absorption is directly proportional to the number of ground-state atoms in the flame.



APPLICATIONS OF ATOMIC ABSORPTION SPECTROSCOPY

- Atomic absorption is the most widely used technique for the determination of metals at trace and ultra-trace levels in a solution.
- It is used to analyze metals in biological fluids such as blood, hair, and urine.
- Atomic absorption is used to find out the number of various metals in the environment.
- It is used in pharmaceutical industries for quantitative analysis of metals in samples for example, in multivitamins tablets.
- Atomic absorption is used to find the concentration of metals (Ca, Mg, Fe, Si, Al,) analysis of water.

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DEPARTMENT OF BIOCHEMISTRY

UNIT TEST II, APRIL 2023

Class: III B.Sc., Biochemistry **Date: 10.04.2023**

Subject: Clinical Biochemistry **Time:** 12 to 1.00 PM

Subject Code: SB26A **Max. Mark:** 25

PART A – (5 X 2 = 10 Marks)

Answer any FIVE questions

CO3 BL6 1. Write the normal constituents of urine.

CO3 BL1 2. Define proteinuria.

CO4 BL1 3. State the disease associated with abnormal blood lipid level.

CO4 BL1 4. Define acromegaly.

CO2 BL2 5. Explain about the type & cause of jaundice.

CO2 BL6 6.Write about physiologic jaundice of the new born.

CO2 BL1 7. Define bleeding time.

PART B – (1 X 5 = 5 Marks)

Answer any ONE question

CO4 BL6 8. Write a note on hyperlipoproteinemia?

CO2 BL2 9. Illustrate in detail about the liver function test SGPT and SGOT.

PART C – (1 X 10 = 10 Marks)

Answer any ONE question

CO4 BL2 10. Describe the causes and pathology of Niemann Pick and Tay Sachs disease.

CO2 BL2 11. Explain in detail about any 5 liver function test with significance and clinical interpretations.

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DEPARTMENT OF BIOCHEMISTRY

UNIT TEST II, APRIL 2023

Class: III B.Sc., Biochemistry **Date: 10.04.2023**

Subject: Clinical Biochemistry **Time:** 12 to 1.00 PM

Subject Code: **Answer Key**

PART A – (5 X 2 = 10 Marks)

Answer any FIVE questions

1. Write the normal constituents of urine.

   It is an aqueous solution of greater than 95% water. Other constituents include urea, chloride, sodium, potassium, creatinine and other dissolved ions, and inorganic and organic compounds. Urea is a non-toxic molecule made of toxic ammonia and carbon dioxide.

2. Define proteinuria.

   Proteinuria is high levels of protein in your urine. Causes may include relatively harmless conditions, including dehydration or intense exercise, or more serious, including kidney disease or immune disorders.

3. State the disease associated with abnormal blood lipid level.

   Secondary lipid metabolism abnormalities can cause a variety of illnesses. Diabetes mellitus, hypothyroidism (LDL hypercholesterolemia), renal illnesses (hypertriglyceridemia, mixed hyperlipoproteinemia, lipoprotein elevation), and cholestatic liver disorders are the most common clinically.

4. Define acromegaly.

   Acromegaly is a rare condition where the body produces too much growth hormone, causing body tissues and bones to grow more quickly. Over time, this leads to abnormally large hands and feet, and a wide range of other symptoms.

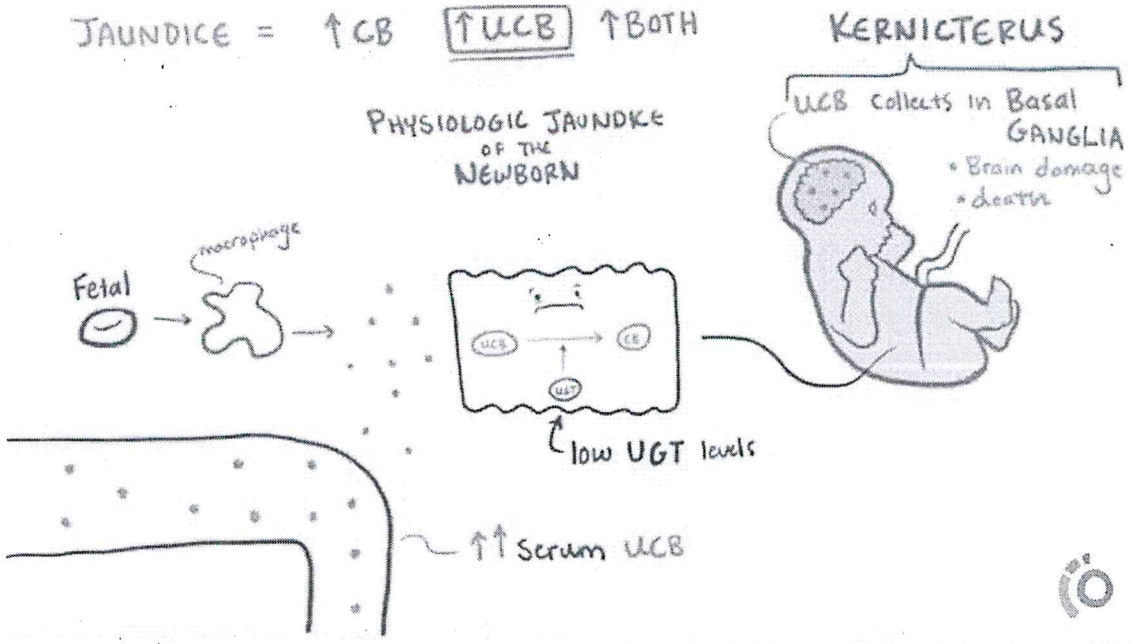
5. Explain about the type & cause of jaundice.

Type & Cause of Jaundice

- **Pre-hepatic Jaundice**
  - ✓ Neonatal (Physiological) Jaundice
  - ✓ Malaria
  - ✓ G 6 PD deficiency
  - ✓ Thalassaemia
  - ✓ Sickle cell disease
  - ✓ Mis-match Blood Transfusion
  - ✓ Auto-immune
- **Intra-Hepatic Jaundice**
  - ✓ Acute Viral hepatitis
  - ✓ Alcohol Cirrhosis
  - ✓ Cirrhosis of Liver
  - ✓ Primray Biliary Cirrhosis,
  - ✓ Haemochromatosis
  - ✓ Wilson Disease
  - ✓ Alpha-1 antitrypsin deficiency
  - ✓ Drug induce – Quinine Group, NSAID, Chemotherapeutic drugs
- **Post Hepatic Jaundice**
  - ✓ Gall Bladder - Common Bile Duct - Pancreatic duct Stone
  - ✓ Gall Bladder - Hepatic – Pancreatic – Duodenal Carcinoma

27

6.Write about physiologic jaundice of the new born.



7. Define bleeding time.

- Determination of bleeding time helps to detect vascular defect & platelet disorder.
- Prolonged bleeding time is generally absociated thrombocytopenia.

Principle:- A 1mm deep prick made on ear lobe or finger of the patient the length of time required for bleeding to cease is record.

Normal Range:- 1-5 minutes

PART B – (1 X 5 = 5 Marks)

Answer any ONE question

8. Write a note on hyperlipoproteinemia?

Definition :2 marks

Explanation : 2 marks

Clinical sig. : 1 mark

9. Illustrate in detail about the liver function test SGPT and SGOT.

Definition : 1 mark

SGPT Test Procedure : 2 marks

SGPT Test Procedure : 2 marks

PART C – (1 X 10 = 10 Marks)

Answer any ONE question

10. Describe the causes and pathology of Niemann Pick and Tay Sachs disease.

Definition : 2 marks

Classification : 5 marks

Clinical interpretation : 3 marks

11. Explain in detail about any 5 liver function test with significance and clinical interpretations.

Definition : 2 marks

Classification : 5 marks

Clinical interpretation : 3 marks

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DEPARTMENT OF BIOCHEMISTRY
Unit test IIAPRIL-2023

Class: III B.Sc Biochemistry | **Date: 10.04.2023**
Subject: Molecular biology | **Max. Mark: 25**
Subject Code: SB26B | **Time: 1 Hour**
(12.00pm to 1.00pm)

Section A (5 x 2 =10)
Answer any **FIVE**questions.

CO 3 BL1 1. Brief about TATA box

CO 3 BL12. Define promoters.

CO 3 BL33. Illustrate the role of sigma factor

CO 3 BL1 4. Name out the inhibitors of transcription

CO 2 BL1 5. Define fidelity of replication.

CO 2 BL6 6. Write the role of ligases in replication.

CO 2 BL1 7. Define SSB protein

Section B (1 x 5 = 10)
Answer any **ONE** question.

CO 3 BL2 8. Describeabout transcription.

CO 5 BL4 9. Explain different types of mutations.

Section C (1 x 10 = 10)
Answer any **ONE** question.

CO 4 BL6:10. Compile about the steps in translation.

CO 2 BL2 11. Describe the various phases of prokaryotic DNA replication.

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Unit test II APRIL-2023
Answer key

Class: III B.Sc Biochemistry **Max. Mark: 25**
Subject: Molecular biology **Time: 1 Hour**
Subject Code: **(12.00pm to 1.00pm)**

Section A (5 x 2 =10)
Answer any **FIVE**questions.

1. Brief about TATA box?

   A TATA box is a DNA sequence that indicates where a genetic sequence can be read and decoded. It is a type of promoter sequence, which specifies to other molecules where transcription begins. Transcription is a process that produces an RNA molecule from a DNA sequence.The sequence of a TATA box consists of "TATAAA" in the gene start transcription region and the sequence of a GC box consists of "GGGCGG" in the gene start transcription region.

2. Define promoters.

   A promoter is a sequence of DNA needed to turn a gene on or off. The process of transcription is initiated at the promoter. Usually found near the beginning of a gene, the promoter has a binding site for the enzyme used to make a messenger RNA (mRNA) molecule.

3. Mention the role of sigma factor

Sigma factors are multi-domain subunits of bacterial RNA polymerase (RNAP) that play critical roles in transcription initiation, including the recognition and opening of promoters as well as the initial steps in RNA synthesis.

4. List out the inhibitors of transcription
   - **Actinomycin D or Dactinomycin and rifampin** are inhibitors of transcription.
   - Actinomycin D is a transcription inhibitor which intercalates into DNA. Actinomycin D forms a very stable complex with DNA, **preventing the unwinding of the DNA double-helix, thus inhibiting the DNA-dependent RNA polymerase activity.**
   - **Rifampin blocks the initiation of mRNA transcription**. Ribosomal and transfer RNA are also equally affected as Mrna

5. Define fidelity of replication.

   Fidelity of replication means the faithful replication of DNA and the production of accurate daughter DNA using the parental DNA as a template. The accuracy of DNA replication is critical to cell reproduction.

6. Write the role of ligases in replication.

DNA ligases are critical enzymes of DNA metabolism. The reaction they catalyse (the joining of nicked DNA) is required in DNA replication and in DNA repair pathways that require the re-synthesis of DNA.

7. Define SSB protein

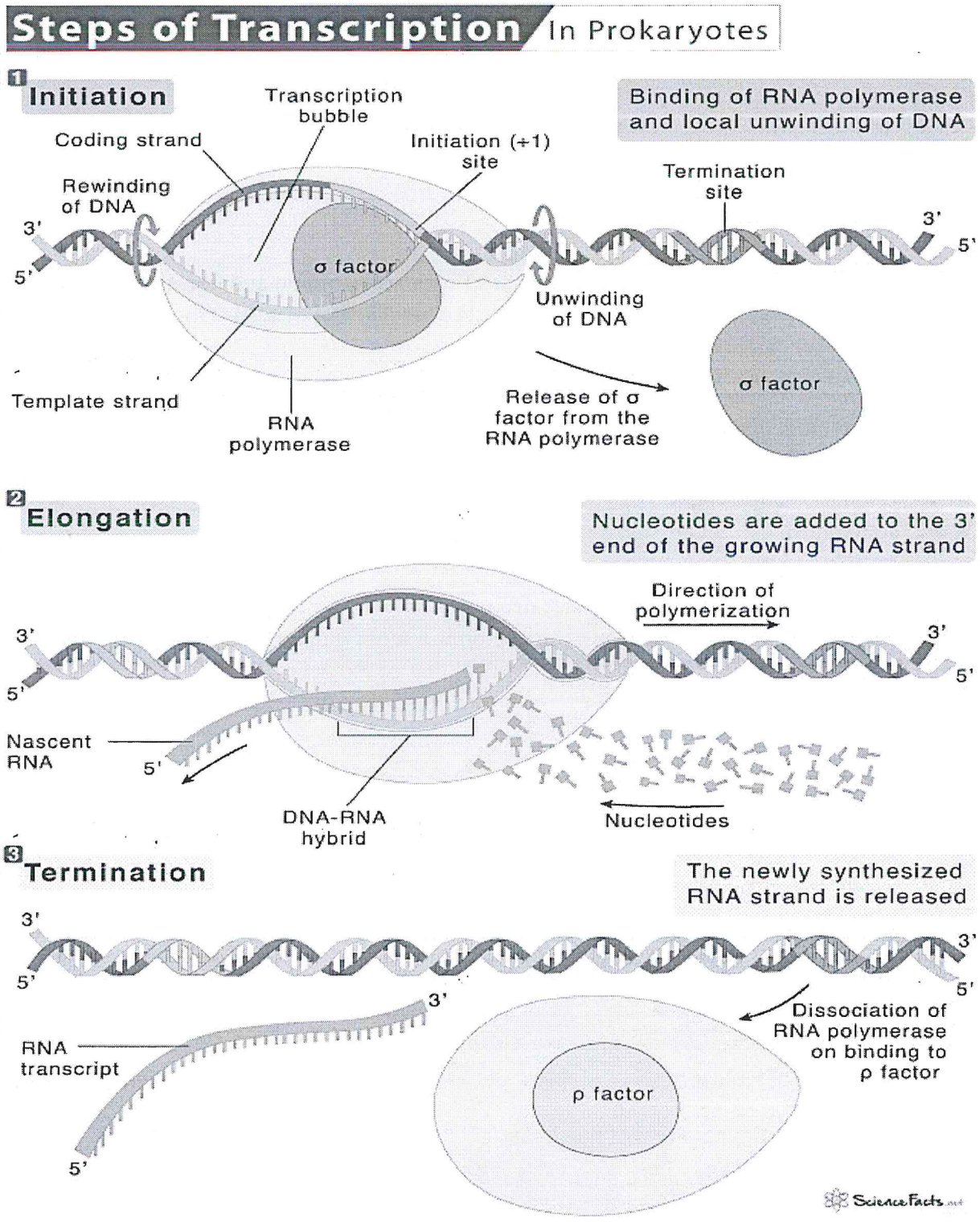
Single-stranded binding proteins (SSBs) are a class of proteins that have been identified in both viruses and organisms from bacteria to humans. Single-Stranded DNA Binding Protein (SSB) binds with high affinity in a cooperative manner to single-stranded DNA and does not bind well to double-stranded DNA. After binding single-stranded DNA, SSB destabilizes helical duplexes, thereby allowing DNA polymerases to access their substrate more easily.

Section B (1 x 5 = 10)

Answer any **ONE** question.

8. Describe about transcription .

Transcription in prokaryotes occurs in the cytoplasm. In prokaryotes, it occurs in three phases- **Initiation, elongation, and termination**. In the initiation phase, RNA polymerase recognizes a promoter site on the DNA strand. Reading a promoter sequence unwinds the DNA strand and initiates transcription.



9. Explain different types of mutations.
   Mutation (1M)
   Base substitution mutations (2M)
   Frameshift mutations (2M)

Section C (1 x 10 = 10)
Answer any **ONE** question.

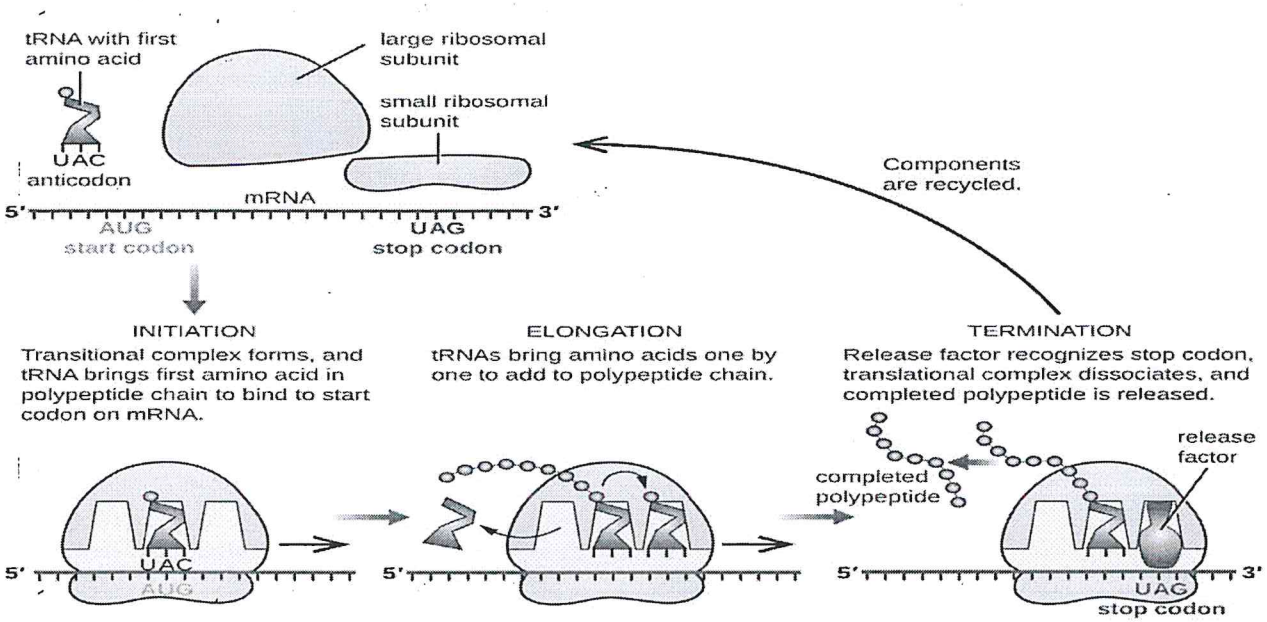
10. Compile the steps in translation.

In prokaryotes, which lack a nucleus, the processes of both transcription and translation occur in the cytoplasm. **The protein biosynthesis begins by the association of a 30s ribosomal subunit and an mRNA at the AUG codon site.**

5 Major Stages of Protein Synthesis

- (a) Activation of amino acids:
- (b) Transfer of amino acid to tRNA:
- (c) Initiation of polypeptide chain:
- (d) Chain Termination:
- (e) Protein translocation

Regulation of protein synthesis in prokaryotes **occurs mainly at the transcriptional level, and involves genetic units known as operons.** An operon is a set of genes that are adjacent to one another in the genome and are coordinately controlled; that is, the genes are either all turned on or all turned off



11. Describe the various phases of prokaryotic DNA replication.
    Diagram (3M)
    Initiation (1M)

Primer Synthesis (1M)
Leading Strand Synthesis (1M)
Lagging Strand Synthesis (1M)
Primer Removal (1M)
Ligation (1M)
Termination (1M)

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DEPARTMENT OF BIOCHEMISTRY

UNIT TEST II, APR 2023

Class: III B.Sc., Biochemistry **Date:** 12.04.2023

Subject: Immunology **Time:** 12 to 1.00 PM

Subject Code: SB46A **Max. Mark:** 25

PART A – (5 X 2 = 10 Marks)

Answer any FIVE questions

CO.1 BL:6 1.Write a note on Innate immunity

CO.1 BL:1 2. State pagocytosis

CO.1 BL:6. 3. Write two significance of null cell.

CO.1 BL:2 4.Differnce between Humoral and Cell mediated immunity

CO.5 BL:1 5. Define Autoimmunity

CO.5 BL:1 6. Tell about Thyroiditis

CO.5BL1 7.Define Graft rejection.

PART B – (1 X 5 = 5 Marks)

Answer any ONE question

CO.1 BL: 3 8. Demonstrate types of immunity.

CO.5 BL:3 9. Write a note on (i) Hashimotos thyroiditis
(ii)Lupuserythematosus(iii)Rheumatoid arthritis.

PART C – (1 X 10 = 10 Marks)

Answer any ONE question

CO.1 BL: 4 10.Explain in detail about Humoral and cell mediated immunity.

CO.5 BL: 6 11. Write in detail account on types of hypersensitivity.

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DEPARTMENT OF BIOCHEMISTRY

UNIT TEST II, APR 2023

Class: III B.Sc., Biochemistry **Date:** 12.04.2023

Subject: Immunology **Time:** 12 to 1.00 PM

Subject Code: SB46A **Max. Mark:** 25

PART A – (5 X 2 = 10 Marks)

Answer any FIVE questions

CO.1 BL:6 1.**Write a note on Innate immunity.**

The immunity that is present at the time of birth of an individual is known as innate immunity.Also called non-specific immunity, it is inherited or passed genetically from parents to children.It also provides the first line of defense to the body.

CO.1 BL:1 2. **State phagocytosis**

Phagocytosis is an important process for nutrition in unicellular organisms, while in multicellular organisms it is found in specialized cells called phagocytes. Phagocytosis consists in recognition and ingestion of particles larger than 0.5 μm into a plasma membrane derived vesicle, known as phagosome.

CO.1 BL:6. 3.**Write two significance of null cell.**

Null cells are large granular lymphocytes that develop inside the bone marrow and **attack pathogens and abnormal cells**. These cells do not have receptors like one would typically find on either mature B cells or T cells

CO.1 BL:2 4.**Differnce between Humoral and Cell mediated immunity.**

The major difference between humoral and cell-mediated immunity is that humoral immunity produces antigen-specific antibodies, whereas cell-mediated immunity does not. T lymphocytes, on the other hand, kill infected cells by triggering apoptosis.

CO.5 BL:1 5.**Define Autoimmunity**

A condition in which the body's immune system mistakes its own healthy tissues as foreign and attacks them. Most autoimmune diseases cause inflammation that can affect many parts of the body. The parts of the body affected depend on which autoimmune disease a person has.

CO.5 BL:1 6.**Tell about Thyroiditis.**

Thyroiditis is inflammation of your thyroid gland. Your thyroid is a small, butterfly-shaped gland located at the front of your neck under your skin. It's a part of your endocrine system and controls many of your body's important functions by producing and releasing certain hormones.

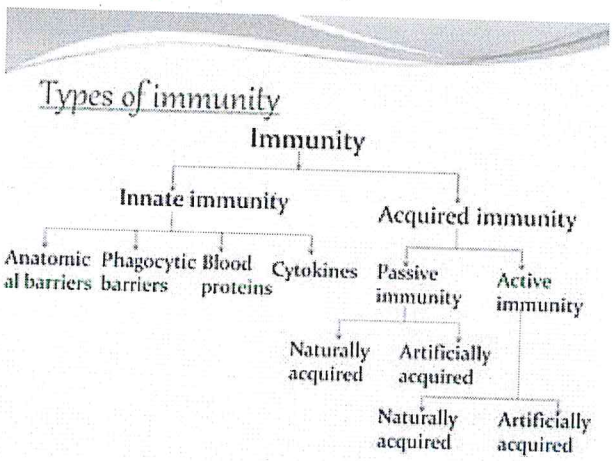
CO.5 BL1 **7.Define Graft rejection.**

Graft rejection occurs when the recipient's immune system attacks the donated graft and begins destroying the transplanted tissue or organ. The immune response is usually triggered by the presence of the donor's own unique set of HLA proteins, which the recipient's immune system will identify as foreign.

PART B – (1 X 5 = 5 Marks)

Answer any ONE question

CO.1 BL: 3 **8. Demonstrate types of immunity.**



Active vs. Passive Immunity – Summary

Active Immunity	Passive Immunity
An Individual's own immune system produces the antibodies needed.	Involves the introduction of external antibodies
Direct contact with antigen stimulates antibody production	The pathogen does not need to have direct contact with the body.
Response takes time to develop and there is a lag phase	Rapid response
Long-lasting	Transient
Generates immunological memory	No memory response
It does not work with immunodeficient patients	Works in immunodeficient patients
Few adverse events	Risk of hypersensitivity reactions and serum sickness (especially with non-animal sources)

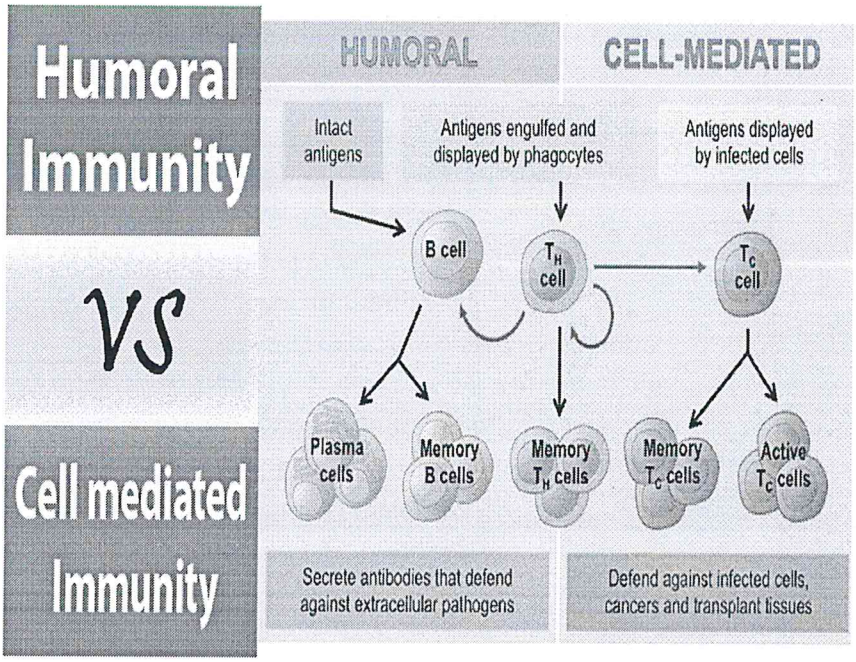
CO.5 BL:3 9. Write a note on (i) Hashimotos thyroiditis (ii)Lupuserythematosus (iii)Rheumatoid arthritis.

(i)Hashimoto's thyroiditis can cause your thyroid to not make enough thyroid hormone. It is an autoimmune disease. It occurs when your body makes antibodies that attack the cells in your thyroid. Symptoms may include an enlarged thyroid gland (goiter), tiredness, weight gain, and muscle weakness
(ii)Systemic lupus erythematosus (SLE), is the most common type of lupus. SLE is an autoimmune disease in which the immune system attacks its own tissues, causing widespread inflammation and tissue damage in the affected organs. It can affect the joints, skin, brain, lungs, kidneys, and blood vessels.
(iii)**Rheumatoid arthritis.**or RA, is an autoimmune and inflammatory disease, which means that your immune system attacks healthy cells in your body by mistake, causing inflammation (painful swelling) in the affected parts of the body. RA mainly attacks the joints, usually many joints at once.

PART C – (1 X 10 = 10 Marks)

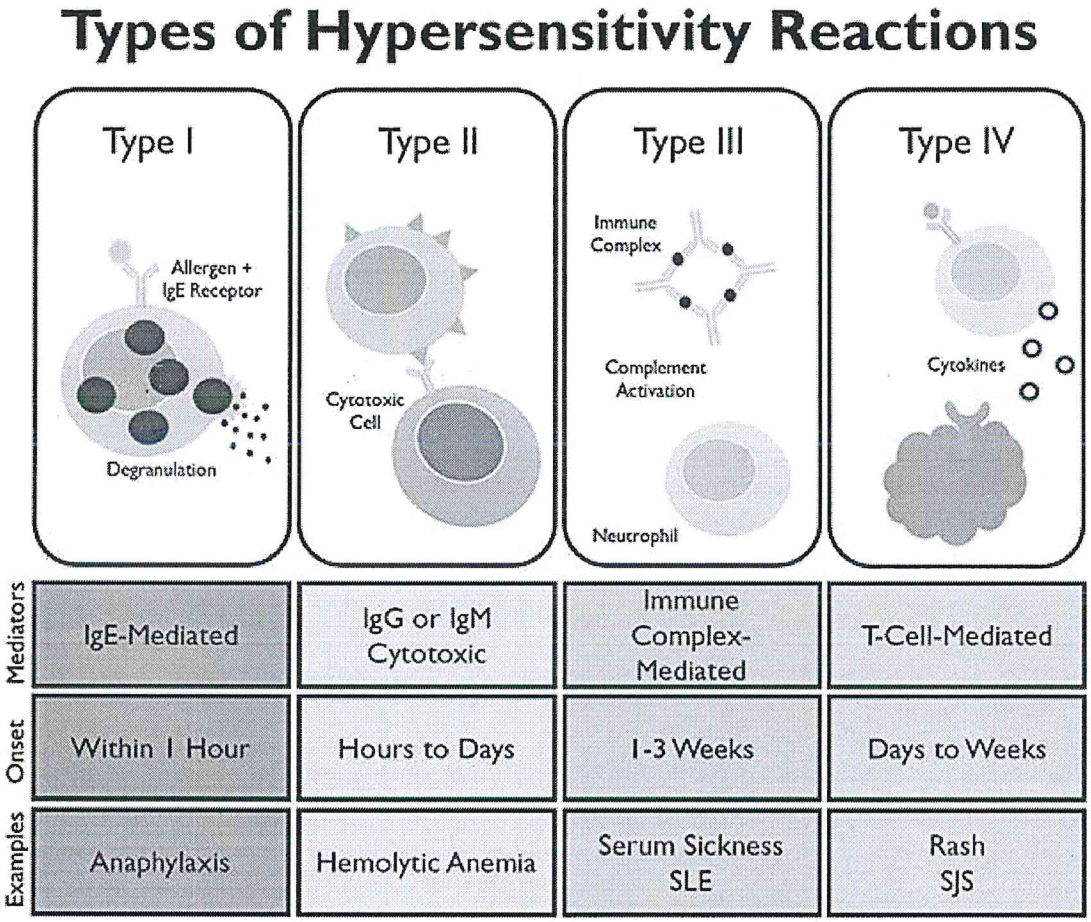
Answer any ONE question

CO.1 BL: 4 10.**Explain in detail about Humoral and cell mediated immunity.**



S.N.	Characteristics	Humoral Immunity	Cell-mediated Immunity
1.	Definition	The immunity mediated by macromolecules found in the extracellular body fluids is called humoral immunity. ("humor" a medieval term for body fluid)	The immunity that identifies and destroys infected cells in the body is called cell-mediated immunity.
2.	Mediator	The main cell involved in humoral immunity are B-cells.	The main cell involved in cell-mediated immunity are T-cells.
3.	Components	B cells, T cells, and macrophages.	Helper T cells, cytotoxic T-cells, natural killer cells, and macrophages.
4.	Pathogen	The humoral immunity protects against extracellular pathogens and also their toxin.	The cell-mediated immunity protects against intracellular pathogens.
5.	Pathogen recognition	Recognize antigens or pathogens that are circulating in the lymph or blood.	It responds to any cell that displays aberrant MHC markers, including cells invaded by pathogens, tumor cells, or transplanted cells.
6.	Antigen detectors	Phagocytes and antibodies themselves are used to	Receptors and MHC molecules on the cell surfaces are used to

CO.5 BL: 6 11. **Write in detail account on types of hypersensitivity.**



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DEPARTMENT OF BIOCHEMISTRY
UNIT TEST – II, APRIL- 2023

Class: III B.Sc., Biochemistry
Subject: Biotechnology
Subject Code: SB46B

Date: 13.04.2023
Time: 12 to 1.00 PM
Max. Mark: 25

PART A – (5 X 2 = 10 Marks)
Answer any FIVE questions

CO.6 BL: 1 1. Enumerate about Northern blotting.
CO.6 BL: 2 2. Quote about Southern blotting.
CO.6 BL: 6 3. Write about DNA fingerprinting technique.
CO.1 BL: 6 4. Write about genetic engineering in insect resistance plants.
CO.5 BL: 6 5. Write about Fermentation technology.
CO.5 BL: 1 6. Define Streptomycine
CO.5 BL: 6 7. Write in detail about Microbial **Protease enzyme**

PART B – (1 X 5 = 5 Marks)
Answer any ONE question

CO.1 BL: 6 8. Write short notes on production of Insulin by rDNA technology.
CO.5 BL: 2 9. Explain in detail about the Streptomycine production and its application.

PART C – (1 X 10 = 10 Marks)
Answer any ONE question

CO.1 BL: 4 10. Explain in detail about the principle, steps and types involved in PCR. Give its applications in clinical diagnosis and forensic science.
CO.5 BL: 4 11. Explain in detail about Ethanol Production by Fermentation Technology

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DEPARTMENT OF BIOCHEMISTRY
UNIT TEST – II, MARCH - 2023

Class: III B.Sc., Biochemistry | **Date: 13.04.2023**
Subject: Biotechnology | **Time: 12 to 1.00 PM**
Subject Code: | **Max. Mark: 25**

Answer Key

PART A – (5 X 2 = 10 Marks)
Answer any FIVE questions

1. **Enumerate about Northern blotting.**
   - Northern blot is a laboratory analysis method used to study RNA. Specifically, purified RNA fragments from a biological sample (such as blood or tissue) are separated by using an electric current to move them through a sieve-like gel or matrix, which allows smaller fragments to move faster than larger fragments.

2. **Quote about Southern blotting.**
   - The Southern blotting combines the transfer of electrophoresis-separated DNA fragments to a filter membrane in a process called blotting, and the subsequent fragment detection by probe hybridization. The method is named after the British biologist Edwin Southern, who first published it in 1975.

3. **Write about DNA fingerprinting technique.**
   - DNA fingerprinting is a laboratory technique used to determine the probable identity of a person based on the nucleotide sequences of certain regions of human DNA that are unique to individuals.

4. **Write about genetic engineering in insect resistance plants.**
   - Genetic engineering facilitates development of insect resistant crops by expressing bacterial d-endotoxins and vegetative insecticidal proteins and other plant genes like lectins, protease inhibitors, etc.
   - **Bt crops**. Bt crops are plants genetically engineered (modified) to contain the endospore (or crystal) Bt toxin to be resistant to certain insect pests.

5. **Write about Fermentation technology.**

Fermentation technology is a field which utilises microorganisms and enzymes to produce compounds that find use in pharmaceutical, chemical, energy, material and food industries. Biotechnology can be defined as the amalgamation of natural sciences and engineering techniques to utilise organisms, cells and their parts for industrial products and services. Thus, fermentation is a biotechnological tool that uses microorganisms to produce several industrial products.

Fermentation is a very ancient technique that has been in use for thousands of years. It was used for the first time in the production of beer. Today, biotechnology

has intersected with fermentation technology to create value-added products such as hormones, enzymes, antibiotics and other metabolites.

6. Define Streptomycine

Streptomycin can be defined as the process that produces an antibiotic, i.e. streptomycin, using the strain of actinomycetes. *Streptococcus griseus* is used in the large scale production of streptomycin, which utilizes carbon, nitrogen, mineral source etc. incorporated in the fermentation medium.

Streptomycin: Streptomycin refers to the broad spectrum aminoglycoside antibiotic, which works actively against the gram-negative bacteria. Streptomycin is commercially available as "**Hypochloride**" with a chemical formula $C_{21}H_{39}N_7O_{12}.3HCL$.

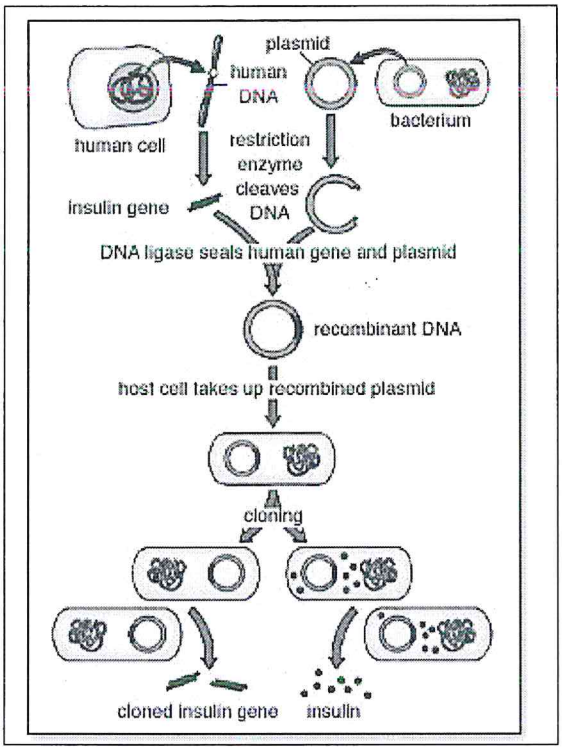
7. Write in detail about Microbial **Protease enzyme.**

- Proteases are the second most important industrial enzymes after amylase.
- About 500 tons of the enzymes are produced per year.
- This can be produced commercially from bacteria and fungi.
- The proteases on the market include-alkaline, neutral and acidic proteases.

i. **Alkaline protease**
ii. Neutral protease
iii. **Acidic protease**

PART B – (1 X 5 = 5 Marks)
Answer any ONE question

8. **Write short notes on production of Insulin by rDNA technology.**
   - Insulin is **synthesized as preproinsulin and processed to proinsulin**. Proinsulin is then converted to insulin and C-peptide and stored in secretary granules awaiting release on demand. Insulin synthesis is regulated at both the transcriptional and translational level.



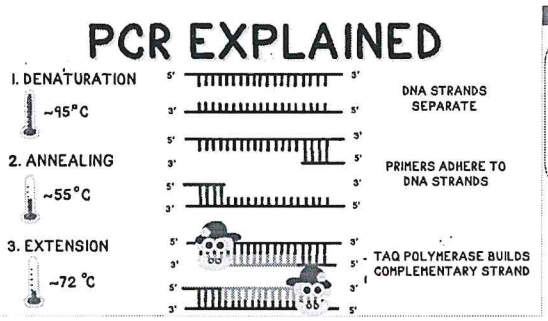
9. Explain in detail about the Streptomycine production and its application.

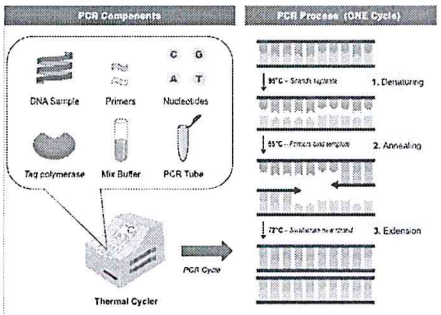
Definition : 2 Marks
Procedure : 3 Marks

PART C – (1 X 10 = 10 Marks)
Answer any ONE question

10. Explain in detail about the principle, steps and types involved in PCR. Give its applications in clinical diagnosis and forensic science.

- Polymerase chain reaction (abbreviated PCR) is a laboratory technique for rapidly producing (amplifying) millions to billions of copies of a specific segment of DNA, which can then be studied in greater detail.





11. Explain in detail about Ethanol production by fermentation technology

Definition : 2 Marks
Experimental Procedure : 8 Marks

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DEPARTMENT OF BIOCHEMISTRY

UNIT TEST II,APRIL 2023

Class	**:** IM. Sc Biochemistry	**Date**	: 10.04.2023
Subject	**:** Enzyme and Enzyme Technology	**Time**	**:** 12 to 1.00 PM
Subject Code: MG22A		**Max. Mark:** 25	

PART A – (5 X 1 = 5 Marks)

Answer any FIVE questions

CO.3 BL:1 1. State Eadie Hofstee plot.

CO.1 BL:2 2. Discuss how lysine is identified in the active site of the enzyme.

CO.4 BL:6 3. Write a short note on activators.

CO.4 BL:1 4. Define enzyme inhibition.

CO.5 BL:1 5. Tell aboutabzymes.

CO.4 BL:1 6. State about feed back inhibition.

CO.4 BL:1 7. Tell about "Ping pong mechanism"

PART B – (2 X 5 = 10 Marks)

Answer any TWOquestion

CO.3 BL:2 8. DescribeLB plot.

CO.1 BL:3 9.Illustrate how the active site of the enzyme is mapped.

CO.4 BL:4 10. Explain bisubstrate reactions

CO.4 BL:6 11. Write about Regulation of glycogen synthase and glycogen phosphorylase.

PART C – (1 X 10 = 10 Marks)

Answer any ONE question

CO.3 BL:4 12.Explain MM equation.

CO.5 BL:2 13. Discuss aboutenzymes in industry.

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DEPARTMENT OF BIOCHEMISTRY

UNIT TEST II,APRIL 2023

Class : IM. Sc Biochemistry **Date** : 10.04.2023

Subject : Enzyme and Enzyme Technology **Time** : 12 to 1.00 PM

Subject Code: MG22A **Max. Mark:** 25

PART A – (5 X 1 = 5 Marks)

Answer any FIVE questions

1. State Eadie Hofstee plot.

   An Eadie–Hofstee diagram (also Woolf–Eadie–Augustinsson–Hofstee. or Eadie–Augustinsson plot) is a graphical representation of enzyme kinetics in which. reaction velocity is plotted as a function of the velocity vs. substrate concentration.

2. Discuss how lysine is identified in the active site of the enzyme.

   Trinitro benzene sulphones reacts with myosine ATPase lysine residue.

3. Write a short note on activators.

   Enzyme activators are molecules that bind to enzymes and increase their activity. They are the opposite of enzyme inhibitors. These molecules are often involved in the allosteric regulation of enzymes in the control of metabolism.
   Ex: ATP is an activator for Aspartate transcarbamyolase

4. Define enzyme inhibition.

   An enzyme inhibitor is a molecule that disrupts the normal reaction pathway between an enzyme and a substrate. Reversible and irreversible inhibitors are chemicals which bind to an enzyme to suppress its activity.
   Ex: CTP is an inhibitor for Aspartate transcarbamyolase

5. **Tell aboutabzymes.**

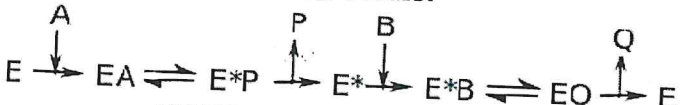
   Abzyme means antibody behaving like an enzyme. It is also called catmab or catalytic monoclonal antibody. We know that antibody binds to the target antigen or pathogens and then activates the complement system, phagocytosis, and other processes to eliminate the pathogen

6. **State about feed back inhibition.**

   Suppression of the activity of an enzyme, participating in a sequence of reactions by which a substance is synthesized, by a product of that sequence.

7. **Tell about "Ping pong mechanism"**

Ping-pong mechanism, also called a double-displacement reaction, is characterized by the change of the enzyme into an intermediate form when the first substrate to product reaction occurs.



PART B – (2 X 5 = 10 Marks)

Answer any TWOquestion

8. Describe LB plot.

Derivation (2M)
Graph (2M)
Slope (1M)

9. Illustrate how the active site of the enzyme is mapped.

Tagging molecule for particular amino acid at active site (2M)

Mechanism of action of tagging molecule (2M)

Examples of tagging molecule (1M)

10. **Explain bisubstrate reactions**

Many enzymes have actives that can bind and accommodate multiple substrates. Such enzymes can carry out reactions which involve two substrates and two products and these reactions are called bisubstrate reactions.

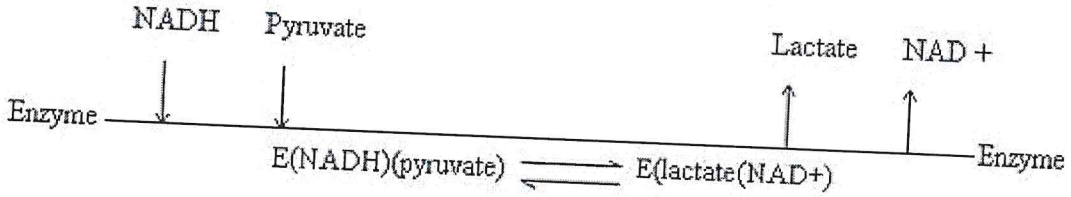
There are two common types of multiple-substrate reactions that enzyme can carry out:

1. Sequential reactions
2. Double-displacement reactions

Sequential reactions

In sequential reactions, all the substrates bind to the active site before the enzyme can convert them into a product. These binding can be ordered or random.

In Ordered sequential reaction, the substrate molecules bind to the active sites in a specific order and the products are released in a specific order. One common example involves lactate dehydrogenase.

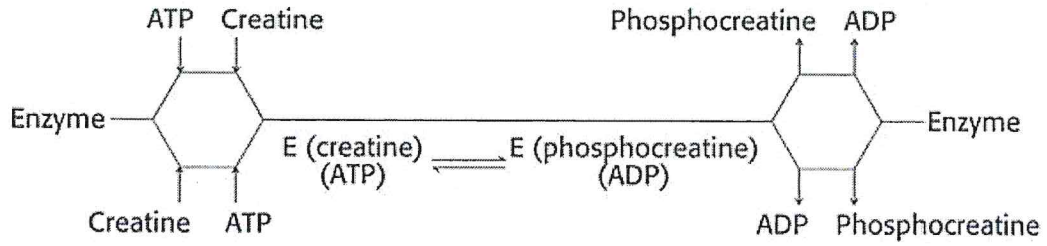


Steps:

- The coenzyme (NADH) binds the active site of the enzyme.
- Next, the substrate would bind to the active site.
- Binding of substrate and coenzyme would form ternary structure. Catalysis would begin.
- After catalysis, lactate is released first, followed by the release of NAD+.

Random sequential reactions

In these reactions, the order of the substrate binding, as well as their release, does not matter, i.e. the binding of substrates is completely random. Example of such a reaction is creatin kinase.

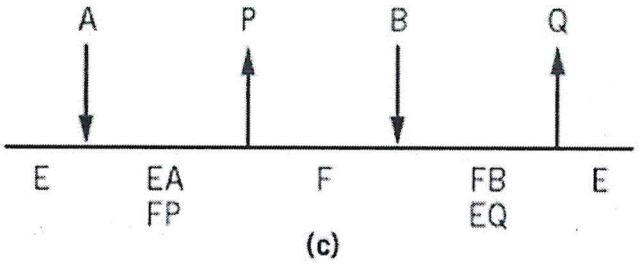


Steps:

- Either ATP or creatin can enter the active site first.
- Once both enter, the formation of ternary structure and catalysis begins.
- The product release is also random.

Double displacement reactions (Ping Pong reaction)

In these reactions, the first substrate is converted to a product followed by the conversion of the second substrate to a product. The binding of the substrate to the enzyme would form the Enzyme-Substrate complex (EA). The substrate is converted to the product and Enzyme-product complex (EP) formed.



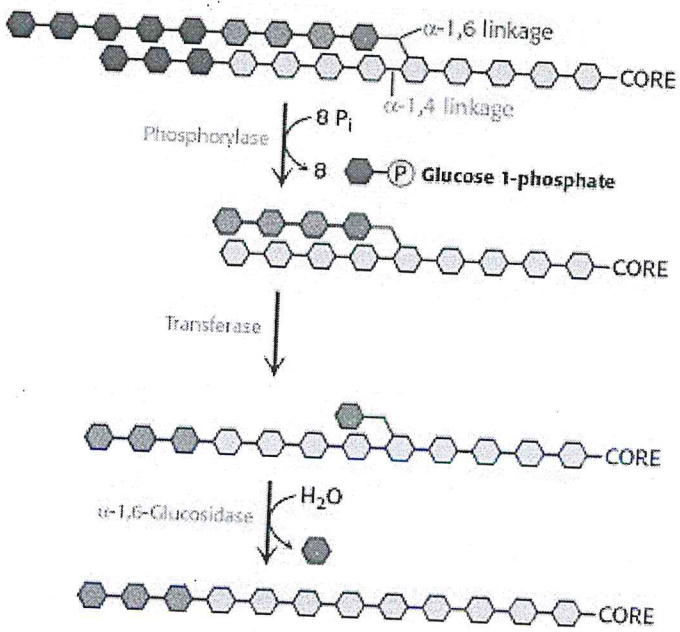
The release of the first product (P) would further change the conformation of the enzyme (F) such that the second substrate can bind to the enzyme. The release of the second product (Q) would change the conformation of the enzyme such that the original enzyme (E) confirmation is achieved.

Transamination reaction is an example of a ping-pong reaction.

11. **Write about Regulation of glycogen synthase and glycogen phosphorylase.**

Glycogen-debranching enzyme plays an important role in the degradation of glycogen and has two independent catalytic activities, oligo-1,4→1,4-glucanotransferase and amylo-1,6-glucosidase, on a single 160-kDa protein.

The transferase shifts a block of three glycosyl residues from one outer branch to the other. This transfer exposes a single glucose residue joined by an α-1,6-glycosidic linkage. α-1,6-Glucosidase, also known as the debranching enzyme, hydrolyzes the α-1, 6-glycosidic bond, resulting in the release of a free glucose molecule.



The transferase and α-1,6-glucosidase convert the branched structure into a linear one, which paves the way for further cleavage by phosphorylase.

PART C – (1 X 10 = 10 Marks)

Answer any ONE question

12.Explain MM equation.

- Postulates of MM equation (1M)
- Derivation of MM equation (2M)
- Graph (2M)
- Slope (1M)
- MM equation (1M)
- ½ Vmax (1M)
- Km = S (1M)
- Significance of Km (1M)

13. **Discuss about enzymes in industry.**

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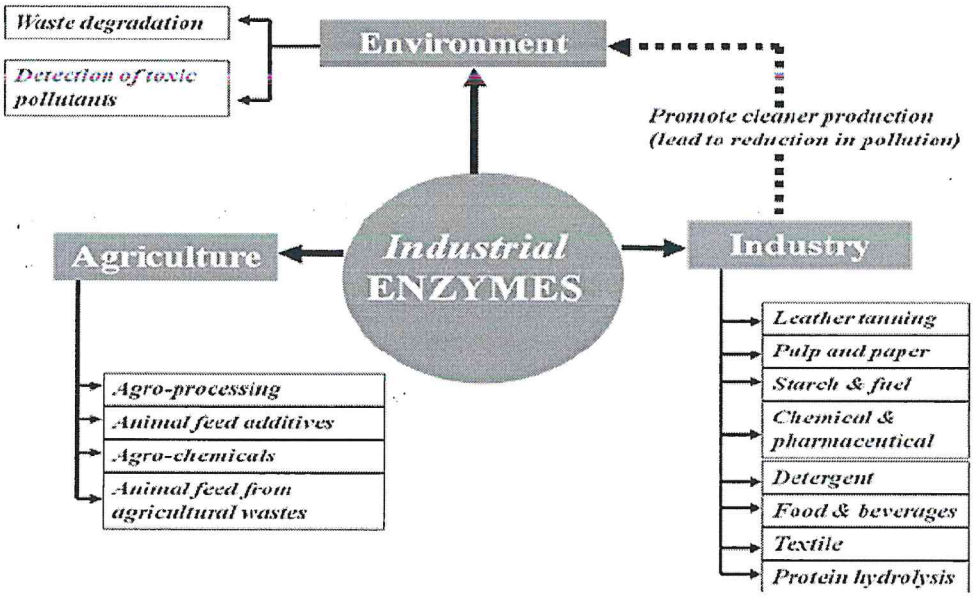

Sector	Enzymes	Applications	References
Pharmaceuticals	Nitrile hydratase, transaminase, monoamine oxidase, lipase, penicillin acylase	Synthesis of intermediates for production of active pharmaceutical ingredients	[2,4,30–38]
Food Processing	Trypsin, amylase, glucose isomerase, papain, pectinase	Conversion of starch to glucose, production of high fructose corn syrup, production of prebiotics, debittering of fruit juice	[2,5,9–12,39–43]
Detergent	Protease, lipase, amylase, cellulase	Stain removal, removal of fats and oils, color retention,	[44–48]
Biofuels	Lipase, cellulase, xylanase	Production of fatty acid methyl esters, decomposition of lignocellulotic material for bioethanol production	[18,19,44,49–57]
Paper and Pulp	Lipase, cellulase, xylanase	Removal of lignin for improved bleaching, improvement in fiber properties	[2,4,44,58–61]

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DEPARTMENT OF BIOCHEMISTRY
UNIT TEST-II APRIL-2023

Class : **I M.Sc., Biochemistry** **Date: 11.04.2023**
Subject : Cellular Metabolism with Clinical Correlation-I **Time:** 12:00 -1:00 PM
Subject Code : MG22B **Max. Mark: 25**

Section A (5 x 1 =5 Marks)

Answer any **FIVE** questions

CO1 BL6	1. Write the importance of glyoxalate cycle.
CO4 BL2	2. Discuss about transamination.
CO4 BL1	3. Define SAM and its importance.
CO4 BL4	4. Explain about oxidative deamination.
CO4 BL1	5. Give any two inhibitors of one carbon transfer metabolism.
CO1 BL1	6. Listout how many ATP produced in glycolysis
CO3 BL4	7. Explain the importance of NADPH.

Section B (2x 5 = 10 Marks)

Answer any **TWO** questions

CO1 BL4	8. Explain in detail about glycolysis.
CO2 BL4	9. Explain about the Pyruvate dehydrogenase complex-mechanism and regulation.
CO3 BL1	10. Discuss in detail about Uronic acid pathway..
CO1 BL4	11. Explain in detail about Regulation of urea cycle.

Section C (1 x 10 = 10 Marks)

Answer any **ONE** question

CO1 BL2	12. Describe the steps involved in synthesis and degradation of starch.
CO3 BL1	13. Illustrate the trans methylation and one carbon transfer mechanism.

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DEPARTMENT OF BIOCHEMISTRY
UNIT TEST-II APRIL-2023
ANSWER KEY

Class : **I M.Sc., Biochemistry** **Date: 11.04.2023**
Subject : Cellular Metabolism with Clinical Correlation-I **Time:** 12:00 -1:00 PM
Subject Code : **Max. Mark: 25**

Section A (5 x 1 =5 Marks)

Answer any **FIVE** questions

1. Write the importance of glyoxalate cycle.

The glyoxylate cycle, a variation of the tricarboxylic acid cycle, is an anabolic pathway occurring in plants, bacteria, protists, and fungi. The glyoxylate cycle centers on the conversion of acetyl-CoA to succinate for the synthesis of carbohydrates. In microorganisms, the glyoxylate cycle allows cells to use two carbons (C2 compounds), such as acetate, to satisfy cellular carbon requirements when simple sugars such as glucose or fructose are not available. The cycle is generally assumed to be absent in animals, with the exception of nematodes at the early stages of embryogenesis.

2. Discuss about transamination.

Transamination is process by which the amino group of amino acid is transferred to an acceptor keto acid. It is catalyzed by transaminases / aminotransferases.

Eg. α- ketoglutarat to yield glutamate
oxaloacetate to yield aspartate.

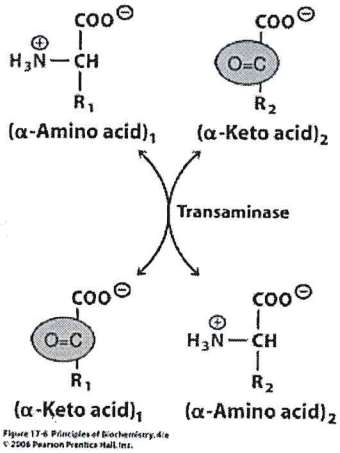

Figure 17-6 Principles of Biochemistry, 4/e
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3. Define SAM and its importance.

SAM is considered the universal methyl donor and is used by methyltransferases to methylate metabolites, RNA, DNA, and proteins, including histones. After the methyl group is transferred from SAM to an acceptor substrate, S-adenosylhomocysteine (SAH) is produced.

4. Explain about oxidative deamination.

Oxidative deamination is an important step in the catabolism of amino acids, generating a more metabolizable form of the amino acid, and also generating ammonia as a toxic byproduct. The ammonia generated in this process can then be neutralized into urea via the urea cycle.

5. Give any two inhibitors of one carbon transfer metabolism.
   1. Methotrexate and
   2. 5-Fluoro Uracil

6. Listout how many ATP produced in glycolysis
   10 ATP produced, 2 ATP utilization on the hole 10-2=8 molecules of ATP gained upon glycolysis.

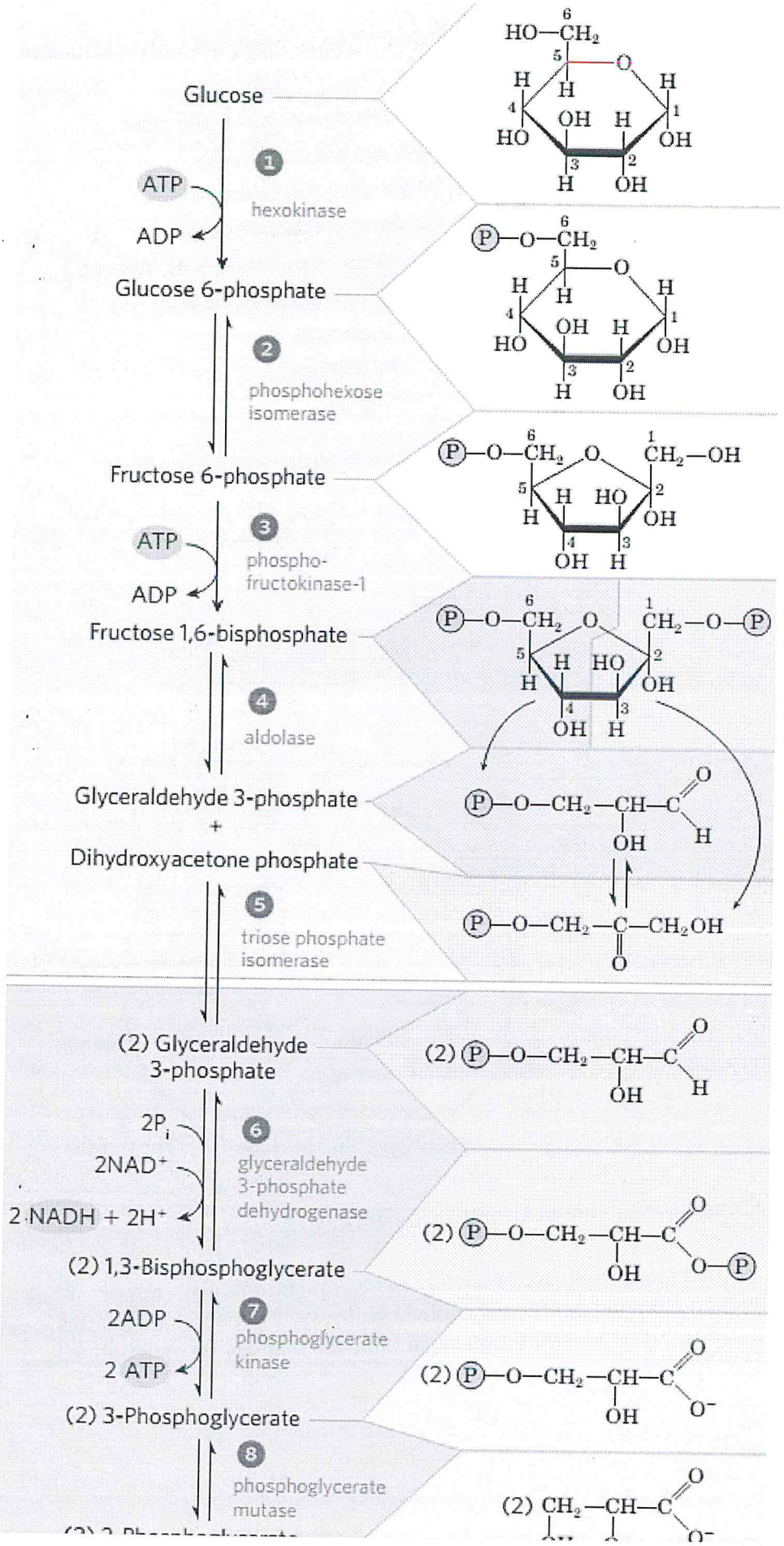
7. Explain the importance of NADPH.

NADPH play a vital role in Lipid metabolism and Nucleic acid biosynthesis, without NADPH both synthesis and degradation of lipid may get affected. NADPH produced in HMP shunt cycle only.

Section B (2x 5 = 10 Marks)

Answer any **TWO** questions

8. Explain in detail about glycolysis.


Glucose
ATP
ADP
1
hexokinase
Glucose 6-phosphate
2
phosphohexose isomerase
Fructose 6-phosphate
ATP
ADP
3
phospho-fructokinase-1
Fructose 1,6-bisphosphate
4
aldolase
Glyceraldehyde 3-phosphate
+
Dihydroxyacetone phosphate
5
triose phosphate isomerase
(2) Glyceraldehyde 3-phosphate
2Pi
2NAD+
2 NADH + 2H+
6
glyceraldehyde 3-phosphate dehydrogenase
(2) 1,3-Bisphosphoglycerate
2ADP
2 ATP
7
phosphoglycerate kinase
(2) 3-Phosphoglycerate
8
phosphoglycerate mutase

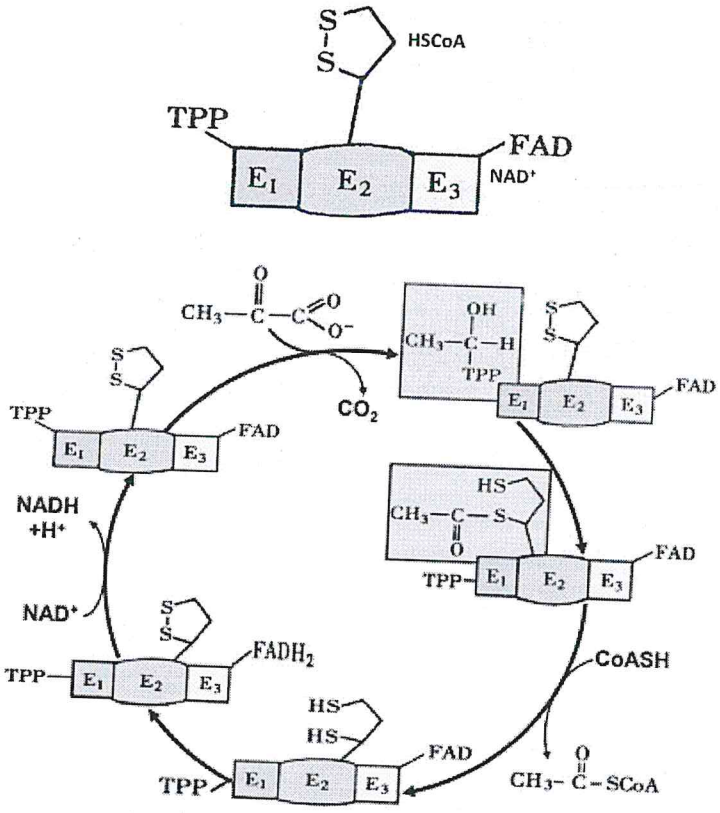
9. Explain about the Pyruvate dehydrogenase complex-mechanism and regulation.

Pyruvate dehydrogenase complex:

Es:
- E_1 pyruvate dehydrogenase
- E_2 dihydrolipoyl transacetylase
- E_3 dihydrolipoyl dehydrogenase

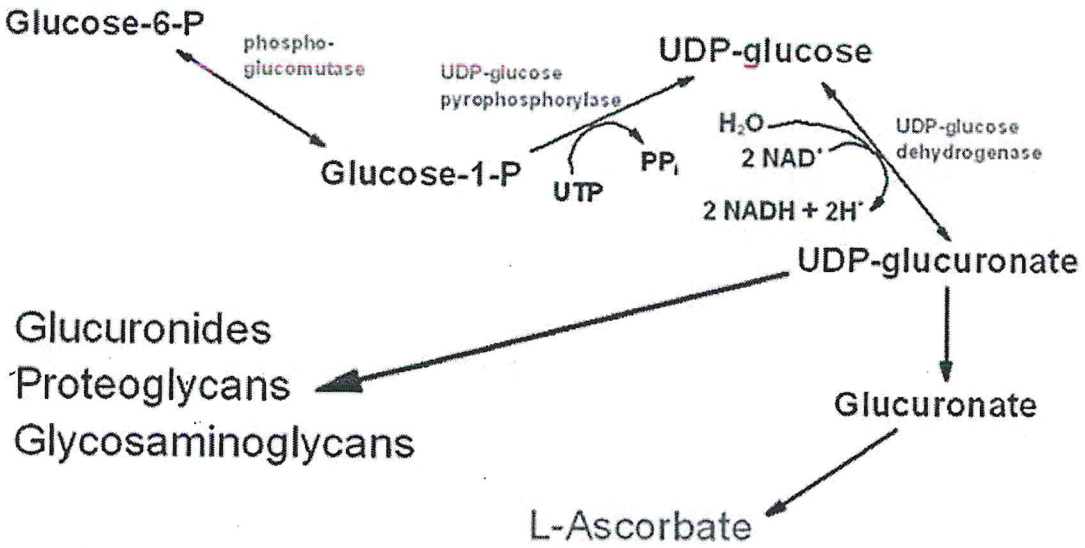
cofactors:
- thiamine pyrophosphate, TPP (VB_1)
- HSCoA (pantothenic acid)
- lipoic Acid
- NAD^+ (Vpp)
- FAD (VB_2)

Pyruvate dehydrogenase complex:



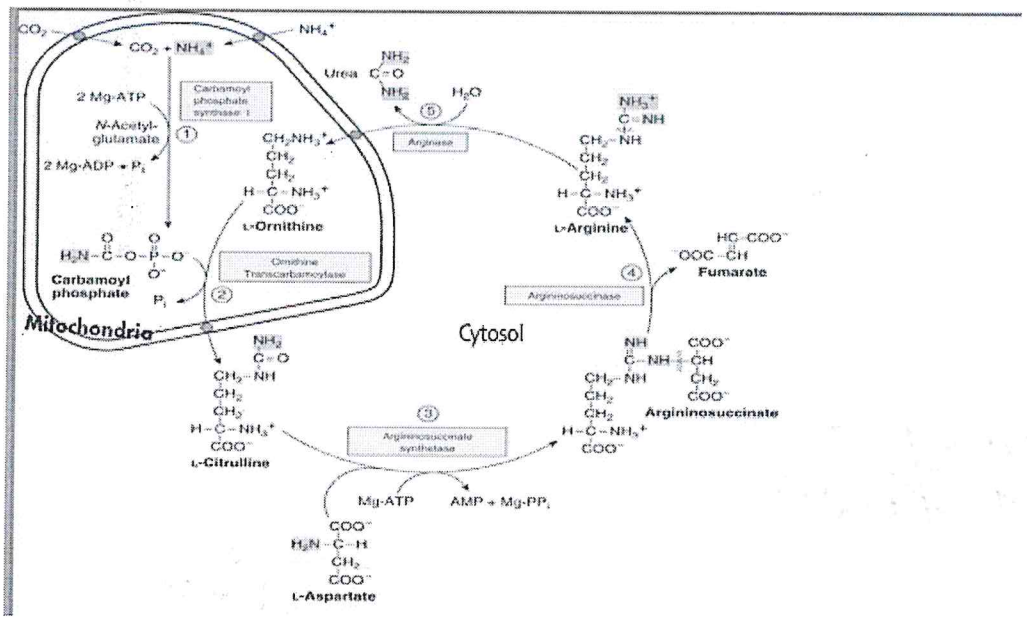
10. Discuss in detail about Uronic acid pathway.

The glucuronic acid pathway is a quantitatively minor route of glucose metabolism. Like the pentose phosphate pathway, it provides biosynthetic precursors and inter-converts some less common sugars to ones that can be metabolized.

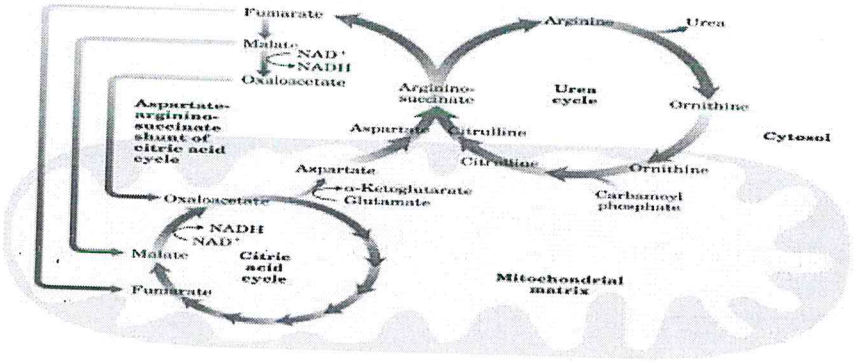


- Uronic acid pathway is an alternative oxidative pathway for glucose metabolism.
- It catalyzes the conversion of glucose to glucuronic acid, ascorbic acid, and pentoses.
- It does not lead to the formation of ATP.

11. Explain in detail about Regulation of urea cycle.



INTERACTION OF UREA CYCLE AND CITRIC ACID CYCLE
Via ASPARTATE-ARGININOSUCCINATE SHUNT



Section C (1 x 10 = 10 Marks)

Answer any **ONE** question

12. Describe the steps involved in synthesis and degradation of starch.

Metabolic Pathway	: 5 marks
Regulation	: 3 Marks
Explanation	: 2 Marks

13. Illustrate the trans methylation and one carbon transfer mechanism.

Metabolic Pathway	: 5 marks
Regulation	: 3 Marks
Explanation	: 2 Marks

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DEPARTMENT OF BIOCHEMISTRY
UNIT TEST - II, APRIL -2023

Class : **I M.Sc., Biochemistry** **Date: 12.04.2023**
Subject : **Cellular Metabolism With Clinical Correlation II** **Time: 12 to 1.00 PM**
Subject Code : **MG22C** **Max. Mark: 25**

Section A (5 x 1 =5)
Answer any FIVE questions

CO. 2 BL1.1. Define Cerebroides.
CO. 1 BL2 .2.Classify leukotriens.
CO. 1 BL1 .3. List out the types of prostaglandins.
CO. 2 BL1 .4. Enumerate the significance of HDL.
CO. 3 BL1. 5. Define bile acids.
CO. 4 BL1. 6.State about glucogenic amino acid.
CO. 3 BL6. 7. Write about hypolipidemic agent

Section B - (2 x 5 = 10)
Answer any TWO questions

CO.3 BL. 2 8. Summarize about lipoprotein metabolism
CO.2 BL .2. 9. Describe the Biosynthesis of Plasmolgens.
CO 4 BL. 6. 10. Write down biosynthesis of spermine and spermidine.
CO 3 BL 4. 11. Explain in detail about the causes, symptoms and diagnosis of atherosclerosis.

Section C – (1 x 10 = 10)
Answer any ONE question

CO1 BL4 12. Explain in Biosynthesis of Triacylglycerol.
CO 3 BL 3.13. Illustrate cholesterol biosynthesis

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DEPARTMENT OF BIOCHEMISTRY
UNIT TEST - II, MARCH -2023

Class : **I M.Sc., Biochemistry** **Date: 12.04.2023**
Subject : **Cellular Metabolism With Clinical Correlation II** **Time: 12 to 1.00 PM**
Subject Code : **Max. Mark: 25**

Answer Key

Section A (5 x 2 =10)
Answer any FIVE questions

1. **Define Cerebroides**

Cerebrosides is glycosphingolipids called monoglycosylceramides which are important components in animal muscle and nerve cell membranes. They consist of a ceramide with a single sugar residue at the 1-hydroxyl moiety.

2. **Classify leukotriens.**

Leukotrienes (LTs) are potent pro-inflammatory mediators derived fromarachidonic acid by the action of 5-lipoxygenase. There are two groups of LTs: LTB(4) and cysteinyl LTs (LTC(4), LTD(4), and LTE(4)). Both of them play important roles in many inflammatory diseases and allergic responses.

3. **List out the types of prostaglandins.**

There are four principal bioactive prostaglandins generated in vivo:prostaglandin (PG) E_2 (PGE_2), prostacyclin (PGI_2), prostaglandin D_2(PGD_2) and prostaglandin $F_{2\alpha}$ ($PGF_{2\alpha}$).

4. **Enumerate the significance of HDL**

Increasing concentrations of HDL particles are associated with decreasing accumulation of atherosclerosis within the walls of arteries, reducing the risk of sudden plaque ruptures, cardiovascular disease, stroke and other vascular diseases. HDL particles are commonly referred to as "good cholesterol", because they transport fat molecules out of artery walls, reduce macrophage accumulation, and thus help prevent or even regress atherosclerosis.

5. **Define bile acids.**

Bile acids are **potent "digestive surfactants" that promote absorption of lipids (including fat-soluble vitamins), acting as emulsifiers** (1,2). Bile acids represent the primary pathway for cholesterol catabolism and account for ~50% of the daily turnover of cholesterol.

Eg,Cholic acid and chenodeoxycholic acid are the primary bile acids.Secondary bile acids are deoxycholic and lithocholic acids, derived from cholic acid and chenodeoxycholic acid, respectively

6.State about glucogenic amino acid.

Glucogenic amino acid are the precursors of gluconeogenesis for the glucose formation. Eg,Glycine, serine, aspartic acid, glutamic acid, glutamine, valine, methionine, histidine, and arginine.

7. Write about hypolipidemic agent

Hypolipemic drugs decrease the plasmatic concentrations of atherogenic lipoproteins, especially LDL., the agents that transport cholesterol and triglycerides in blood.

The lipid-lowering drugs include statins, fibrates, bile-acid sequestrants, nicotinic acid and acipimox, inhibitors of HMG CoA reductase, S-methyl methionine (vitamin U)

Section B (1 x 5 = 10)

Answer any ONE question

8. Summarize about lipoprotein metabolism

Lipoprotein particle metabolism can occur via the exogenous or endogenous pathway, depending whether the source of origin is dietary or hepatic. Both the exogenous and endogenous metabolic pathways of lipoproteins are outlined below. Exogenous MetabolismThe vast majority of dietary lipids are triglycerides (>95%), and the remaining are phospholipids, free fatty acids, cholesterol and fat-soluble vitamins.Triglycerides from the diet are digested in the gastrointestinal tract to form monoglycerides and free fatty acids through various processes, including gastric lipase, bile emulsification and pancreatic lipase. Similarly, cholesterol esters from the diet undergo a process of de-esterification to form free cholesterol.Monoglycerides, free fatty acids and cholesterol are soluble in the bile acid micelles and can be absorbed from the chymus into the enterocytes due to their smaller size.

Inside the enterocytes, they are reassembled into triglycerides and combined with cholesterol to form large chylomicron lipoproteins. Apolipoprotein B-48 regulates the secretion of these particles into the lacteals, and the chylomicrons then circulate through the lymphatic vessels and into the bloodstream.

Chylomicrons are responsible for the transport of dietary triglycerides and cholesterol from the enterocytes and into the circulation system. In the adipose and muscle tissue the majority of the triglycerides in the chylomicron can be converted to fatty acids and glycerol to provide a source of energy. Depleted of energy, the chylomicron remnants rich in cholesterol travel back to the liver to be cleared from the body, through a process mediated by apoprotein E.

Endogenous Metabolism

Lipoproteins can be synthesized in the liver with endogenous triglycerides and cholesterol in the hepatocytes, such as those from chylomicron remnants. Apolipoprotein B-100 is important in the synthesis of very low-density lipoproteins (VLDL) particles in the liver. When the VLDL particles are released into the bloodstream, they encounter high-density lipoprotein (HDL) particles that donate apolipoprotein C-II and apolipoprotein E to the VLDL particles.

HDL particles are lipoproteins that are initially free of cholesterol and are synthesized in the enterocytes and the liver. The complex metabolism of HDL involved the acquisition of cholesterol from peripheral tissues and other lipoproteins, such that it can be transported to where it is needed. The VLDL then circulates in the bloodstream and travel to the peripheral adipose and muscle tissues in the body. By way of a hydrolysis reaction, the triglycerides can be broken down to supply fatty acids and glycerol to the cells as a source of energy.

The energy-depleted VLDL remnants, also known as intermediate density lipoproteins (IDLs), have a higher proportion of cholesterol, as the triglycerides have been consumed. They continue to circulate in the bloodstream until they are absorbed by the liver with the involvement of apolipoproetein E. Alternatively, the remnants can be further hydrolyzed by hepatic lipase, releasing more glycerol and fatty acids, to form low-density lipoproteins (LDL) that are the type of lipoproteins that are richest in cholesterol.

The LDL circulates in the bloodstream and can be absorbed by cells in the liver or peripheral tissues. The particles can bind to the target tissue with the LDL receptor with the involvement of apolipoprotein B-100. The LDL can then be absorbed by endocytosis, and the particles hydrolyzed to release lipids such as cholesterol.

9. Describe the Biosynthesis of Plasmolgens

Biosynthesis of plasmalogens begins with association of peroxisomal matrix enzymes GNPAT (glycerone phosphate acyl transferase) and AGPS (alkyl-glycerone phosphate synthase) on the luminal side of the peroxisomal membrane. These two enzymes can interact with each other to increase efficiency. Therefore, fibroblasts without AGPS activity have a reduced GNPAT level and activity

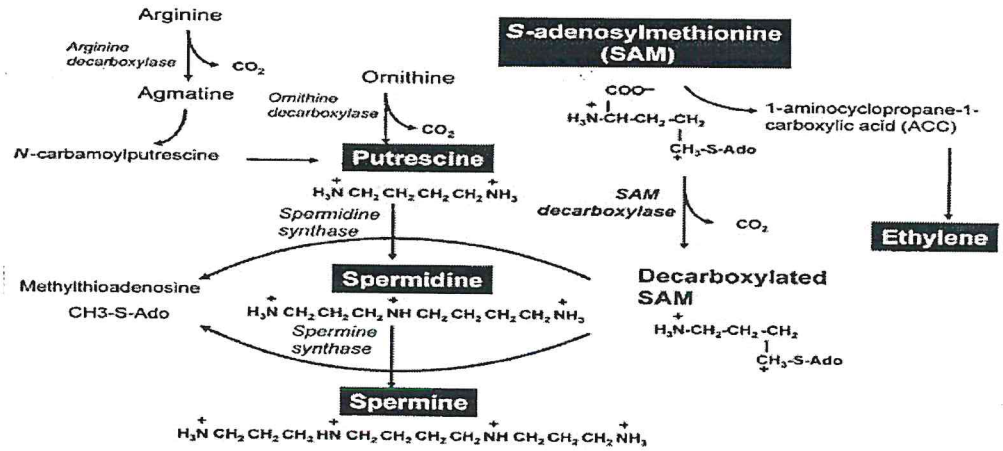
first step of the biosynthesis is catalyzed by GNPAT. This enzyme acylates dihydroxyacetone phosphate at the sn-1 position. This is followed by the exchange of the acyl group for an alkyl group by AGPS. The 1-alkyl-DHAPdihydroxyacetone phosphate is then reduced to 1-O-alkyl-2-hydroxy-sn-glycerophosphate (GPA) by an acyl/alkyl-dihydroxyacetone phosphate reductase located in both peroxisomal and endoplasmatic reticulummembranes. All other modifications occur in the endoplasmatic reticulum. There an acyl group is placed at the sn-2 position by an alkyl/acyl GPA acyltransferase and the phosphate group is removed by a phosphatidic acidphosphatase to form 1-O-alkyl-2-acyl-sn-glycerol.

Using CDP-ethanolamine a phosphotransferase forms 1-O-alkyl-2-acyl-sn-GPEtn. After dehydrogenation at the 1- and 2-positions of the alkyl group by an electron transport system and plasmanylethanolamine desaturase the vinyl ether bond of plasmalogens is finally formed. The protein corresponding to plasmanylethanolamine desaturase has been identified and is called CarF in bacteria and PEDS1 (TMEM189) in humans (and animals). Plasmenylcholine is formed from 1-O-alkyl-2-acyl-sn-glycerol by choline phosphotransferase. As there is no plasmenylcholine desaturase choline plasmalogens can be formed only after hydrolysis of ethanolamine plasmalogens to 1-O-(1Z-alkenyl)-2-acyl-sn-glycerol that can be modified by choline phosphotransferase and CDP choline.

10. Write down biosynthesis of spermine and spermidine?

Explanation (2 marks)/Pathway (3 marks)

- Biosynthesis. Spermine biosynthesis in animals starts with **decarboxylation of ornithine by the enzyme Ornithine decarboxylase in the presence of PLP**. This decarboxylation gives putrescine. Thereafter the enzyme spermidine synthase effects two N-alkylation by decarboxy-S-Adenosyl methionine.



11. Explain in detail about the causes, symptoms and clinical correlation of atherosclerosis

Causes:

- Arteriosclerosis is a type of vascular disease where the blood vessels carrying oxygen away from the heart (arteries) become damaged from factors such as **high cholesterol, high blood pressure, diabetes and certain genetic influences. (1 mark)**
- **Symptoms** depend on which arteries are affected and how much blood flow is blocked. **Chest pain (angina), cold sweats, dizziness, extreme tiredness, heart palpitations (feeling that your heart is racing), shortness of breath, nausea and weakness** are all symptoms of coronary heart disease. **(1 mark)**

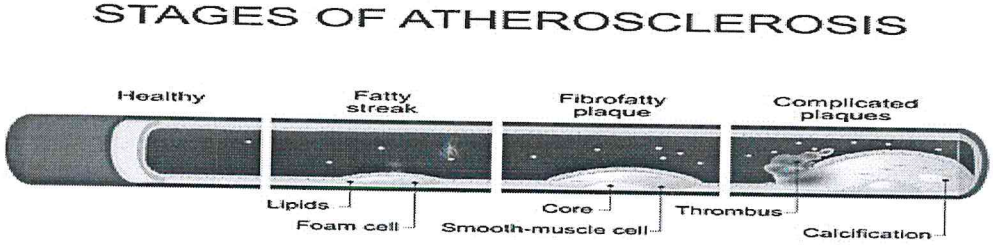
The atherosclerosis processes

- Fatty streaks formation.
- Atheroma formation.
- Atherosclerotic plaques formation. **(1 mark)**

Diagnosis:

- Inflammation plays a major role in the process of atherosclerosis. **High-sensitivity CRP (hs-CRP) tests** help determine the risk of heart disease before symptoms are present. Higher hs-CRP levels are associated with a higher risk of heart attack, stroke and cardiovascular disease.
- **A coronary calcium scan is a CT scan of heart that measures the amount of calcium in the walls of coronary arteries.** Buildup of calcium, or calcifications, are a sign of atherosclerosis or coronary heart disease. **(1 mark)**

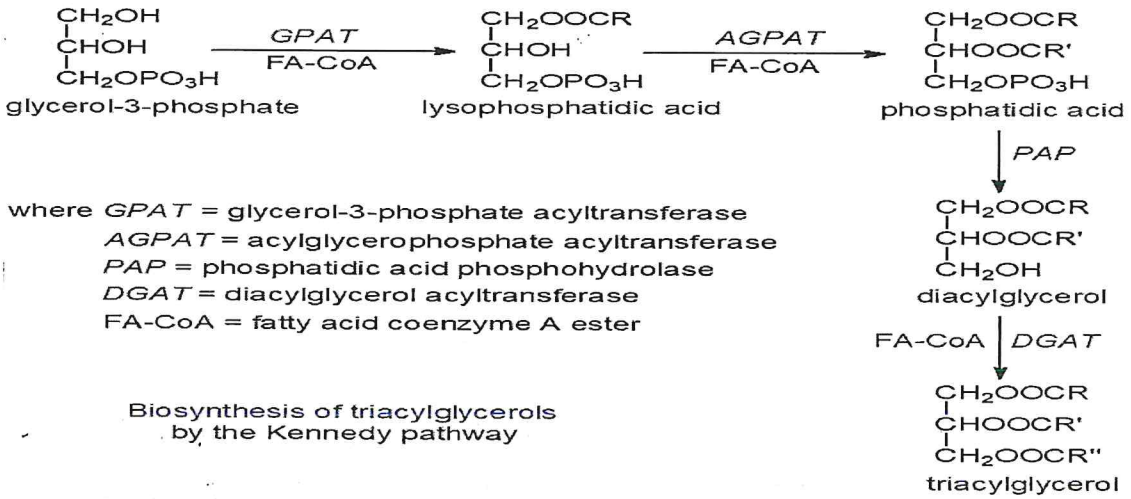
Diagram (1 mark)



Answer any ONE question

11. . Explain in Biosynthesis of Triacylglycerol.

Biosynthesis of Triacylglycerols. Three main pathways for triacylglycerol biosynthesis are known, the sn-glycerol-3-phosphate and dihydroxyacetone phosphate pathways, which predominate in liver and adipose tissue, and a monoacylglycerol pathway in the intestines.

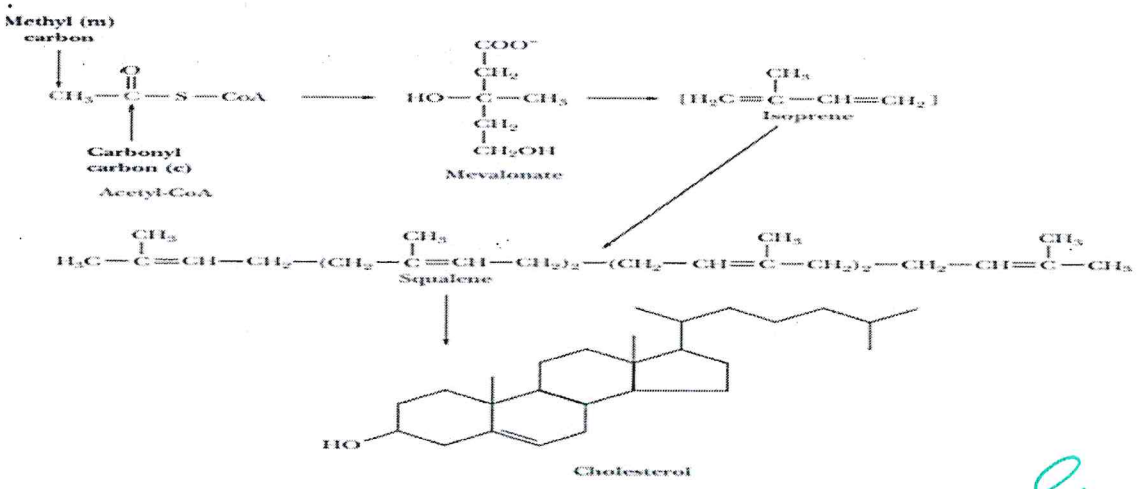


Biosynthesis of triacylglycerols by the Kennedy pathway

13. Illustrate cholesterol biosynthesis

Explanation-5 marks/pathway& regulation -5 marks

- Cholesterol is synthesized via a cascade of enzymatic reactions known as the **mevalonate pathway**. This series of reactions is primarily regulated by a rate-limiting step involving the conversion of hydroxyl-methyl glutaryl-coenzyme A (HMG-CoA) into mevalonate.
- A series of reactions - **oxidation, cyclization, and loss of three methyl groups** - results in conversion of squalene to cholesterol



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DEPARTMENT OF BIOCHEMISTRY
UNIT TEST- II, APRIL -2023

Class : I M.Sc., Biochemistry
Subject: Energy Drug Metabolism
Subject Code :MG32A

Date: 13.04.2023
Time: 12 to 1.00 PM
Max. Mark: 25

Section A (5 x 1 =5)
Answer any FIVE questions

CO4 BL6 1. Write about Photorespiration.
CO2 BL2 2. Discuss about Redox potential.
CO1 BL6 3. Write about Gibbs free energy.
CO1 BL6 3. Write about enthalpy.
O2 BL2 5. Discuss about protonophores.
CO4 BL6 6. List out the energy sources of brain and adipose tissues.
CO4 BL6 7. Mention about anaplerotic reaction

Section B - (2 x 5 = 10)
Answer any TWO questions

CO4 BL6 8. Write short notes about the Photosystem I and Photosystem II.
CO4 BL1 9. Enumerate briefly about
a. C4 carbon fixation.
b. C3 pathway.

CO2 BL4 10. Elucidate the mechanism of oxidative phosphorylation
CO4 BL2 11. Short note on beta oxidation of fatty acid

Section C – (1 x 10 = 10)
Answer any ONE question

CO4 BL4 12. Explain in detail about the cyclic and non-cyclic photophosphorylation.
CO4 BL6 13. Write in detail about TCA cycle. Explain the energetics and regulation of TCA cycle

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DEPARTMENT OF BIOCHEMISTRY
UNIT TEST- II, APRIL -2023

Class : I M.Sc., Biochemistry **Date: 13.04.2023**
Subject: Energy Drug Metabolism **Time: 12 to 1.00 PM**
Subject Code : **Max. Mark: 25**

Answer Key

Section A (5 x 1 =5)
Answer any FIVE questions

1. **Write about Photorespiration.**
   - Photorespiration is a process that occurs in Calvin Cycle during plant metabolism.
   - Photorespiration is the process of light-dependent uptake of molecular oxygen (O_2) concomitant with release of carbon dioxide (CO_2) from organic compounds.
   - In this process, the key enzyme RuBisCO that is responsible for the fixing of carbon dioxide reacts with oxygen rather than carbon dioxide.
   - The gas exchange resembles respiration and is the reverse of photosynthesis where CO_2 is fixed and O_2 released.
2. **Discuss about Redox potential.**
   - Redox potential (also known as oxidation / reduction potential) is a measure of the tendency of a chemical species to acquire electrons from or lose electrons to an electrode and thereby be reduced or oxidized respectively.
   - It aids in the representation of a substance's tendency to lose electrons to and receive electrons from an electrode. It specifies whether the material is oxidized or reduced.
   - Redox potential is expressed in volts (V). Millivolts or volts are used to calculate redox potential.
3. **Write about Gibbs free energy.**
   - Gibbs free energy, also known as the Gibbs function, Gibbs energy, or free enthalpy.
   - It is a quantity that is used to measure the maximum amount of work done in a thermodynamic system when the temperature and pressure are kept constant.
   - Gibbs free energy is denoted by the symbol 'G'.
4. **Write about enthalpy.**
   i. Enthalpy is the measurement of energy in a thermodynamic system.
   ii. The quantity of enthalpy equals to the total content of heat of a system, equivalent to the system's internal energy plus the product of volume and pressure.
5. Discuss about protonophores.
   A protonophore, also known as a proton translocator, is **an ionophore that moves protons across lipid bilayers or other type of membranes**. e.g. the mitochondrial uncouplers carbonyl cyanide p-trifluoro methoxy phenylhydrazone (FCCP), carbonyl cyanide m-chlorophenylhydrazone (CCCP) or 2,4-dinitrophenol (DNP)
6. List out the energy sources of brain and adipose tissues.
   - Glucose is virtually the sole fuel for the human brain. ketone bodies generated by the liver partly replace glucose as fuel for the brain.
   - The major fuels for muscle are glucose, fatty acids, and ketone bodies
7. Mention about anaplerotic reaction

- An **anaplerotic reaction** is a metabolic reaction that replenishes the supply of metabolic intermediates that are essential for biosynthesis.
- The most typical **anaplerotic reaction in TCA cycle** is the **carboxylation of pyruvate to oxaloacetate,** which is catalyzed by the ATP-dependent pyruvate carboxylase

Section B - (2 x 5 = 10)
Answer any TWO questions

8. Write short notes about the Photosystem I and Photosystem II.

i. Photosystem I (PSI) is a multisubunit protein complex located in the thylakoid membranes of green plants and algae, where it **initiates one of the first steps of solar energy conversion by light-driven electron transport.**

ii. Photosystem II (PSII) is **a membrane protein super complex that executes the initial reaction of photosynthesis in higher plants, algae, and cyanobacteria.** It captures the light from the sun to catalyze a transmembrane charge separation.

iii. Photosystem I and photosystem II is that **PS I tends to absorb light of longer wavelengths > 680nm, whereas PS II absorbs light of shorter wavelengths <680 nm.**

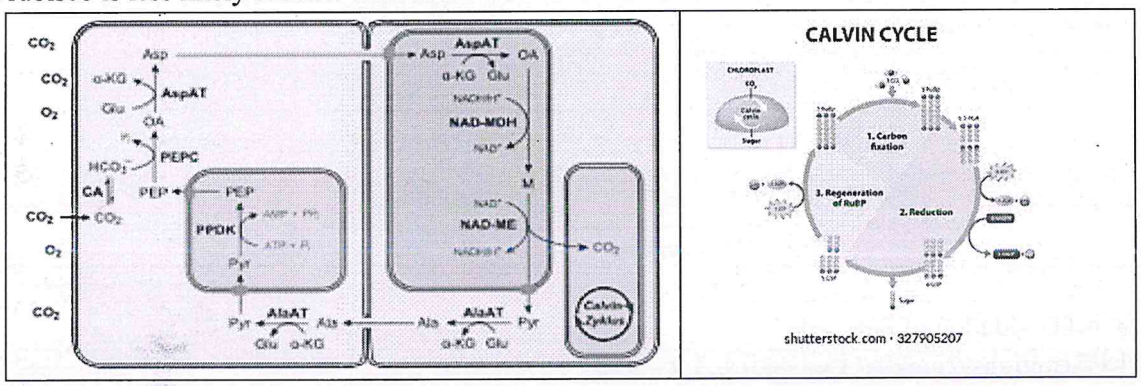
	Photosystem 1	Photosystem 2
1	Photocenter is P700.	Photocenter is P680.
2	Pigments absorb longer wavelength of light i.e., greater than 680 nm.	Pigments absorb shorter wavelength of light i.e., less than 680 nm.
3	Uses light energy to convert NADP to $NADPH_2$.	Uses light energy to dissociate water molecules.
4	Has less number of proteins in the core complex.	Has multi-subunit complex in the core complex.
5	Is the center for iron-sulfur type reaction.	Is the center for quinone-type reaction.
6	Has more chlorophyll a than chlorophyll b.	Has more chlorophyll b than chlorophyll a.
7	Not involved in the photolysis of water.	Involved in the photolysis of water.
8	Participates in cyclic and non-cyclic photophosphorylation.	Participates in non-cyclic photophosphorylation.
9	Contains Chlorophyll A-695, Chlorophyll A-670, Chlorophyll A-680, Chlorophyll A-700, Chlorophyll B, carotenoids.	Contains Chlorophyll A-670, Chlorophyll A-660, Chlorophyll A-695, Chlorophyll A-680, Chlorophyll A-700, Chlorophyll B, phycobilin, xanthophylls.

9. Enumerate briefly about

i. C4 carbon fixation.

- C_4 pathway of carbon fixation is adapted by plants found in a dry tropical region, e.g. maize, sorghum, etc. C_3 and C_4 pathway differ in the first product of carbon fixation. In C_3 plants, 3 carbon compound 3-phosphogyceric acid (PGA) is produced, whereas, in C_4 plants, 4 carbon compound oxaloacetic acid (OAA) is produced.
- In C_4 plants also C_3 pathway is used in the formation of a glucose molecule. C_4 plants have **Kranz anatomy** in leaves to tolerate high temperature. Large bundle sheath cells are present around vascular bundles of leaves. Bundle sheath cells have thick walls, no intercellular spaces and have large chloroplasts. Carbon fixation occurs in mesophyll cells.

- CO_2 acceptor is a 3-carbon compound phosphoenolpyruvate (PEP). The enzyme PEP carboxylase (PEPcase) catalyses the reaction. Mesophyll cell lack RuBisCO. The first product of carbon dioxide fixation is 4 carbon compound OAA.
- OAA is then converted to other 4C acids like malic acid and aspartic acid. They are transported to bundle sheath cells. By decarboxylation in bundle sheath cells, CO_2 is released, which enters Calvin cycle. The 3-carbon acid is transported back to mesophyll cells. The bundle sheath cells have RuBisCO but lack PEPcase.
- C4 plants—including maize, sugarcane, and sorghum—**avoid photorespiration by using another enzyme called PEP during the first step of carbon fixation**. This step takes place in the mesophyll cells that are located close to the stomata where carbon dioxide and oxygen enter the plant. These plants are called C4 plants, because the first product of carbon fixation is **a 4-carbon compound** (instead of a 3-carbon compound as in C3 or "normal" plants). C4 plants use this 4-carbon compound to effectively "concentrate" CO2 around rubisco, so that rubisco is less likely re react with O2.



ii. C3 pathway.

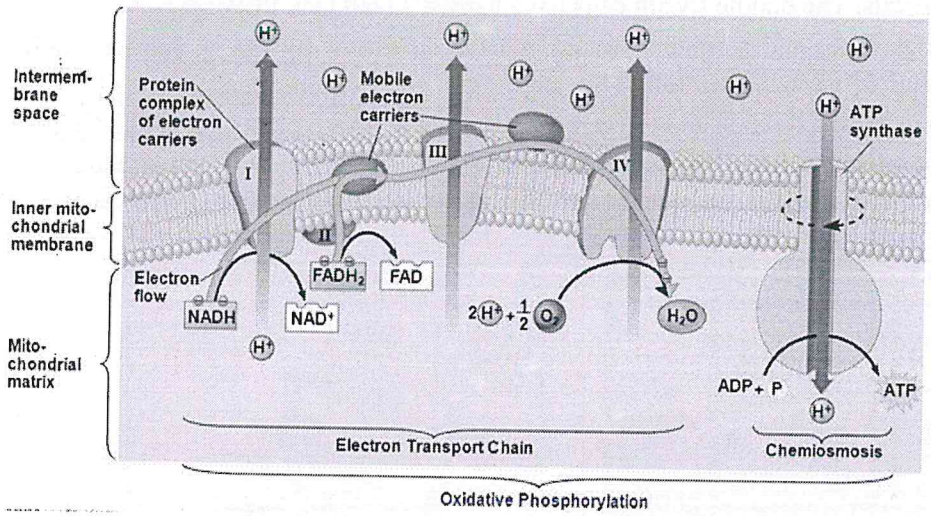
- Carbon fixation in C_3 plants occurs in the dark reaction or light-independent reaction of photosynthesis. It is also known as the Calvin Cycle. It occurs in the stroma of chloroplasts
- Calvin cycle occurs in all the plants, be it C_3, C_4, CAM or any other plants. It is also known as the Calvin Cycle. Calvin cycle occurs in all the plants, be it C_3, C_4, CAM or any other plants.
- The first product of carbon dioxide fixation is 3 carbon compounds known as 3-phosphoglyceric acid or PGA. CO_2 acceptor is a 5-carbon compound ribulose biphosphate or RUBP
- **Calvin cycle has three main steps:**
    - **Carboxylation** – In this process CO_2 fixation takes place. Enzyme RUBP carboxylase oxygenase or RuBisCO catalyses the carboxylation of RUBP to form PGA.
    - **Reduction** – Formation of carbohydrate or glucose takes place by reduction. ATP and NADPH formed during light reaction are used in the process. 2 ATP and 2 NADPH are used per cycle.
    - **Regeneration** – Regeneration of RUBP is an important step for the cycle to continue, 1 ATP molecule is used for phosphorylation.
- One molecule of glucose requires 6 cycle repetition, hence in total $6CO_2$, 18ATP and 12NADPH are utilized in 6 Calvin cycles to form one glucose.

10. Elucidate the mechanism of oxidative phosphorylation

Oxidative phosphorylation is the phosphorylation of ADP to ATP using the free energy produced from redox reactions in the electron transport chain. **(1 mark)**

Steps/ Diagram (4 marks)

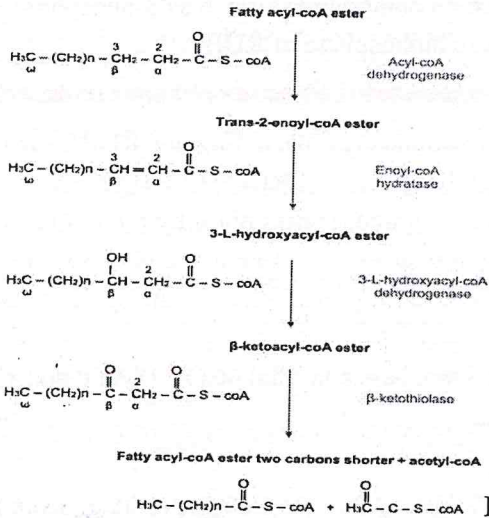
- Delivery of Electrons by NADH and FADH2. Reduced NADH and FADH2 transfer their electrons to molecules near the beginning of the transport chain. ...
- Electron Transport and Proton Pumping. ...
- Splitting of Oxygen to form Water. ...
- ATP Synthesis.



11.Short note on beta oxidation of fatty acid

Steps-1.5 Marks/Reactions-2marks/ Energetics-1.5 marks

- Beta-oxidation is a four-step process, which repeats until the fatty acid has been completely broken down. The four steps are dehydrogenation, hydration, oxidation, and thiolysis.
- The four main enzymes involved in β-oxidation are: **acyl-CoA dehydrogenase, enoyl-CoA hydratase, hydroxy acyl-CoA dehydrogenase, and ketoacyl-CoA thiolase.**
- Beta-oxidation is the process by which long chain fatty acyl CoA is degraded. The products of beta-oxidation are **acetyl CoA. $FADH_2$, NADH and H**



Energetics:

Mechanism	ATP Yield (New Concept)	ATP Yield (
1. β-oxidation 7 cycles 7 $FADH_2$ and 7 NADH are generated when oxidized by ETC	7$FADH_2$ 7 x 1.5 = 10.5 7 NADH· 7 x 2.5 = 17.5	7 x 2 =14 7 x 3= 21
2. From 8 acetyl CoA 1 acetyl CoA =3 NADH + 1 $FADH_2$ + 1 GTP Oxidized by citric acid cycle, each acetyl CoA provides ATP	10 x 8 = 80	12 x 8 =96
Total Energy from one mole of palmitoyl CoA	108	131
Energy utilized for activation (Formation of Palmitoyl CoA)	2	2
Net yield of oxidation of one mole of palmitate	108-2 =106	131-2 = 129

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UNIT TEST- II, APRIL-2023

Class : I M.Sc., Biochemistry **Date: 17.04.2023**
Subject : Nutritional Biochemistry **Time: 12 to 1.00 PM**
Subject Code : **Max. Mark: 25**

Section A (5 x 1 =5)
Answer any FIVE questions

CO2 BL6 1. Define food additives.
CO2 BL2 2. Discuss the role of dietary fiber.
CO2 BL1 3. Write a note on essential fatty acids.
CO2 BL1 3. Write a note on essential amino acids.
CO1 BL6 5. Write a note on calorific value.
CO4 BL1 6. State the functions of calcium in our body.
CO4 BL2 7. Discuss about malnutrition.

Section B - (2 x 5 = 10)
Answer any TWO questions

CO5 BL6 8. Write short notes about the dietary management for infection disease Covid-19.
CO5 BL1 9. Enumerate the effects of tobacco on health.
CO4 BL6 10. Write short notes on kwashiorkor.
CO4 BL2 11. Describe the metabolic functions of vitamin A.

Section C – (1 x 10 = 10)
Answer any ONE question

CO5 BL3 12. Enumerate the signs, symptom, treatment and dietary management for Typhoid and Malaria.
CO1 BL4 13. Explain BMR and the factors that affect BMR.

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UNIT TEST - II, APRIL -2023

Class : II M.Sc., Biochemistry **Date: 10.04.2023**
Subject : Hormone **Time: 12 to 1.00 PM**
Subject Code : MEN4A **Max. Mark: 25**

Section A (5 x 1 =5)
Answer any FIVE questions

CO5 BL1 1. List out the Gonadal hormones.
CO1 BL1 2. Examine the Hypothalamic releasing factors.
CO1 BL1 3. Quote about Endorphins.
CO1 BL1 4. State the POMC family.
CO5 BL1 5. State menopause
CO3 BL1 6. Define goitrogens.
CO3 BL5 7.State calcitonin.

Section B - (2 x 5 = 10)
Answer any TWO questions

CO4 BL6 8. Write short notes on
i. Vasopressin
ii. Oxytocin
CO5 BL1 9. Enumerate the Chemical nature and biological action of prostaglandins.
CO 5 BL4 10. Explain the chemical nature and biological action of estrogen.
CO3 BL2 11. Discuss about the biological functions of calcitriol.

Section C – (1 x 10 = 10)
Answer any ONE question

CO1 BL4 12. Explain in detail about the Anterior pituitary hormones.
CO5 BL4. 13.Explain the biological changes during pregnancy.

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UNIT TEST - II, MARCH -2023

Class : II M.Sc., Biochemistry **Date: 10.04.2023**
Subject : Hormone **Time: 12 to 1.00 PM**
Subject Code : MEN4A **Max. Mark: 25**

Answer Key

Section A (5 x 2 =10)
Answer any FIVE questions

1. **List out the Gonadal hormones.**

- Hormones produced by the GONADS, including both steroid and peptide hormones. The major steroid hormones include **ESTRADIOL and PROGESTERONE from the OVARY, and TESTOSTERONE from the TESTIS.**

2. **Examine the Melanocyte stimulating hormone?**

- The thyrotropin-releasing hormone (TRH), gonadotropin-releasing hormone (GnRH), growth hormone-releasing hormone (GHRH), corticotropin-releasing hormone (CRH), somatostatin, and dopamine are released from the hypothalamus into the blood and travel to the anterior pituitary.

3. **Quote about Endorphins.**

- Endorphins are chemicals (hormones) your body releases when it feels pain or stress. They are released during pleasurable activities such as exercise, massage, eating and sex too. Endorphins help relieve pain, reduce stress and improve your sense of well-being.

4. **State the POMC family.**

- Proopiomelanocortin (POMC) is the pituitary precursor of circulating melanocyte stimulating hormone (α-MSH), adrenocorticotropin hormone (ACTH), and β-endorphin.
- Biologically active POMC products include endorphins such as β-endorphin, corticotropins such as adrenocorticotropin (ACTH), and melanotropins such as α–melanocyte-stimulating hormone (αMSH)

5. **State Menopause**

The time of life when a woman's ovaries stop producing hormones and menstrual periods stop. Natural menopause usually occurs around age 50. A woman is said to be in menopause when she hasn't had a period for 12 months in a row.

6. **Define Goitrogens.**

Goitrogens are substances that disrupt the production of thyroid hormones. This triggers the pituitary to release thyroid-stimulating hormone, which then promotes the growth of thyroid tissue, eventually leading to goiter

7. **State calcitonin**

Calcitonin is a hormone that your thyroid gland makes and releases to help regulate calcium levels in your blood by decreasing it. Calcitonin opposes the actions of the parathyroid hormone, which is a hormone that increases your blood calcium levels.

Section B (1 x 5 = 10)
Answer any ONE question

8. Write short notes on

a. **Vasopressin:** Vasopressin or antidiuretic hormone (ADH) or arginine vasopressin (AVP) is a nonapeptide synthesized in the hypothalamus. Science has known it to play essential roles in the control of the body's osmotic balance, blood pressure regulation, sodium homeostasis, and kidney functioning. The effects of V1a and V2 receptors can be amplified when vasopressin is secreted in excessive amounts, and this condition may be experienced by patients undergoing a disease or stress.

b. **Oxytocin:** Oxytocin is a natural hormone that manages key aspects of the female and male reproductive systems, including labour and delivery and lactation, as well as aspects of human behaviour. oxytocin acts as a chemical messenger and has an important role in many human behaviours including **sexual arousal, recognition, trust, romantic attachment and mother–infant bonding**. As a result, oxytocin has been called the 'love hormone' or 'cuddle chemical'.

9. Enumerate the Chemical nature and biological action of prostaglandins.

- Prostaglandins have been found in almost every tissue in humans and other animals. They are derived enzymatically from the fatty acid arachidonic acid. Every prostaglandin contains 20 carbon atoms, including a 5-carbon ring. They are a subclass of eicosanoids and of the prostanoid class of fatty acid derivatives.
- Prostaglandins are **unsaturated carboxylic acids**, consisting of of a 20-carbon skeleton that also contains a five-member ring and are based upon the fatty acid, arachidonic acid. There are a variety of structures one, two, or three double bonds.
- Prostaglandins are known to: 1) **stimulate uterine contraction**; 2) inhibit spontaneous contraction of the rabbit uterus; 3) inhibit the respiratory smooth muscle of different animals; 4) lower systemic arterial blood pressure when injected intravenously; 5) stimulate contractions in isolateral segments of intestinal.

10. . Explain the chemical nature and biological action of estrogen.

- **Estrogen** or **oestrogen** is a sex hormone responsible for the development and regulation of the female reproductive system and secondary sex characteristics. There are three major endogenous estrogens that have estrogenic hormonal activity: estrone (E1), estradiol (E2), and estriol (E3).Estradiol, an estrane, is the most potent and prevalent. Another estrogen called estetrol (E4) is produced only during pregnancy.
- Like all steroid hormones, estrogens readily diffuse across the cell membrane. Once inside the cell, they bind to and activate estrogen receptors (ERs) which in turn modulate the expression of many genes.[6]Additionally, estrogens bind to and activate rapid-signaling membrane estrogen receptors (mERs) such as GPER (GPR30).
- In addition to their role as natural hormones, estrogens are used as medications, for instance in menopausal hormone therapy, hormonal birth control and feminizing hormone .
- Synthetic and natural estrogens have been found in the environment and are referred to as xenoestrogens.

11. Discuss about the biological functions of calcitriol.

- Calcitriol is the active form of vitamin D, normally made in the kidney. It is also known as 1,25-dihydroxycholecalciferol. It is a hormone which binds to and activates the vitamin D receptor in the nucleus of the cell, which then increases the expression of many genes.
- Calcitriol increases blood calcium (Ca^{2+}) mainly by increasing the uptake of calcium from the intestines. Promoting absorption of dietary calcium from the gastrointestinal tract.Increasing renal tubular reabsorption of calcium, thus reducing the loss of calcium in the urine.Stimulating release of calcium from bone. For this it acts on the specific type of bone cells referred to as osteoblasts, causing them to release RANKL, which in turn activates osteoclasts.
- Calcitriol acts in concert with parathyroid hormone (PTH) in all three of these roles. For instance, PTH also indirectly stimulates osteoclasts. However, the main effect of PTH is to increase the rate at which the kidneys excrete inorganic phosphate (P_i), the counterion of Ca^{2+}
- The resulting decrease in serum phosphate causes hydroxyapatite ($Ca_5(PO_4)_3OH$) to dissolve out of bone, thus increasing serum calcium. PTH also stimulates the production of calcitriol Many of the effects of calcitriol are mediated by its interaction with the calcitriol receptor, also called the vitamin D receptor or VDR For instance, the unbound inactive form of the calcitriol receptor in intestinal epithelial cells resides in the cytoplasm.
- When calcitriol binds to the receptor, the ligand-receptor complex translocates to the cell nucleus, where it acts as a transcription factor promoting the expression of a gene encoding a calcium binding protein. The levels of the calcium binding protein increase enabling the cells to actively transport more calcium (Ca^{2+}) from the intestine across the intestinal mucosa into the blood.
- Thus calcitriol also stimulates the intestinal absorption of phosphate. Calcitriol also inhibits the release of calcitonin, a hormone which reduces blood calcium primarily by inhibiting calcium release from bone.

Answer any ONE question

12. Explain in detail about the Anterior pituitary hormones.

- Anterior lobe is the largest and shares about 70% of the total weight of hypophysis. It originates from an embryonic invagination of the pharangeal epithelium called **rathke's pouch.** It consists of glandular epithelial cells of varying shapes and sizes, this tissue is composed of irregular clumps of secretary cells supported by fine connective tissue fiber and surrounded by a rich vascular network.
- Based on histological staining techniques **3 types of cells** may be differentiated.
    - **Acidophil (or) α-cells:**
        i. Stained strongly with acidic dyes (acid fuchsine)
        ii. Secrete **growth hormone** and **prolactin.**
    - **Basophils (or) β-cells**:
        i. Stained strongly with basic dyes (aniline blue).
        ii. Secrete **luteinizing hormone, follicle stimulating hormone** and **thyroid stimulation hormone.**

- **Neutrophils or chromophobe cells:**
    1. Do not stained with either
    2. Believed to secrete **adrenocortico tropic hormone.**

13. Explain the biological changes during pregnancy.

- Maternal physiological changes in pregnancy are the adaptations that take place during pregnancy that enable the accommodation of the developing embryo and fetus.
- These are normal physiological adaptations that cause changes in behavior, the functioning of the heart, blood vessels, and blood, metabolism including increases in blood sugar levels, kidney function, posture, and breathing.
- During pregnancy numerous hormones and proteinsare secreted that also have a broad range of effects.During pregnancy, both protein metabolism and carbohydrate metabolism are affected. One kilogram of extra protein is deposited, with half going to the fetus and placenta, and another half going to uterine contractile proteins, breast glandular tissue, plasma protein, and haemoglobin.
- An increased requirement for nutrients is given by fetal growth and fat deposition. Changes are caused by steroid hormones, lactogen, and cortisol.Maternal insulin resistance can lead to gestational diabetes. Increased liver metabolism is also seen, with increased gluconeogenesis to increase maternal glucose levels .

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DEPARTMENT OF BIOCHEMISTRY

UNIT TEST-II APRIL 2023

CLASS: II MSc **11.04.2023**

SUB: CLINICAL BIOCHEMISTRY-II **TIME:1 HOUR**

SUB CODE: MEN4B **MAX MARKS: 25**

PART-A (5X1=5 Marks)

Answer any **FIVE** questions.

CO2 BL 6:1. Write the normal level of serum bilirubin and how is it measured?

CO2 BL 1:2. Define creatinine clearance.

CO2 BL 3:3. Illustrate the significance of CRP

CO2 BL 1:4. State about haptoglobins.

CO3 BL 6:5. Write a note on cirrhosis of liver.

CO3 BL 1:6. Name the types of Jaundice.

CO1 BL1:7. Enumerate the clinical significance of α- feto protein.

PART-B (2X5=10 Marks)

Answer any **TWO** questions.

CO2 BL2:8. Summarize the cause and syndrome of any two inborn errors of lipid metabolism.

CO3 BL2:9. Discuss about Cystic fibrosis.

CO3 BL2:10. Describe about the assessment of renal function by tubular function test.

CO3 BL6:11. Write about the causes and types of hepatitis.

PART-C (1x10=10 Marks)

Answer any **ONE** question.

CO3 BL6:12. Write an essay on liver function test.

CO2 BL3:13. Illustrate about haemodialysis and peritoneal dialysis.

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DEPARTMENT OF BIOCHEMISTRY

UNIT TEST-II APRIL 2023

CLASS: II MSc

SUB: CLINICAL BIOCHEMISTRY-II **TIME:1 HOUR**

SUB CODE: MEN4B **MAX MARKS: 25**

ANSWER KEY

PART-A (5X1=5 Marks)

1.Write the normal level of serum bilirubin and how is it measured?

- A normal level is: Direct (also called conjugated) bilirubin: less than 0.3 mg/dL (less than 5.1 µmol/L) Total bilirubin: 0.1 to 1.2 mg/dL (1.71 to 20.5 µmol/L)
- Bilirubin fractions are measured by **(1) the direct diazo reaction, (2) high-performance liquid chromatography (HPLC), (3) direct spectrophotometry, and (4) enzymatic methods**

2. Define creatinine clearance

- The creatinine clearance test **helps provide information about how well the kidneys are working**. The test compares the creatinine level in urine with the creatinine level in blood.
- The normal range of CrCl is **110 to 150mL/min in males and 100 to 130mL/min in females**. Serum creatinine level for men with normal kidney function is approximately 0.6 to 1.2mg/dL and between 0.5 to 1.1 mg/dL for women.

3. Illustrate the significance of CRP

- The C-reactive protein (CRP) test is used to find inflammation in body.
- Inflammation could be caused by different types of conditions, such as an infection or autoimmune disorders like rheumatoid arthritis or inflammatory bowel disease.

4. State about haptoglobins.

- Haptoglobin is an acute phase protein capable of binding haemoglobin, thus preventing iron loss and renal damage. Haptoglobin also acts as an antioxidant, has antibacterial activity and plays a role in modulating many aspects of the acute phase response.

5.Write a note on cirrhosis of liver.

- Cirrhosis is scarring (fibrosis) of the liver caused by long-term liver damage. The scar tissue prevents the liver working properly. Cirrhosis is sometimes called end-stage liver disease because it happens after other stages of damage from conditions that affect the liver, such as **hepatitis and other viruses, and alcohol abuse.**

6. Name the types of Jaundice.

- Hepatic jaundice, Haemolytic jaundice& obstructive jaundice

7. Enumerate the clinical significance of α- feto protein.

- A positive AFP PLUS test means -**higher likelihood group for having a baby with a neural tube defect or a chromosome abnormality.**
- Between 15 and 20 weeks, AFP levels usually range between 10 ng/ml to 150 ng/ml. **Adult blood levels greater than 200 ng/ml in patients with liver cirrhosis strongly indicate hepatocellular carcinoma.**
- Alpha-fetoprotein (AFP) is used as a tumor marker to detect and diagnose cancers of the liver, testicles, and ovaries.
- AFP in blood—greater than 400 ng/mL—**could be a sign of liver tumors**. High levels of AFP may mean other cancers, including Hodgkin disease, lymphoma, and renal cell carcinoma (kidney cancer).

PART-B (2X5=10 Marks)

Answer any **TWO** questions.

8. Summarize the cause and syndrome of any two inborn errors of lipid metabolism.

Cause- 2.5 Marks/ syndrome- 2.5 Marks

- Lipid metabolism disorders, such as Gaucher disease and Tay-Sachs disease, involve lipids. Lipids are fats or fat-like substances. They include oils, fatty acids, waxes, and cholesterol.

Cause and symptoms of Gaucher's disease

- Gaucher (go-SHAY) disease is the result of **a buildup of certain fatty substances in certain organs, particularly spleen and liver**. This causes these organs to enlarge and can affect their function. The fatty substances also can build up in bone tissue, weakening the bone and increasing the risk of fracture
- **Symptoms**
- Enlarged spleen.
- Enlarged liver
- Eye movement disorders.
- Yellow spots in the eyes.
- Not having enough healthy red blood cells (anemia)
- Extreme tiredness (fatigue)
- Bruising.
- Lung problems.

Tay-Sachs is caused by a baby receiving two defective HEXA genes, one from each parent. Tay-Sachs disease symptoms include **failing to meet motor milestones, such as sitting and standing**. Babies born with Tay-Sachs often die at a young age. Genetic testing can help to make family planning decisions

9. Discuss about Cystic fibrosis.

Inheritance:(1 mark)

- Autosomal recessive. To be born with cystic fibrosis, a child must inherit a copy of the faulty gene from both of their parents. This can happen if the parents are "carriers" of the faulty gene.

Signs and symptoms (2 marks)

- A persistent cough that produces thick mucus (sputum)
- Wheezing.
- Exercise intolerance.
- Repeated lung infections.
- Inflamed nasal passages or a stuffy nose.
- Recurrent sinusitis.

Diagnosis:(1 mark)

- Sweat (chloride) test. This test measures the amount of chloride in the sweat.
- Genetic tests. Blood, or cells taken from a cheek scraping, can be tested for mutations in the CFTR gene.

Treatments for cystic fibrosis (2 marks)

- antibiotics to prevent and treat chest infections.

- medicines to make the mucus in the lungs thinner and easier to cough up.
- medicines to widen the airways and reduce inflammation.
- special techniques and devices to help clear mucus from the lungs.

10. Describe about the assessment of renal function by tubular function test.

Explanation-2.5marks/ test protocol- 2.5 marks

- Renal function tests (RFT) are a group of tests that may be performed together to evaluate kidney (renal) function. The tests measure levels of various substances, including several minerals, electrolytes, proteins, and glucose (sugar), in the blood to determine the current health of the kidneys.
- Tubular function tests involve evaluation of functions of the proximal tubule (i.e. tubular handling of sodium, glucose, phosphate, calcium, bicarbonate and amino acids) and distal tubule (urinary acidification and concentration.
- The renal tubular reabsorption function of kidney is assessed by two types of tests (i) **Urine concentration tests** and (ii) **Urine dilution test**. These tests are performed to evaluate the functional capacity of the kidneys to concentrate and dilute urine.

11. Write about the causes and types of hepatitis.

Causes-3 marks/ Types with clinical significance-7 marks

Disease	Pathogen	Symptoms	Incubation period	Method of transmission	Diagnostic test
Hepatitis A	HAV, Picornaviridae	Fever, headache, malaise, jaundice	2-6 weeks	Ingestion	IgM antibodies
Hepatitis B	HBV, Hepadnaviridae	Severe liver damage, chronic disease occurs	3-26 weeks	Parenteral, sexual contact	IgM antibodies
Hepatitis C	HCV, Flaviviridae	Same as HBV, more chronic	2-33 weeks	Parenteral	PCR of viral RNA
Hepatitis D	HDV, Deltaviridae	Severe liver damage, high mortality rate	6-26 weeks	Parenteral, when co-infected with HBV	IgM antibodies
Hepatitis E	HEV, Caliciviridae	Pregnant women may be at high risk and show high mortality, not chronic disease	2-6 weeks	Ingestion	IgM antibodies, PCR of viral RNA

PART-C (1x10=10 Marks)

Answer any **ONE** question.

12. Write an essay on liver function test.

Types of LFTs-2 marks/ protocol-3 marks/Normal values-2 marks/ Interpretation-3 marks.

Liver function tests are tests used to help diagnose and monitor liver disease or damage.

13. Illustrate about haemodialysis and peritoneal dialysis.

Definition-2 marks/ Haemodialysis-4 marks /Peritoneal dialysis-4 marks

In hemodialysis, blood is pumped out of the body, filtered through a machine and returned to the body through the tubes that connect the patient to the machine. On the contrary, in peritoneal dialysis, a catheter is implanted in the patient's stomach through which the dialysate is circulated.

Aspect	Haemodialysis	Peritoneal Dialysis
Area dialyzed	Blood directly through arterial and venous access	Abdominal wall through a dialysing fluid
Frequency of dialysis	3-5 times a week	Every day
Potential side effects	Fatigue Low blood pressure	Risk of infection Limited membrane function
Major risks of treatment	Gastrointestinal effects Skin effects Fluid imbalance Inflammation Mental health impacts	Hernia Weight fluctuations Infection

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UNIT TEST - II, APRIL -2023

Class : II M.Sc., Biochemistry **Date: 12.04.2023**
Subject : Signal Transduction **Time: 12 to 1.00 PM**
Subject Code : MEN4A **Max. Mark: 25**

Section A (5 x 1 =5)
Answer any FIVE questions

CO1 BL6 1. Write about the signal transduction.
CO3 BL2 2. Discuss about the classes of G-proteins.
CO3 BL1 3: List out the names of toxins used for G-protein studies.
CO4 BL2 4. Describe hormones, which bind with nuclear receptors.
CO5 BL2 5. Define transactivation.
CO5 BL6 6. List out the ligands that activate nuclear receptor.
CO5BL6 7. Discuss about the transcriptional activators.

Section B - (2 x 5 = 10)
Answer any TWO questions

CO1 BL6 8. Write short notes on extra and intracellular receptor.
CO3 BL1 9. Enumerate the GTPase switch and its regulation.
CO5 BL4 10. Explain in detail about nuclear receptors based on its mechanism of action.
CO4 BL2 11. Describe the structure of RTK

Section C – (1 x 10 = 10)
Answer any ONE question

CO5 BL4 12. Explain in detail about the mechanism of transcriptional regulation by nuclear receptor.
CO5 BL2 13. Explain the steroid hormone induced signal transduction pathway

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Subject : Signal Transduction **Time: 12 to 1.00 PM**
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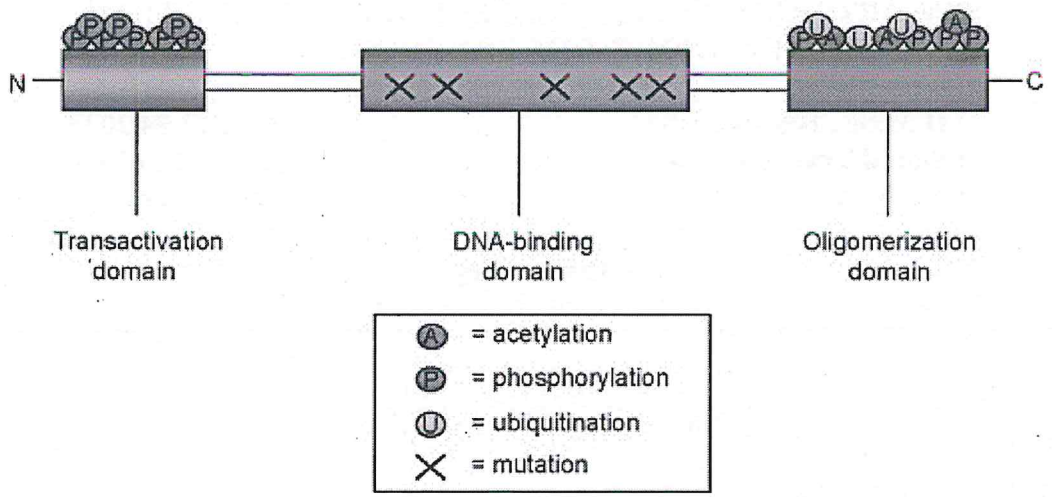
Answer Key

Section A (5 x 1 =5)
Answer any FIVE questions

1. **Write about the signal transduction.**
   - Signal transduction is the process by which a chemical or physical signal is transmitted through a cell as a series of molecular events, most commonly protein phosphorylation catalyzed by protein kinases, which ultimately results in a cellular response.
2. **Discuss about the classes of G-proteins.**
   - The G-protein is heterotrimeric and is made up of three different subunits: alpha (α), beta (β) and gamma (γ). In its inactive state, GDP is bound to the α-subunit of the G-protein. All -subunits of vertebrate heterotrimeric G proteins have been classified into **4 major classes**, Gs, Gi, Gq, and G12, which possess orthologs already in sponges, one of the earliest animal phyla to evolve.
3. **List out the names of toxins used for G-protein studies.**
   - The G-protein ADP-ribosylating toxins CT and PT are the "classical" pro- tein toxins which are used as pharmacological tools. Both toxins are used to study signal pathways involving heterotrimeric G proteins.
4. **Describe hormones, which bind with nuclear receptor.**
   - The four classes include **steroid Receptors (Class I), RXR heterodimers (Class II), homodimeric orphan receptors (Class III), and monomeric orphan receptors (Class IV). In addition to nuclear receptors**, several G protein-coupled receptors and ion channels act as cell surface receptors for certain steroid hormones.

5. Define transactivation.

In the context of gene regulation: transactivation is the increased rate of gene expression triggered either by biological processes or by artificial means, through the expression of an intermediate transactivator protein.



Functional domains of p53 are affected by post-translational modifications and mutations. The amino terminus contains the transactivation domain, which becomes phosphorylated in response to certain types of cell damage. The central region of the protein contains the DNA-binding domain that is very commonly mutated in human tumors. The oligomerization domain, which mediates the formation of p53 dimers and tetramers, is present at the carboxy terminus of the protein, and can be modified post-translationally by phosphorylation, acetylation and ubiquitination.

6. List out the ligands that activate nuclear receptor.

Ligands that bind to and activate nuclear receptors include lipophilic substances such as endogenous hormones, vitamins A and D, and xenobiotic hormones. Because the expression of a large number of genes is regulated by nuclear receptors, ligands that activate these receptors can have profound effects on the organism.

7. What are transcriptional activators?

A transcriptional activator is a protein (transcription factor) that increases transcription of a gene or set of genes. Activators are considered to have positive control over gene expression, as they function to promote gene transcription and, in some cases, are required for the transcription of genes to occur.

Section B - (2 x 5 = 10)
Answer any TWO questions

8. **Write short notes on extra and intracellular receptor.**
   - Extracellular signaling receptors are classified into two main groups according to their location in the cell: cell surface receptors, located in the plasma membrane, and nuclear transcription factor receptors located inside the cell.

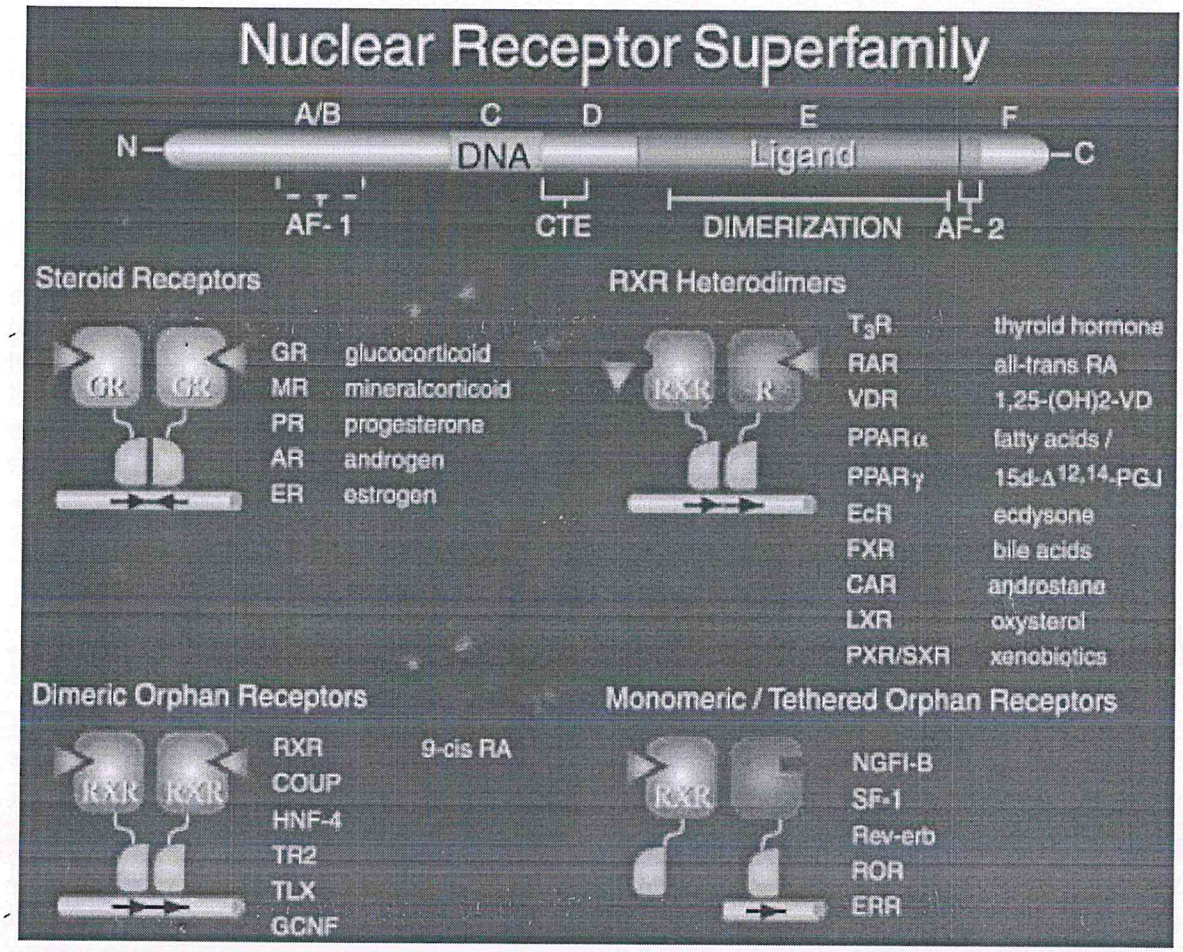
- Intracellular receptors are a class of ligand-dependent transcription factors that include receptors for both steroid and non-steroid hormones. In the non-liganded state, these receptors reside in the cytoplasm and/or in the nucleus.
- There are two main types of ligands: ligands that bind to receptors inside the cell, called intracellular ligands, and ligands that bind to receptors outside the cell, called extracellular ligands.

9. **Enumerate the GTPase switch and its regulation.**
    - GTPase proteins regulate a variety of cellular processes, including membrane trafficking in cells (Stenmark, 2009). These proteins act as switches by alternating between an active, GTP-bound state and an inactive, GDP-bound state. Various regulatory proteins modulate the rate of conversion between these two states. Most Rho GTPases are regulated by GEFs, GAPs and GDIs. These proteins control the cycling between the active GTP-bound form and the inactive GDP-bound form. The primary function of small GTPases is to serve as molecular switches of intracellular signal transduction, and the on/off states of the switch are basically determined by its bound guanine nucleotide, GTP or GDP.

10. Explain in detail about nuclear receptors based on its mechanism of action.

Nuclear receptors are multifunctional proteins that transduce signals of their cognate ligands. Nuclear receptors (NRs) may be classified into two broad classes according to their mechanism of action and subcellular distribution in the absence of ligand.

Small lipophilic substances such as natural hormones diffuse through the cell membrane and bind to nuclear receptors located in the cytosol (type I NR) or nucleus (type II NR) of the cell. Binding causes a conformational change in the receptor which, depending on the class of receptor, triggers a cascade of downstream events that direct the NRs to DNA transcription regulation sites which result in up or down-regulation of gene expression. They generally function as homo/heterodimers. In addition, two additional classes, type III which are a variant of type I, and type IV that bind DNA as monomers have also been identified.

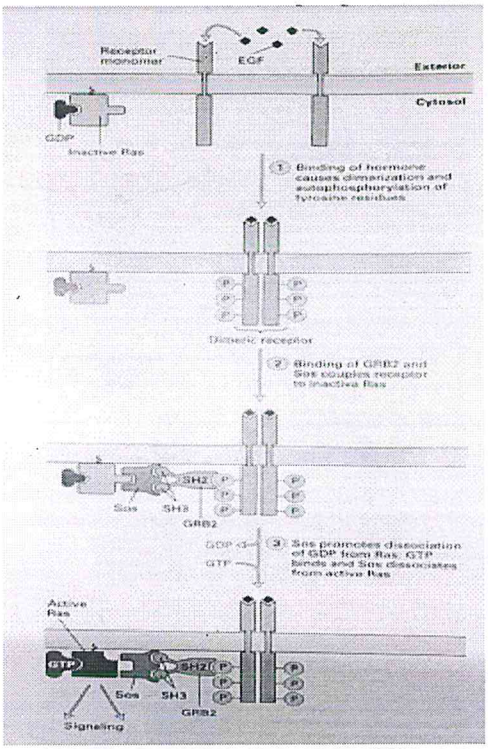


11. Describe the structure of RTK.

Tyrosine kinase receptors are membrane-spanning proteins with large amino-terminal extracellular domains bearing the ligand binding site, a juxtamembrane domain, a protein kinase catalytic domain, and a carboxyl-terminal tail.

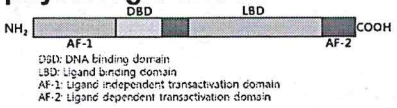
Mechanisms of RTK activation under normal physiologic conditions. RTKs are generally activated by receptor-specific ligands. Growth factor ligands bind to extracellular regions of RTKs, and the receptor is activated by ligand-induced receptor dimerization and/or oligomerization

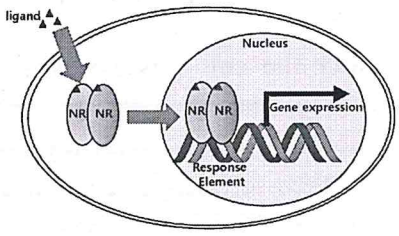
RTKs differ from other cell surface receptors in that they contain intrinsic enzyme activity. In particular, the binding of a signaling molecule with an RTK activates tyrosine kinase in the cytoplasmic tail of the receptor.



Section C – (1 x 10 = 10)
Answer any ONE question

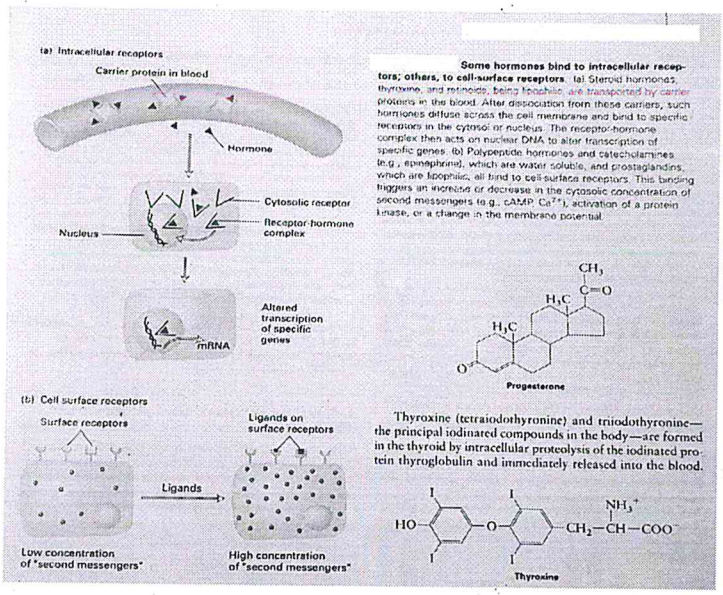
12. **Explain in detail about the mechanism of transcriptional regulation by nuclear receptor.**
    - Nuclear receptors (NRs) are a family of transcription factors that regulate numerous physiological processes such as metabolism, reproduction, inflammation, as well as the circadian rhythm. **NRs sense changes in lipid metabolite levels to drive differential gene expression, producing distinct physiologic effects**.

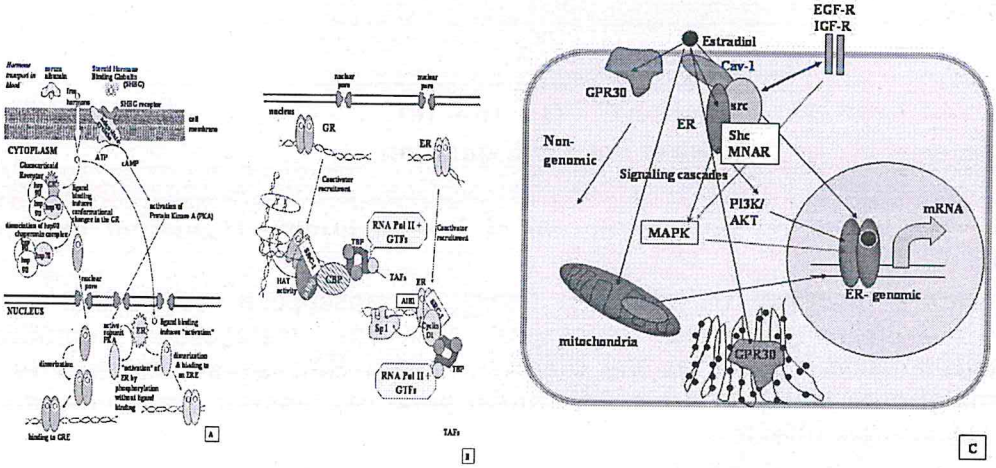




    -
    - Mechanism ..

13. Explain the steroid hormone induced signal transduction pathway





A target cell contains the steroid hormone receptor(s) required to respond to a given steroid hormone.

A. Most steroid hormones that enter the cell travel in the bloodstream either in free state or loosely bound to serum albumins. Estrogens and androgens are bound to steroid hormone binding globulin (SHBG) with high affinity. The cell membrane contains a SHBG receptor linked to adenylate cyclase. Activation of adenylate cyclase by the SHBG receptor or peptide hormones such as LH generate cAMP which activates the protein kinase A (PKA) phosphorylation cascade. As described in the text, PKA can activate ERα and other steroid hormone receptors in the absence of ligand binding. Most receptors in the steroid/nuclear receptor superfamily reside in the nucleus in the newly synthesized or unliganded state. The exception is the glucocorticoid receptor (GR) which is complexed with the hsp90 chaperonin complex in the cytoplasm. Hsp90

and its accompanying proteins are thought to stabilize the receptor until hormone-binding occurs. Although receptors for progesterone, estrogens, and androgens have also been found in complexes with the primarily cytosolic hsps, the function of these associations is unclear. In the case of estrogens, progestins, and androgens, the hormones freely enter the nucleus and bind to their cognate receptor. Binding of hormone ligand to the receptor "activates" the receptor by inducing alterations in the conformation of the receptor protein. This allows the receptors to form homodimers and bind to specific hormone response elements in the DNA in the regulatory region of the target gene.

B. Once bound to the HRE, the liganded steroid hormone receptor induces a DNA bend and, in the presence of agonist ligand, recruits coactivator proteins. The HRE-bound receptor also interacts with other DNA-bound transcription factors, as shown for the interaction of Sp1 with ER. Certain coactivator proteins have histone acetyltransferase (HAT) activity that acetylates lysine residues in histones H3 and H4. This results in a "loosening" of chromatin structure that facilitates the binding and transcriptional activity of RNA polymerase II at the transcription start site.

C. In addition to genomic activity, recent studies have shown that many NR, as reviewed in the text, including ERα, are located in complexes of proteins in caveolae, including caveolin-1 (Cav-1) and c-src, in the plasma membrane. Binding of E2 to PM-associate ERα or to GPR30, a membrane ER, activates intracellular signaling cascades and cross-talks with EGFR and IGF-R. ERα and ERβ are also present in mitochondria, although their roles in this organelle remain to be defined.

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DEPARTMENT OF BIOCHEMISTRY

UNIT TEST II ,APRIL 2023

Class	: II M. Sc Biochemistry	**Date**	: 13.04.2023
Subject	: Immunochemistry	**Time**	: 12 to 1.00 PM
Subject Code: MENAE		**Max. Mark:** 25	

PART A – (5 X 1 = 5 Marks)

Answer any FIVE questions

CO.1 BL:6 1. Write a note on antigen - presenting cells.

CO.1 BL:1 2. State the functions of the immune system.

CO.1 BL:1 3. Define innate immunity.

CO.1 BL:2 4. Discuss on the cells responsible for production of antibodies.

CO.5 BL:1 5. Define Autoimmunity

CO.6 BL:1 6. Tell about Thyroiditis.

CO.5 BL:1 7. Define Graft rejection.

PART B – (2 X 5 = 10 Marks)

Answer any TWOquestion

CO.1 BL:2 8. Distinguish between active and passive immunity

CO.1 BL:4 9. Write a brief note on factors affecting innate immunity

CO.2 BL:6 10. Discuss briefly on classes of MHC.

CO.6 BL:6 11. Write a note on (i) Hashimotos thyroiditis (ii)Lupus erythematosus (iii)Rheumatoid arthritis.

PART C – (1 X 10 = 10 Marks)

Answer any ONE question

CO.2 BL:2 12. Discuss about scope and advances in immunology

CO.5 BL:6 13. Write in detail account on types of hypersensitivity.

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DEPARTMENT OF BIOCHEMISTRY

UNIT TEST II ,FEB 2023

Class	: II M. Sc Biochemistry	**Date**	: 13.04.2023
Subject	: Immunochemistry	**Time**	: 12 to 1.00 PM
Subject Code: MENAE		**Max. Mark:** 25	

PART A – (5 X 1 = 5 Marks)

Answer any FIVE questions

CO.1 BL:6 1. **Write a note on antigen - presenting cells.**

A type of immune cell that boosts immune responses by showing antigens on its surface to other cells of the immune system. An antigen-presenting cell is a type of phagocyte. Also called APC.

CO.1 BL:1 2. **State the functions of the immune system.**

The immune system has a vital role: It protects your body from harmful substances, germs and cell changes that could make you ill. It is made up of various organs, cells and proteins. As long as your immune system is running smoothly, you don't notice that it's there.

CO.1 BL:1 3. **Define innate immunity.**

Innate immunity is the first response of the body's immune system to a harmful foreign substance. When foreign substances, such as bacteria or viruses, enter the body, certain cells in the immune system can quickly respond and try to destroy them.

CO.1 BL:2 4. **Discuss on the cells responsible for production of antibodies.**

Synthesized exclusively by B cells, antibodies are produced in billions of forms, each with a different amino acid sequence and a different antigen-binding site.

CO.5 BL:1 5.**Define Autoimmunity**

A condition in which the body's immune system mistakes its own healthy tissues as foreign and attacks them. Most autoimmune diseases cause inflammation that can affect many parts of the body. The parts of the body affected depend on which autoimmune disease a person has.

CO.5 BL:1 6.**Tell about Thyroiditis.**

Thyroiditis is inflammation of your thyroid gland. Your thyroid is a small, butterfly-shaped gland located at the front of your neck under your skin. It's a part of your endocrine system and controls many of your body's important functions by producing and releasing certain hormones.

CO.5 BL1 7.**Define Graft rejection.**

Graft rejection occurs when the recipient's immune system attacks the donated graft and begins destroying the transplanted tissue or organ. The immune response is usually triggered by the presence of the donor's own unique set of HLA proteins, which the recipient's immune system will identify as foreign.

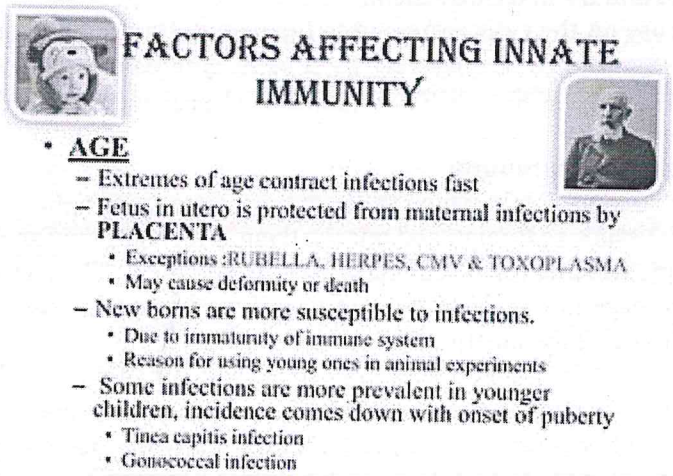
PART B – (2 X 5 = 10 Marks)

Answer any TWOquestion

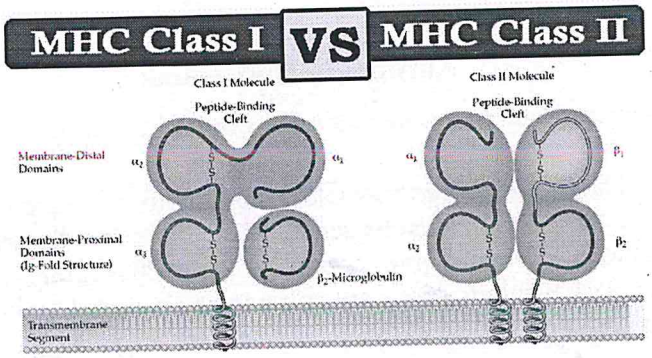
CO.1 BL:2 8. **Distinguish between active and passive immunity.**

Active Immunity	Passive Immunity
An Individual's own immune system produces the antibodies needed.	Involves the introduction of external antibodies
Direct contact with antigen stimulates antibody production	The pathogen does not need to have direct contact with the body.
Response takes time to develop and there is a lag phase	Rapid response
Long-lasting	Transient
Generates immunological memory	No memory response
It does not work with immunodeficient patients	Works in immunodeficient patients
Few adverse events	Risk of hypersensitivity reactions and serum sickness (especially with non-animal sources)

CO.1 BL:4 9. **Write a brief note on factors affecting innate immunity.**



CO.2 BL:6 10. **Discuss briefly on classes of MHC.**



S.N.	Characteristics	MHC-I molecule	MHC -II molecule
1.	Distribution	Present on almost all nucleated cells including platelets.	Have a restricted tissue distribution and are chiefly found on macrophages, dendritic cells, B cells, and other antigen-presenting cells only.
2.	Encoding genes	MHC class I proteins are encoded by the HLA-A, HLA-B, and HLA-C genes.	MHC Class II proteins are encoded by the genes of the HLA-D region.
3.	Nature of antigen presented	Antigens presented by MHC class I molecules are of endogenous origin.	Antigens presented by MHC class II molecules are derived from extracellular proteins.
		Cytosolic proteins; they sample peptides generated	Class II molecules sample peptides outside the cell

CO.6 BL:6 11. **Write a note on (i) Hashimotos thyroiditis**

(ii)Lupus erythematosus (iii)Rheumatoid arthritis.

(i)Hashimoto's thyroiditis can cause your thyroid to not make enough thyroid hormone. It is an autoimmune disease. It occurs when your body makes antibodies that attack the cells in your thyroid. Symptoms may include an enlarged thyroid gland (goiter), tiredness, weight gain, and muscle weakness
(ii)Systemic lupus erythematosus (SLE), is the most common type of lupus. SLE is an autoimmune disease in which the immune system attacks its own tissues, causing widespread inflammation and tissue damage in the affected organs. It can affect the joints, skin, brain, lungs, kidneys, and blood vessels.
(iii)**Rheumatoid arthritis.**or RA, is an autoimmune and inflammatory disease, which means that your immune system attacks healthy cells in your body by mistake, causing inflammation (painful swelling) in the affected parts of the body. RA mainly attacks the joints, usually many joints at once.

PART C – (1 X 10 = 10 Marks)

Answer any ONE question

CO.2 BL:2 **12.Discuss about scope and advances in immunology.**

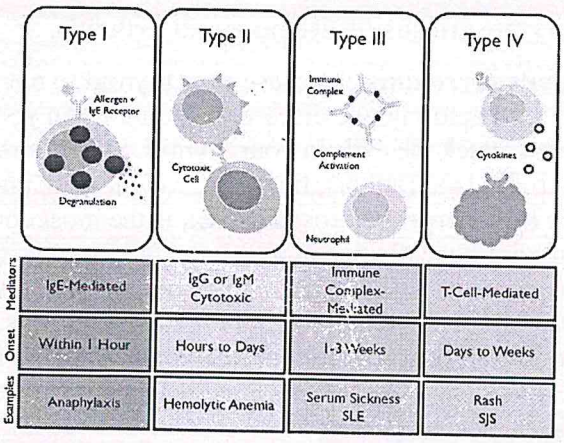
The future of immunobiology appears to be assured. The early successes of immunization by Jenner and Pasteur laid the way for the incredible flowering of immunobiology in the 20th century. Now it seems proper to ask what questions are going to be answered by immunobiology in the 21st century, and what remains to be done.

One of the big questions is whether immunologists can figure out a way to really understand innate immunity, given that it is a system in which there is really no specific product to measure. Have we discovered this product in the ability of Toll to activate co-stimulatory molecules? We don't think so. Immunologists will need to spend years, decades, or even centuries to figure out all the ins and outs of innate immunity. Another big question is how adaptive immunity really works. It seems that apoptosis plays a big part in controlling the adaptive immune system, but does anyone really know how to measure its contribution *in vivo*? Certainly we do not.

Future studies in cancer immunology promise untold benefits, but we do not see them even remotely on the horizon. Imagine how it would feel to come up with a general cure for cancer, one of mankind's oldest and deadliest enemies. Such advances are, of course, a double-edged sword, since decreasing deaths from cancer and infectious disease may well lead to an increasing population that exceeds the capacity of the available natural and social resources. Nevertheless, we should think positively about the benefits of immunological research, because we should all be interested in the benefits that can flow from such investigations, and not the possible negative outcomes. So this last part of the book will be written from an optimist's viewpoint that all research is aimed at increasing the benefits to mankind.

CO.3 BL:6 **13. Write in detail account on types of hypersensitivity.**

Types of Hypersensitivity Reactions



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Question and answer key

ODD SEMESTER

2022-2023

SRM ARTS AND SCIENCE COLLEGE
Department of Biotechnology

Date : 28.09.2022 **Duration : 1 hr** **Class : I B.Sc.,**

Subject Name & Code : Cell and Molecular Biology SC21A

Section A (5 x 2 = 10)

(Answer any **FIVE** questions)

CO5	BL 1	1.	Define Spindle fibre.
CO1	BL 1	2.	Tell about Robert Hook
CO1	BL 1	3.	Recall the term Cilia.
CO1	BL 2	4.	Describe Prokaryote.
CO5	BL 2	5.	Interpret the term reduction division
CO1	BL 4	6.	Explain Cell wall
CO5	BL 3	7.	Sketch on prophase.

Section B (1 x 5 = 5)

(Answer any **ONE** question)

CO5	BL 4	8.	Explain the stages of mitosis
CO1	BL 2	9.	Discuss about Cell theory

Section C (1 x 10 = 10)

(Answer any **ONE** question)

CO5	BL 2	10.	Summarize on cell cycle and its regulation
CO1	BL 2	11.	Distinguish between prokaryotic and eukaryotic cell with example

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Answer Keys

1. Define Spindle fibre.

   Spindle fibers form a protein structure that divides the genetic material in a cell. The spindle is necessary to equally divide the chromosomes in a parental cell into two daughter cells during both types of nuclear division: mitosis and meiosis. During mitosis, the spindle fibers are called the mitotic spindle.

2. Tell about Robert Hooke

   Robert Hooke is known for his discovery of the law of elasticity (Hooke's law), for his first use of the word cell in the sense of a basic unit of organisms

3. Recall the term Cilia

   Tiny hair-like organelles attached to the cell surface — are located on almost all polarized cell types of the human body

4. Describe Prokaryote.

   Prokaryotes are organisms whose cells lack a nucleus and other organelles. Prokaryotes are divided into two distinct groups: the bacteria and the archaea, which scientists believe have unique evolutionary lineages.

5. Interpret the term reduction division

   The first cell division in meiosis, the process by which germ cells are formed. In reduction division, the chromosome number is reduced from diploid (46 chromosomes) to haploid (23 chromosomes). Also known as first meiotic division and first meiosis.

6. Explain Cell wall

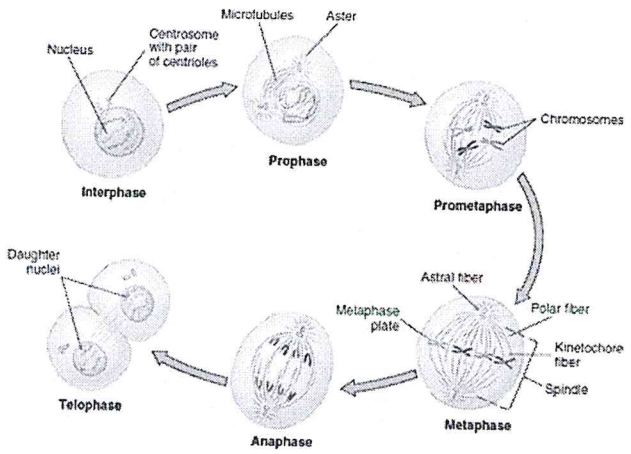
   A cell wall is a structural layer surrounding some types of cells, just outside the cell membrane.

7. Sketch on prophase.

   During prophase, the complex of DNA and proteins contained in the nucleus, known as chromatin, condenses. The chromatin coils and becomes increasingly compact, resulting in the formation of visible chromosomes. Chromosomes are made of a single piece of DNA that is highly organized.

Part B

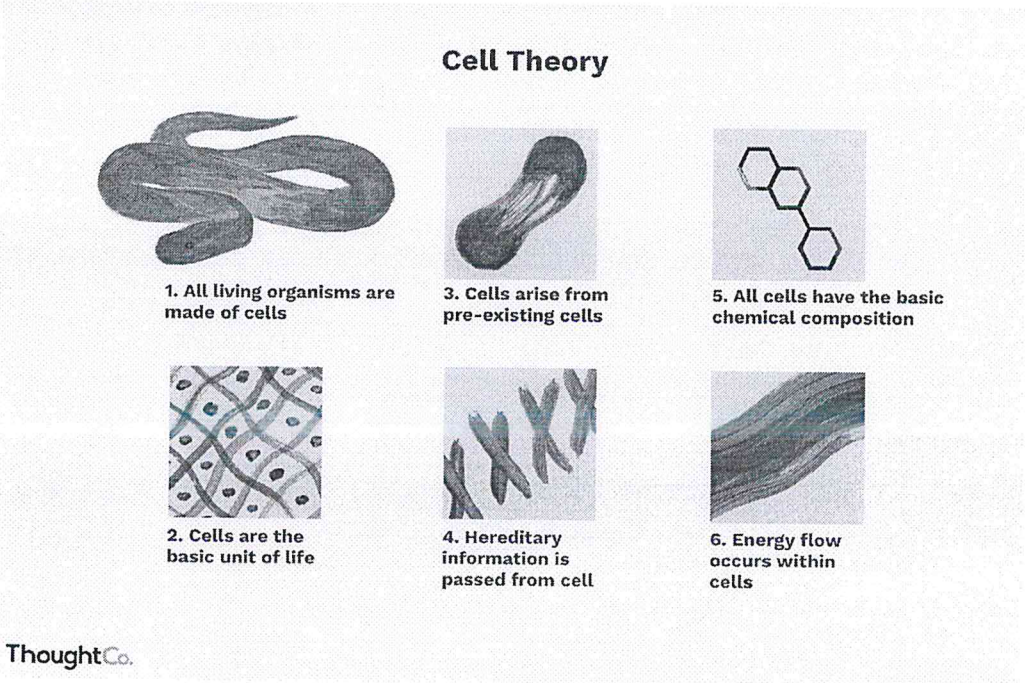
8. Explain the stages of mitosis



9. Discuss about Cell theory

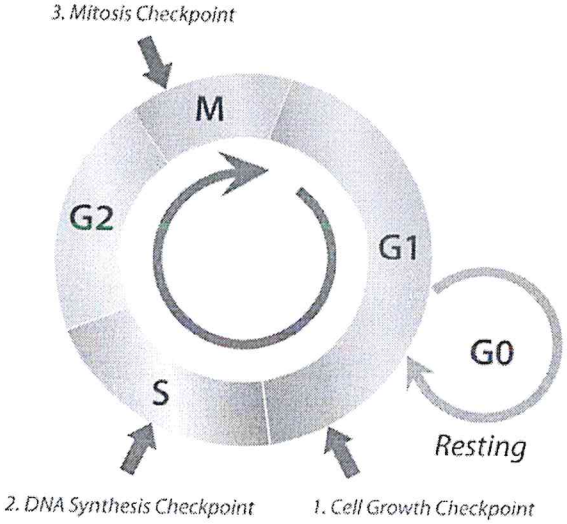
Cell theory, fundamental scientific theory of biology according to which cells are held to be the basic units of all living tissues. First proposed by German scientists Theodor Schwann and Matthias Jakob Schleiden in 1838, the theory that all plants and animals are made up of cells marked a great conceptual advance in biology and resulted in renewed attention to the living processes that go on in cells.

Robert Hooke cell theory



10. Summarize on cell cycle and its regulation

The Cell Cycle and the Checkpoints



1. Cell Growth Checkpoint

- Occurs toward the end of growth phase 1 (G1).
- Checks whether the cell is big enough and has made the proper proteins for the synthesis phase.
- If not, the cell goes through a resting period (G0) until it is ready to divide.

2. DNA Synthesis Checkpoint

- Occurs during the synthesis phase (S).
- Checks whether DNA has been replicated correctly.
- If so, the cell continues on to mitosis (M).

3. Mitosis Checkpoint

- Occurs during the mitosis phase (M).
- Checks whether mitosis is complete.
- If so, the cell divides, and the cycle repeats.

11. Distinguish between prokaryotic and eukaryotic cell with example

Prokaryotes	Eukaryotes
Circular DNA (in cytosol)	Linear DNA (in nucleus)
No organelles	Several membrane bound organelles
Nucleoid (not membrane bound)	Nucleus (membrane bound)
Single chromosome	Several chromosomes
Plasma membrane typically lacks receptors	Plasma membrane with receptors (sterols and carbohydrates)
Chemically complex cell wall (may contain peptidoglycan)	Chemically simple cell walls (cellulose (plants) and chitin (fungi))
DNA transcription and mRNA translation occurs simultaneously (in cytosol)	DNA transcription in nucleus, and mRNA translation in cytosol
Flagellum (if present) Simple, built from two proteins	Flagellum (if present) Complex, built from microtubules
May have pili and fimbriae	May have cilia
Haploid genome (only one copy of each gene)	Diploid genome (more than one copy of each gene)
May have plasmids (DNA outside chromosome)	Plasmid DNA not common
Compact genome (little repetitive DNA)	Usually large amounts of non-coding and repetitive DNA
May have a glycocalyx cover	Glycocalyx only if no cell wall
Small ribosomes	Large ribosomes in cytosol/nucleus small ribosomes in organelles
No histones in chromosome	DNA "wound" around histones
Lacks cytoskeleton	Cytoskeleton (actin, microtubules)
Mycolaginous capsule	No mycolaginous capsule
Cell size range 0.5–100 µm	Cell size range 10–150 µm
Asexual reproduction (binary fission)	Sexual reproduction (meiosis and mitosis)

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SRM ARTS AND SCIENCE COLLEGE
Department of Biotechnology

Date : 02.11.2022 **Duration : 1 hr** **Class : I B.Sc., Biotechnology**
Subject Name & Code : Cell and Molecular Biology SC21A

Section A (5 x 2 = 10)
(Answer any **FIVE** questions)

CO4 BL 1 1. Define thymine dimers.
CO3 BL 1 2. Tell about nucleic acids.
CO4 BL 1 3. Recall the term stop codons
CO3 BL 2 4. Describe DNA structure.
CO3 BL 2 5. Interpret the term replication.
CO4 BL 4 6. Explain translocation
CO3 BL 3 7. Sketch on types of DNA.

Section B (1 x 5 = 5)
(Answer any **ONE** question)

CO4 BL 4 8. Explain post translational modification
CO3 BL 2 9. Discuss the circular and linear forms of DNA

Section C (1 x 10 = 10)
(Answer any **ONE** question)

CO3 BL 2 10. Summarize on models of DNA replication
CO4 BL 2 11. Describe the protein synthesis in prokaryotes

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Section – A

1. Define thymine dimmers
Covalently bonded
Ultraviolet radiation

2. Tell about nucleic acids.
Macromolecules
Three components

3. Recall the term stop codons
Signals the termination
A sequence of nucleotides

4. Describe DNA structure.
Double helical structure
Hydrogen bonds

5. Interpret the term replication.
Copies of DNA identical molecules
Three models of replication

6. Explain translocation
Change in location
Rearrangement of chromosomes

7. Sketch on types of DNA.
A - DNA, B - DNA, Z – DNA
Diagrammatic representation of the above types

Section – B

8. Explain post translational modification
Covalent and enzymatic modification of proteins, Diagrammatic representation
Phosphorylation, glycosylation, acetylation, hydroxylation, methylation, lipidation, proteolysis, ubiquitination
Four steps: tRNA charging, initiation, elongation and termination
Modulation and extension of protein functions
Function of haemostatic proteins
Target particular polypeptides to specific cellular locations

9. Discuss the circular and linear forms of DNA

Linear DNA - Nucleus of eukaryotic organism
Circular DNA - Cytoplasm of prokaryotic cells
Closed loop and has no ends, plasmids, mobile genetic elements
Linear DNA composed of two ends
Linear DNA involves formation of replication fork
Circular DNA is comparatively smaller
Diagrammatic representation

Section – C

10. Summarize on models of DNA replication

Rolling circle replication – rapidly synthesize multiple copies of DNA or RNA
Rolling circle initiated by an initiator protein
Continued DNA synthesis can produce multiple single-stranded linear copies of original DNA called concatemer
Create a nick, RNA polymerase III replicate the SSO DNA
DNA polymerase I removes the primer
Theta mode of replication – initiation occurs at ori site
In theta mode, ds-DNA denatures to form ss-DNA, denatured segment of DNA called replication bubble
DNA unwinds and y-shaped structure formed called as replication fork
Bidirectional replication is the most classical way of replicating genomic nucleic acid
Telomere replication

11. Describe the protein synthesis in prokaryotes

Protein synthesis occurs in the cytoplasm
The processes of translation and transcription occur in cytoplasm
Protein biosynthesis begins by dissociation of 30s ribosomal subunit and an mRNA at AUG codon site
Operons are transcribed to mRNA in the cytoplasm by RNA polymerase
The regulation occurs at transcriptional level and involves genetic units known as operons
Diagrammatic representation of synthesis
Rifamycin inhibits the protein replication
The required ATP is given by charged tRNA
The ribosome translates the mRNA produced from DNA into chain of amino acids

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Date : 29.09.2022 **Duration : 1 hr** **Class : I B.Sc.,**
Subject Name & Code : Fundamentals of Microbiology DSA01

Section A (5 x 2 = 10)

(Answer any **FIVE** questions)

CO1 BL 1 1. State Discovery Era
CO3 BL 1 2. Illustrate Koch's Postulate
CO3 BL 2 3. Demonstrate different shapes of bacteria
CO2 BL 2 4. Distinguish Prokaryotes and Eukaryotes
CO2 BL 3 5. Differentiate Moist heat and Dry heat
CO1 BL 3 6. Define Antibiotics
CO1 BL 2 7. List out different Staining techniques

Section B (1 x 5 = 5)

(Answer any **ONE** question)

CO5 BL 3 8. Explain the mode of action of antibiotics
CO2 BL 2 9. Differentiate gram positive and gram negative bacteria with diagram.

Section C (1 x 10 = 10)

(Answer any **ONE** question)

CO5 BL 3 10. Summarize Sterilization Technique
CO3 BL 2 11. Sketch Structure of bacteria with parts and explain its function.

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Section A

(5 x 2 = 10)

(Answer any **FIVE** questions)

1. State Discovery Era

Antonie van Leeuwenhoek (1632–1723) was one of the first people to observe microorganisms, using a microscope of his own design, and made one of the most important contributions to biology. Robert Hooke was the first to use a microscope to observe living things.

2. Illustrate Koch's Postulate

The bacteria must be present in every case of the disease. The bacteria must be isolated from the host with the disease and grown in pure culture. The specific disease must be reproduced when a pure culture of the bacteria is inoculated into a healthy susceptible host.

3. Demonstrate different shapes of bacteria

Different shapes of bacteria
Spherical- Cocci.
Rod-shaped- Bacilli.
Spiral bacteria.
Comma shaped- Vibrio.

4. Distinguish Prokaryotes and Eukaryotes

Prokaryotic cells are primitive cells mainly found in the unicellular organisms, and they do not nucleus, instead they contain a fragment of DNA, and the organelles are not bounded by the membranes, where as the eukaryotic cells are found in all types of multicellular organisms such as plant and animal cells and they contains nucleus and membrane bound organelles.

5. Differentiate Moist heat and Dry heat

The key difference between dry heat and moist heat sterilization is that dry heat sterilization refers to the sterilization under high temperature in dry conditions, while moist heat sterilization refers to the sterilization under high temperature and pressure generated through water steam.

6. Define Antibiotics

Antibiotic, chemical substance produced by a living organism, generally a microorganism, that is detrimental to other microorganisms.

7. List out different Staining techniques

Gram stain. Other differential staining methods include the endospore stain (to identify endospore-forming bacteria), the acid-fast stain (to discriminate Mycobacterium species from other bacteria), a metachromatic stain to identify phosphate storage granules, and the capsule stain (to identify encapsulated bacteria).

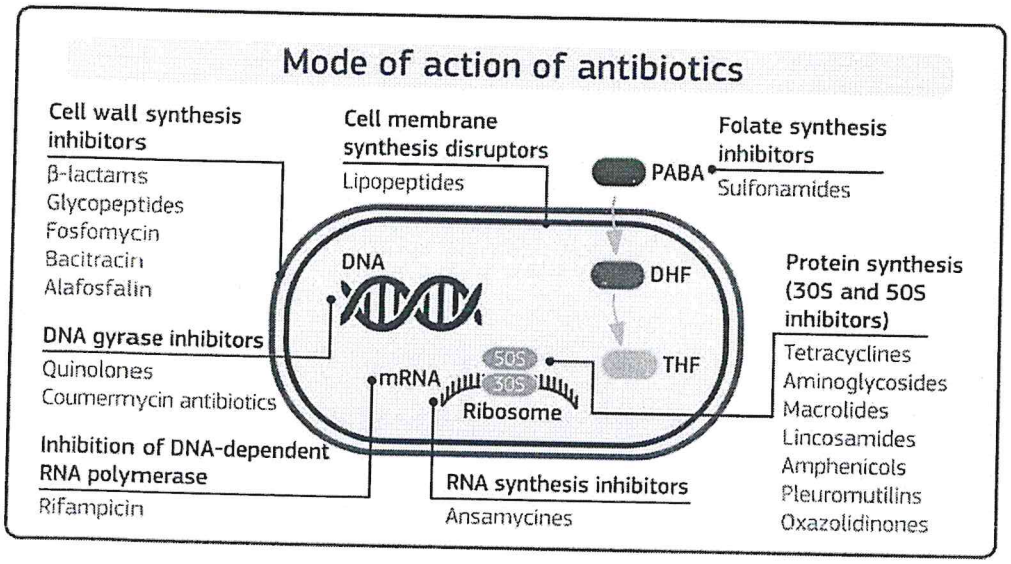
Section B

(1 x 5 = 5)

(Answer any **ONE** question)

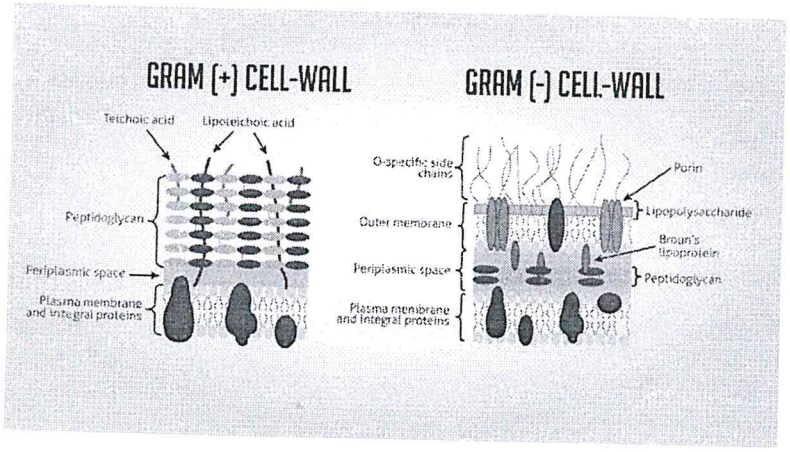
8. Explain the mode of action of antibiotics.

There are six major modes of action: (1) interference with cell wall synthesis, (2) inhibition of protein synthesis, (3) interference with nucleic acid synthesis, (4) inhibition of a metabolic pathway, (5) inhibition of membrane function, (6) inhibition of ATP Synthase (Fig.).



9. Differentiate gram positive and gram negative bacteria with diagram.

Gram staining is a differential staining technique that differentiates between gram-negative and gram-positive groups by colouring these cells purple or pink. As a result of the presence of a thick layer of peptidoglycan in its cell walls, gram-positive bacteria stain purple, by retaining the crystal violet that these cells get stained with. Due to the thin layer of peptidoglycan, the gram-negative bacteria appear pink after staining with safranin.



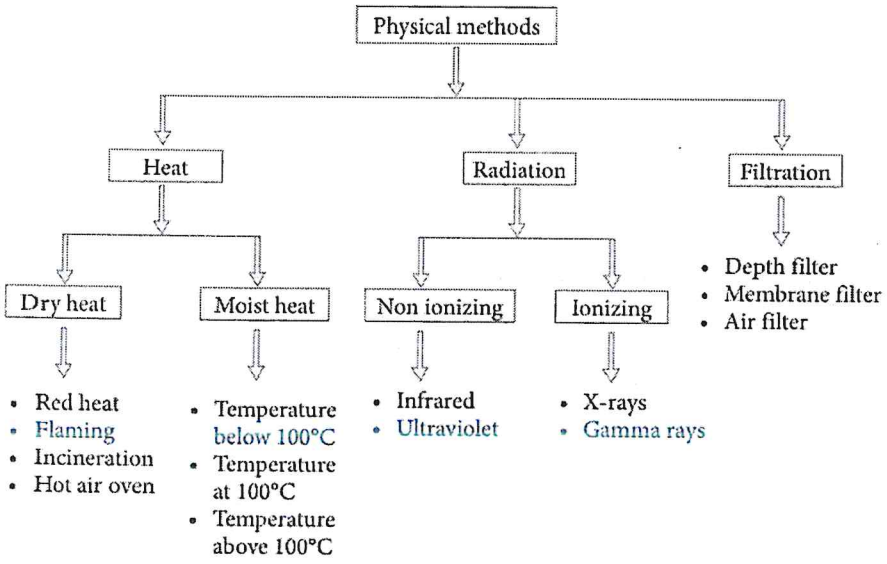
Section C (1 x 10 = 10)

(Answer any **ONE** question)

10. Summarize Sterilization Technique

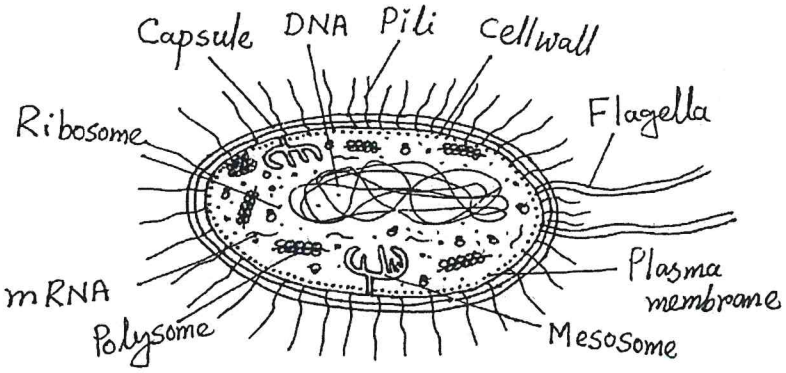
Sterilization can be achieved through various means, including heat, chemicals, irradiation, high pressure, and filtration. Sterilization is distinct from disinfection, sanitization, and pasteurization, in that those methods reduce rather than eliminate all forms of life and biological agents present.

Sterilization can be achieved through various means, including heat, chemicals, irradiation, high pressure, and filtration. Sterilization is distinct from disinfection, sanitization, and pasteurization, in that those methods reduce rather than eliminate all forms of life and biological agents present. After sterilization, an object is referred to as being sterile or aseptic.



Flowchart 4.1: Physical Methods of Sterilization

11. Sketch Structure of bacteria with parts and explain its function.



Cell Envelope - The cell envelope is made up of two to three layers: the interior cytoplasmic membrane, the cell wall, and -- in some species of bacteria -- an outer capsule.

Cell Wall - Each bacterium is enclosed by a rigid cell wall composed of peptidoglycan, a protein-sugar (polysaccharide) molecule. The wall gives the cell its shape and surrounds the cytoplasmic membrane, protecting it from the environment.

Capsule - Some species of bacteria have a third protective covering, a capsule made up of polysaccharides (complex carbohydrates). Capsules play a number of roles, but the most important are to keep the bacterium from drying out and to protect it from phagocytosis (engulfing) by larger microorganisms.

Cytoplasm - The cytoplasm, or protoplasm, of bacterial cells is where the functions for cell growth, metabolism, and replication are carried out.

Cytoplasmic Membrane - A layer of phospholipids and proteins, called the cytoplasmic membrane, encloses the interior of the bacterium, regulating the flow of materials in and out of the cell.

Flagella - Flagella (singular, flagellum) are hairlike structures that provide a means of locomotion for those bacteria that have them. They can be found at either or both ends of a bacterium or all over its surface.

Nucleoid - The nucleoid is a region of cytoplasm where the chromosomal DNA is located..

Pili - Many species of bacteria have pili (singular, pilus), small hairlike projections emerging from the outside cell surface.

Ribosomes - Ribosomes are microscopic "factories" found in all cells, including bacteria.

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SRM ARTS AND SCIENCE COLLEGE
Department of Biotechnology

Date : 03.10.2022 **Duration : 1 hr** **Class : I B.Sc.,**

Subject Name & Code : Fundamentals of Microbiology SN31A

Section A (5 x 2 = 10)

(Answer any **FIVE** questions)

CO1 BL 2 1. State Generation Time.
CO6 BL 2 2. Name any two Bacterial Growth Media with composition
CO2 BL 2 3. Comment on Capsule Staining
CO1 BL 2 4. Define Cryopreservation
CO2 BL 3 5. Mode of action of antibiotcs
CO3 BL 3 6. Define MRSA
CO3 BL 2 7. Define Biopesticides.

Section B (1 x 5 = 5)

(Answer any **ONE** question)

CO3 BL 3 8. Explain the mycorrhizae as biofertlizers
CO2 BL 2 9. Categorize Biochemical Characterization with any six analyses

Section C (1 x 10 = 10)

(Answer any **ONE** question)

CO5 BL 3 10. Express on Bacterial Growth and Development
CO3 BL 2 11. Sketch the Vector borne disease (Malaria fever)

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Section A

(5 x 2 = 10)

(Answer any **FIVE** questions)

1. State Generation Time.

Generation time is the time it takes for a population of bacteria to double in number. For many common bacteria, the generation time is quite short, 20-60 minutes under optimum conditions.

2. Name any two Bacterial Growth Media with composition

Nutrient Agar: Composition, Preparation and Uses

Nutrient Agar is a general purpose, nutrient medium used for the cultivation of microbes supporting growth of a wide range of non-fastidious organisms.

Composition of Nutrient Agar

0.5% Peptone, It is an enzymatic digest of animal protein. Peptone is the principal source of organic nitrogen for the growing bacteria.

0.3% beef extract/yeast extract, It is the water-soluble substances which aid in bacterial growth, such as vitamins, carbohydrates, organic nitrogen compounds and salts.

.5% agar, It is the solidifying agent.

0.5% NaCl, The presence of sodium chloride in nutrient agar maintains a salt concentration in the medium that is similar to the cytoplasm of the microorganisms.

Luria Bertani Agar, Miller (Miller Luria Bertani Agar) M1151

Composition

Ingredients Gms / Litre

Tryptone 10.

Yeast extract 5.

Sodium chloride 10.

Agar 15.

Final pH (at 25°C) 7.5±0.2

3. Comment on Capsule Staining

The main purpose of capsule stain is to distinguish capsular material from the bacterial cell. A capsule is a gelatinous outer layer secreted by bacterial cell and that surrounds and adheres to the cell wall. Most capsules are composed of polysaccharides, but some are composed of polypeptides. The capsule differs from the slime layer that most bacterial cells produce in that it is a thick, detectable, discrete layer outside the cell wall. The capsule stain employs an acidic stain and a basic stain to detect capsule production.

4. Define Cryopreservation

Cryopreservation is a process that preserves organelles, cells, tissues, or any other biological constructs by cooling the samples to very low temperatures. The responses of living cells to ice formation are of theoretical interest and practical relevance.

5. Mode of action of antibiotics

There are six major modes of action: (1) interference with cell wall synthesis, (2) inhibition of protein synthesis, (3) interference with nucleic acid synthesis, (4) inhibition of a metabolic pathway, (5) inhibition of membrane function, (6) inhibition of ATP Synthase

6. Define MRSA

Methicillin-resistant Staphylococcus aureus (MRSA) is a cause of staph infection that is difficult to treat because of resistance to some antibiotics.

7. Define Biopesticides.

Biopesticides are living organisms that are sprayed on crop plants to kill pests.
They're utilized to get rid of weeds and pests.
A biopesticide is a biological pest management approach.
Because biopesticides do not pollute the environment, they are preferred over chemical pesticides.
Biopesticides example:
Various lepidopteran, coleopteran, and dipteran species are infected with Bacillus thuringiensis, which causes digestive illnesses.
Through genetic engineering, the toxin from this bacteria has been directly expressed in plants, such as Bt cotton and Bt brinjal.

Section B

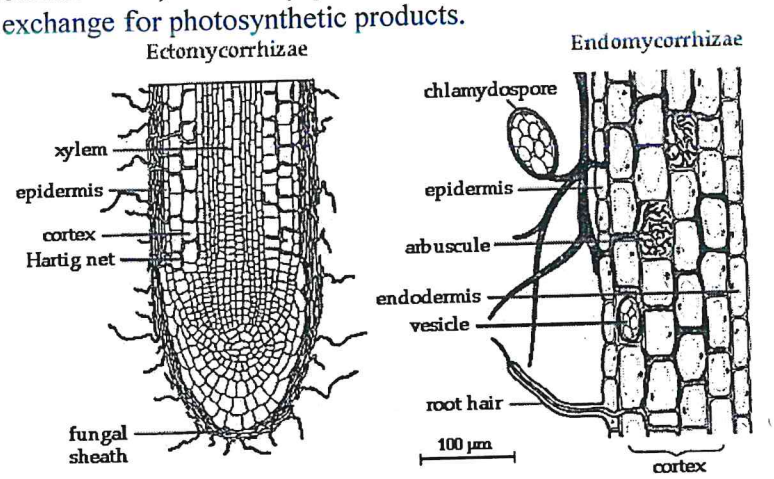
(1 x 5 = 5)

(Answer any **ONE** question)

8. Explain the mycorrhizae as biofertlizers

A mycorrhiza is a symbiotic association between a green plant and a fungus. The plant makes organic molecules such as sugars by photosynthesis and supplies them to the fungus, and the fungus supplies to the plant water and mineral nutrients, such as phosphorus, taken from the soil.

Arbuscular Mycorrhizal Fungi (AMF) constitute a group of root obligate biotrophs that exchange mutual benefits with about 80% of plants. They are considered natural biofertilizers, since they provide the host with water, nutrients, and pathogen protection, in exchange for photosynthetic products.



9. Categorize Biochemical Characterization with any six analyses

Biochemical reactions can reveal the vital information necessary for accurately identifying the genera of various bacteria within a sample. By their nature, bacteria produce large volumes of enzymes, and it is these enzymes that allow for their identification via biochemical methods. The type of enzymes produced by a bacterium can usually be used to classify its species given that bacteria have distinct enzymatic profiles.

S. No.	Biochemical Testing	Inferences	Type of Bacteria
1	**Kovacs' reagent:** (Paradimethyl amino bezaldehyde + Isoamyl alcohol + Sulphuric acid)	Appearance of pink coloured ring	Presence of *E.coli*.
2	**Methyl red test:**	Appearance of pink coloured ring in methyl red.	Presence of *E.coli* and *Citrobacter freundii*
3	**Citrase utilization test:** (Simmon's citrate medium + Bromo thymol indicator	Appearance of green colour or blue colour in the medium Green-Negative. Blue- Positive	Absence or presence of *Citrobacter freundii.*
4	**Urease test:** (Urease is digested by urease enzyme resulted in release of ammonia)	Appearance of yellow colour shows negative. Appearance of pink colour positive.	Presence of *Citrobacter freundii.* and *Klebsiella pneumoniae*
5	**Oxidase reaction:** (Tetra methyl parapholene diamine dihydro chloride)	Appearance of purple colour within 30 minutes.	Presence of bacteria contains cytochrome oxidase like
6	**Fermentation and gas production test:** (Glucose, lactose, sucrose, mannose	Change of colour from blue to yellow.	Presence of fermenting and gas producing bacteria.
7	**Triple sugar iron test** (Glucose, lactose and sucrose 1:10:10).	Black colour change in the media.	Presence of hydrogen sulphide gas producing bacteria.

Section C

(1 x 10 = 10)

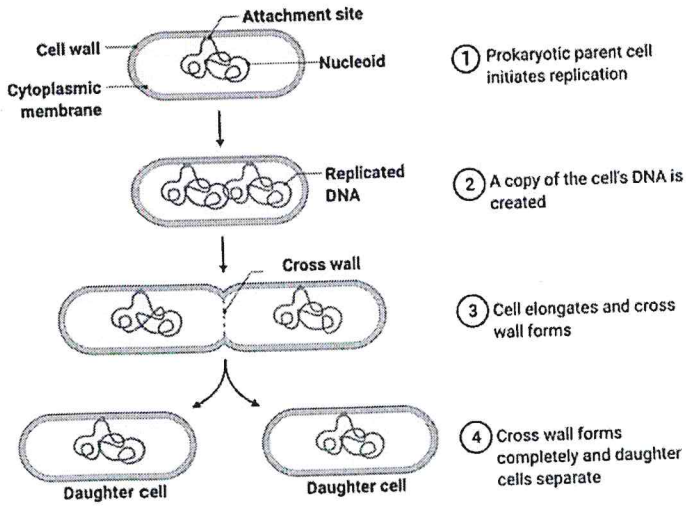
(Answer any **ONE** question)

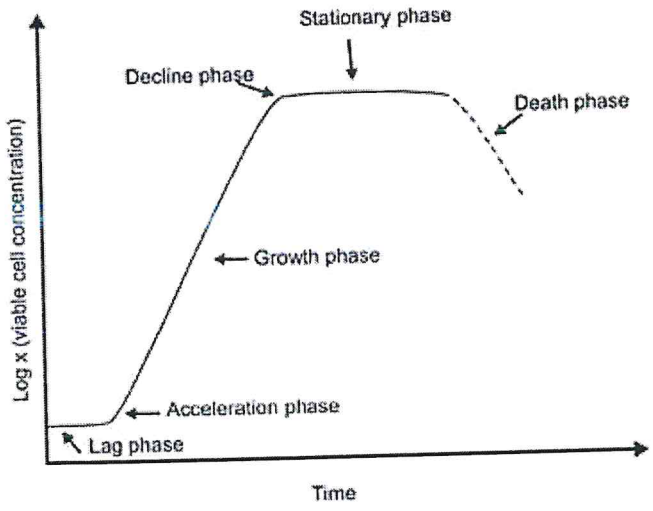
10. Express on Bacterial Growth and Development.

Bacteria grow and reproduces via binary fission, which involves the process of the parent organism growing and dividing into doubles into a new individual. The parent cell also shares identical DNA with the daughter cell after the elongation process. They consume nutrition and develop to reproduce.

Growth of bacteria:

1. Bacteria are prokaryotic unicellular organisms found in different habitats.
2. Bacteria grow and reproduces via binary fission, which involves the process of the parent organism growing and dividing into doubles into a new individual.
3. The parent cell also shares identical DNA with the daughter cell after the elongation process.
4. They consume nutrition and develop to reproduce.
5. Under favorable conditions, the bacteria consumes and grows to develop into a new individual.
6. The optimum conditions comprise optimum temperature, adequate nutrition, and moisture for doubling.
7. The growth of bacteria happens across various stages.





Four stages of bacterial growth:

A. Lag phase:
It is the phase where the bacterial cell prepares for the reproduction process.
It grows and adapts to the conditions.
The synthesis of RNA and required enzymes occur.

B. Log phase:
Log phase is the phase where most of the reproduction and growth occurs.
It is the phase where the bacterial cell starts to double exponentially.
It is the logarithmic increase in the growth rate.
The doubling of bacteria is approximately 20-60 minutes.

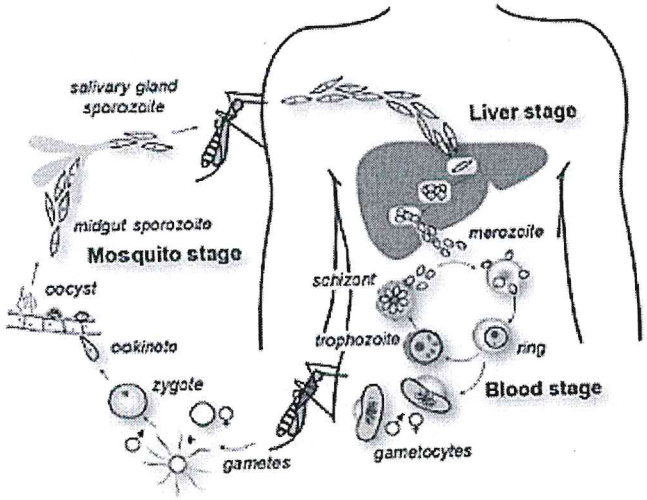
C. Stationary phase:
It is the phase where the bacteria population stops dividing and growing.
The rate of growth becomes equal to the death rate.
The nutrient in the solution starts to deplete.

D. Death phase:
The death phase is the phase where all the nutrients have been consumed.

The bacteria start to die.
The death rate is more than the growth rate.

11. Sketch the Vector borne disease (Malaria fever)

Vector-Borne Disease: Disease that results from an infection transmitted to humans and other animals by blood-feeding anthropods, such as mosquitoes, ticks, and fleas. Examples of vector-borne diseases include Dengue fever, West Nile Virus, Lyme disease, and malaria.
Vector Borne diseases are the illness caused by the vectors. A vector is a carrier of the causative microbe for various diseases such as mosquitoes, ticks and fleas. The reproduction rates of vectors are influenced by climate and weather. Such diseases are widespread and found throughout the world.
Malaria is a disease caused by a parasite. The parasite is spread to humans through the bites of infected mosquitoes. People who have malaria usually feel very sick with a high fever and shaking chills.
Symptoms
Signs and symptoms of malaria may include:
Fever, Chills
General feeling of discomfort, Headache
Nausea and vomiting, Diarrhea, Abdominal pain
Muscle or joint pain, Fatigue
Rapid breathing, Rapid heart rate, Cough.



Mosquito transmission cycle
Uninfected mosquito. A mosquito becomes infected by feeding on a person who has malaria.
Transmission of parasite. If this mosquito bites you in the future, it can transmit malaria parasites to you. In the liver. Once the parasites enter your body, they travel to your liver — where some types can lie dormant for as long as a year.
Into the bloodstream. When the parasites mature, they leave the liver and infect your red blood cells. This is when people typically develop malaria symptoms.
On to the next person. If an uninfected mosquito bites you at this point in the cycle, it will become infected with your malaria parasites and can spread them to the other people it bites.

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UNIT TEST 1 (ODD SEMESTER)

Date : 14.09.2022 **Duration : 1 hour** **Class: II B.Sc.**

Subject Name & Code:Genetic Engineering SB33A

Section A (5 x 2 = 10)

(Answer any **FIVE** questions)

CO1	BL2	1.ExplainRestriction enzymes
CO1	BL1	2. Define Host cell
CO1	BL2	3. Describe R DNA
CO4	BL3	4. Illustrate Electroporation
CO4	BL2	5. InterpretBiolistic method of gene transfer
CO1	BL1	6. Name any two Secondary metabolite
CO4	BL1	7. Recall the term Cry protein

Section B (1 x 5 = 5)

(Answer any **ONE** question)

CO1	BL3	8. Demonstrate the introduction of r DNA into host cell by physical method
CO4	BL1	9. Enumerate about Bt cotton

Section C (1 x 10 = 10)

(Answer any **ONE** question)

CO4	BL2	10. Summarize onAgrobacterium .Tumifaciens mediated gene transfer
CO1	BL3	11. Prepare the strategies involved in r DNA cloning

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Answer key

Section-A

1) Restriction enzymes:-cuts the particular protein of the DNA.molecular scissors, BamHI , HindIII

2) Host cell:-carries the vector with GOI for amplification.E.coli.

3) RDNA:-vector with GOI forcing DNA.used to manipulate & isolate the DNA.

4) Electroporation:-Electrical pulses in cell membrane.passes in nucleic acids.

5) Biolistic method of gene transfer:-physical transferationmethod.directly shooting DNA - cell using device gene gun.

6) Two secondary metabolites:-organic compound for growth and development.plant produce for defence mechanisms.end product for primary metabolites

7) cry protein:-parasporal inclusion protein. From Bt cotton.

Section –B

8) R DNA transfer into host cell- Electroporation, Particle bombardment method, Microinjection and Liposome mediated gene transfer.

Microinjection- glass micropipette with 0.5-10 micrometer is used-cells are immobilized on a solid support

Microprojectile- gold coated DNA particle are accelerated to a velocity of 1400 feet/second. – microparticles are carried by a bullet- transgenic plants soyabean, tobacco

Liposome mediated gene transfer- lipid bags – enclosed with plasmids- endocytosis of protoplast- tobacco, petunia and carrot

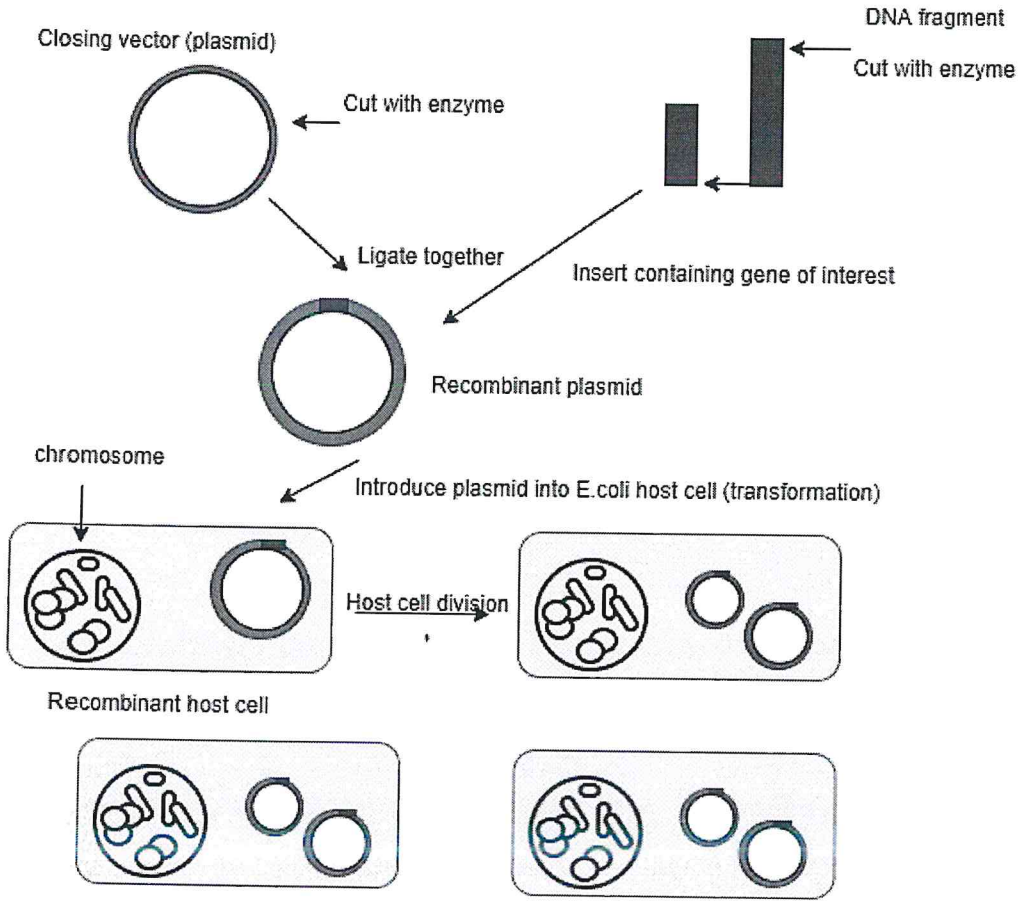
9) Bt cotton:-it is a GMO or genetically pest resistant plant cotton variety which produces insecticide to combat bollworm. moths, butterflies, beetles, cotton bollworms, gh to flies,aphids.field trials -U.S.A (1993)commercially supplied -1995.india - 2003.production of

Bt cotton:-crygene from Bt inserted into tiplasmidrecombinant DNA is reinsert into agrobacterium tumefaciens.culture in petriplate cell division takes place.screeingmicropropagation plant tissue culture.bt cotton plantlets supplied to the famers bt cotton fields insect eat and killed.

Section- C

10)Agrobacterium:-gram -ve, rod shape, crown gall disease.open enormous opportunities for plant GE.Genetransfer for developing vectors.Structure of Ti-plasmid:-Organization of Ti-plasmid:-T-DNA region: - -biosynthesis of auxin, cytokinin, opine. -Set of 24kb 2) virulence region:- transfer of T-DNA into host plant. 3) opine catabolism:- codes for ptn.4) the left border:-plant genome upon being infected by soil bacterium A.tumefaciens. Insect and insert a desired DNA into TDNA -use of A.tumifaciens to deliver. - Serve as natural vectors.Agrobacterium rhizogenes:-infect plant , result in hairy roots and crown gall.Root inducing:-products of T-DNA genes involved in plant growth regulators.Importance of hairy roots:-cultured invitro.Pharmaceutical proteins. T-DNA transfer & integration:-signal induction. Attachment of agrobacterium to plants cell. Virulence proteins.T-DNA strand. Transfer of T-DNA to bacterium.transfer of T-DNA into plant cells and integrations.Mechanism of t-DNA transfer in plant its applications in GE:-T-DNA transferred from bacteria into the host plants into the nuclear genome.it infects wound or damaged plants tissues.opines - amino acid derivatives and agropines - sugar derivatives. It transformed plant cells and creats a biosynthesis machinery to produce nutrients for its own use. Examples of Ti plasmid:-binary vectors and co-integrate vectors.

11) Strategies involved in rDNA technology- 1) Isolation of DNA 2) use of restriction enzymes 3) Transformation into host cell 4) identification of transformed cells 5) Amplification of rDNA 6) Cell multiplication to get a clone



E. Coli cells containing cloned plasmids

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Department of Biotechnology

Date : 2.11.2022 **Duration : 1 hour** **Class : II B.Sc**

Subject Name & Code:Genetic Engineering SB33A

Section A (5 x 2 = 10)

(Answer any **FIVE** questions)

CO5	BL2	1. Explain about transgenic animals and its uses
CO5	BL1	2. Define Humulin
CO1	BL2	3. Illustrate horticulture
CO5	BL3	4. Explain about transgenic plants and its uses
CO2	BL2	5. Explain Insertional inactivation
CO3	BL1	6. Summarize on Agarose Gel Electrophoresis
CO4	BL1	7. Choose a promoter region for a bacterial expression vector

Section B (1 x 5 = 5)

(Answer any **ONE** question)

CO1	BL3	8. Demonstrate the production of transgenic animal with one example
CO3	BL3	9. Illustrate the process of expression vector and their applications

Section C (1 x 10 = 10)

(Answer any **ONE** question)

CO2	BL2	10. Explain the cDNA Library construction
CO5	BL3	11. Describe the production of transgenic plants with examples

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Answer Key

Section A

1. Transgenic animals are the animals with the modified genome. A foreign gene is inserted into the genome of the animal to alter its DNA. This method is done to improve the genetic traits of the target animal.

Transgenesis is the phenomenon in which a foreign gene with desired characteristics is introduced into the genome of the target animal. The foreign gene that is introduced is known as the transgene, and the animal whose genome is altered is known as transgenic. These genes are passed on to the successive generations.

2. Humulin N is a prescription medicine used to treat the symptoms of Type 1 and Type 2 Diabetes Mellitus. Humulin N may be used alone or with other medications.

Humulin N belongs to a class of drugs called Antidiabetics, Insulins; Antidiabetics, Intermediate-Acting Insulins.

3. The art and science of growing fruits, vegetables, herbs, nuts and ornamental plants.

4. A transgenic plant is a modified organism where genes are transferred from one organism to another through genetic engineering techniques". The purpose of producing a transgenic plant is to obtain a species that has ideal traits, high yield and quality.

5. Insertional inactivation is a technique used in recombinant DNA technology. In this procedure, a bacterium carrying recombinant plasmids or a fragment of foreign DNA is made to insert into a restriction site inside a gene to resist antibiotics, hence causing the gene to turn non-functional or in an inactivated state.

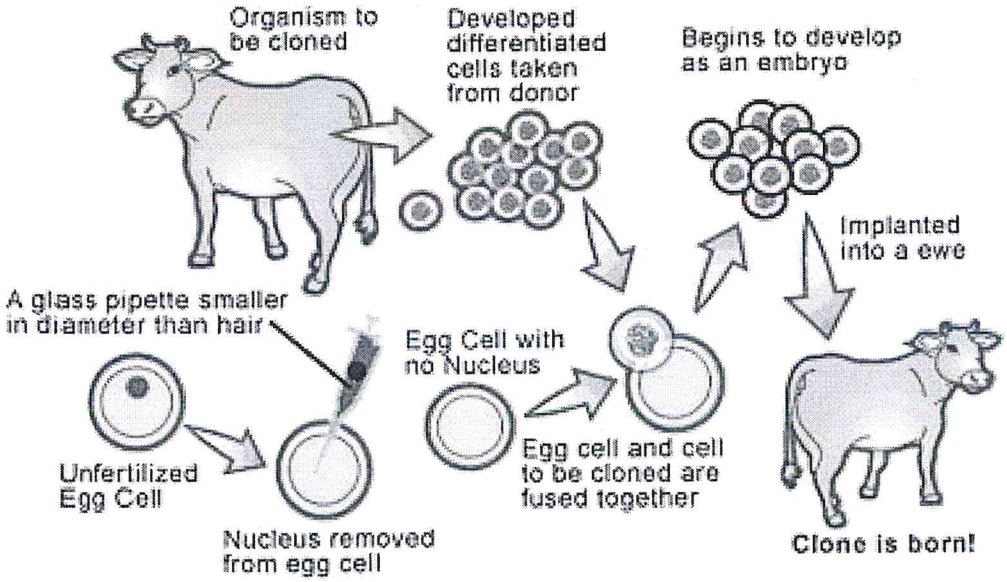
6. Agarose gel electrophoresis has proven to be an efficient and effective way of separating nucleic acids. Agarose's high gel strength allows for the handling of low percentage gels for the separation of large DNA fragments.

7. A promoter is a region of DNA where transcription of a gene is initiated. Promoters are a vital component of expression vectors because they control the binding of RNA polymerase to DNA.

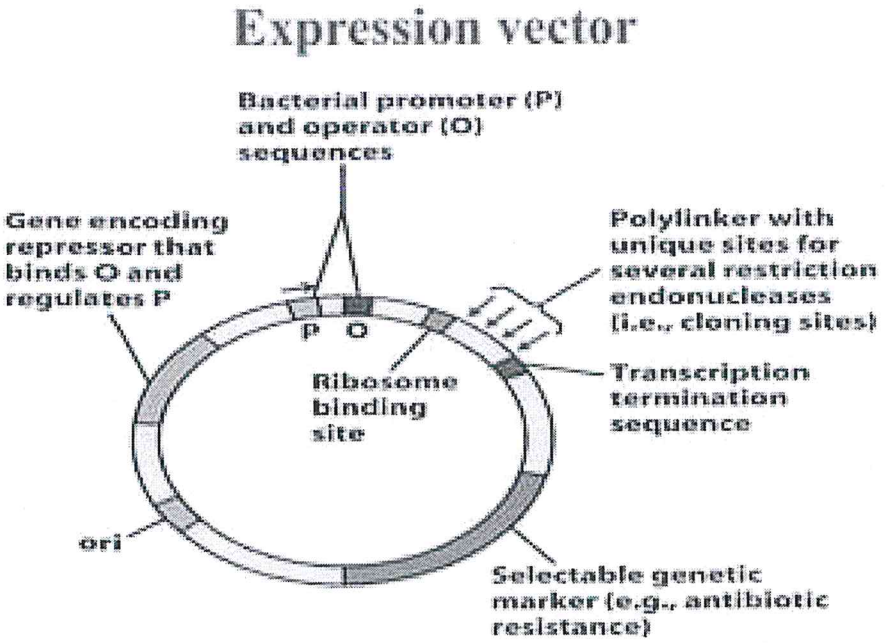
Section B

8. Methods for Creating Transgenic Animals,

Applications

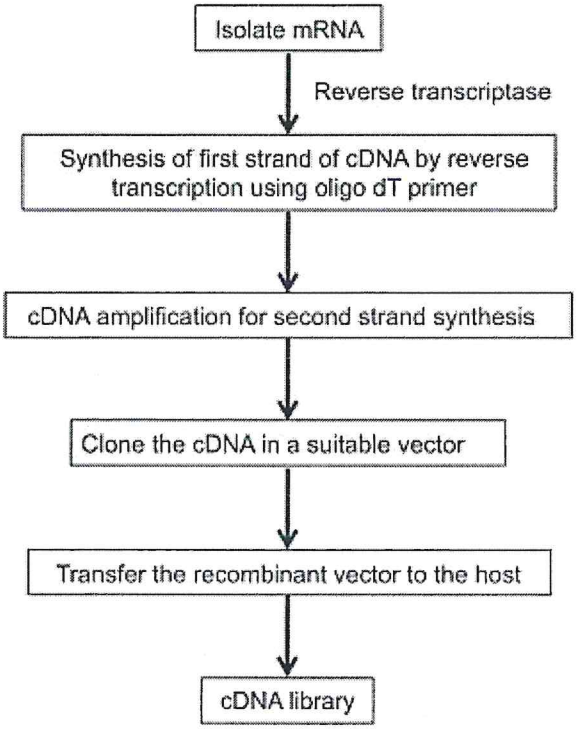


9. Expression vector



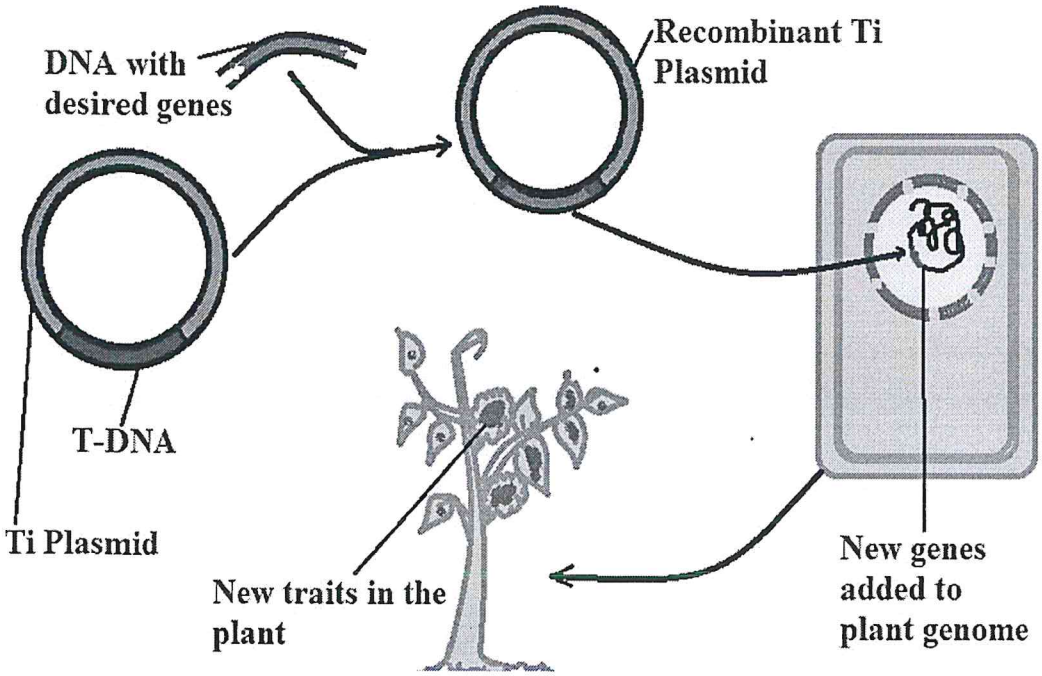
Section B

10. cDNA library



11. Transgenic Plants

- Introduction
- Methods of producing transgenic animals
- Importance
- Gene constructs



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Date : 15-09-2022 **Duration : 1 hour** **Class : II B.Sc. Biotechnology**
Subject Name & Code : Essentials of Biochemistry, SC23A

Section A (5 x 2 = 10 marks)

(Answer any **FIVE** questions)

CO1	BL1	1. Define Optical activity
CO1	BL1	2.Name the Anomers
CO1	BL1	3.Define Mutarotation
CO3	BL2	4. Classify fatty acids
CO2	BL3	5. Sketch any two essential amino acids
CO2	BL4	6. Contrast Transamination and Deamination
CO6	BL1	7. Define ampholytes

Section B (1 x 5 = 5 marks)

(Answer any **ONE** question)

CO1	BL1	8.Enumerate the classification of carbohydrates
CO3	BL2	9. Describe Cholesterol synthesis.

Section C (1 x 10 = 10 marks)

(Answer any **ONE** question)

CO1	BL2	10. Describe the Fischer and Haworth structure of glucose
CO2	BL3	11. Illustrate the Urea cycle with a neat diagram

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Date : 15-09-2022 **Duration : 1 hour** **Class : II B.Sc. Biotechnology**
Subject Name & Code :Essentials of Biochemistry, SC23A

Section A (5 x 2 = 10 marks)

(Answer any **FIVE** questions)

CO1	BL1	1. Define Optical activity
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Answer Key.
Section A
(Answer any **FIVE** questions)

1. Define Optical activity
   optical activity, the ability of a substance to rotate the plane of polarization of a beam of light that is passed through it.
   Glucose molecule having an optically active chiral carbon that can rotate a plane-polarized light passing through it is optically active.

2.Name the Anomers

Two anomers are designated alpha (α) or beta (β), according to the configurational relationship between the anomeric centre and the anomeric reference atom, hence they are relative stereodescriptors

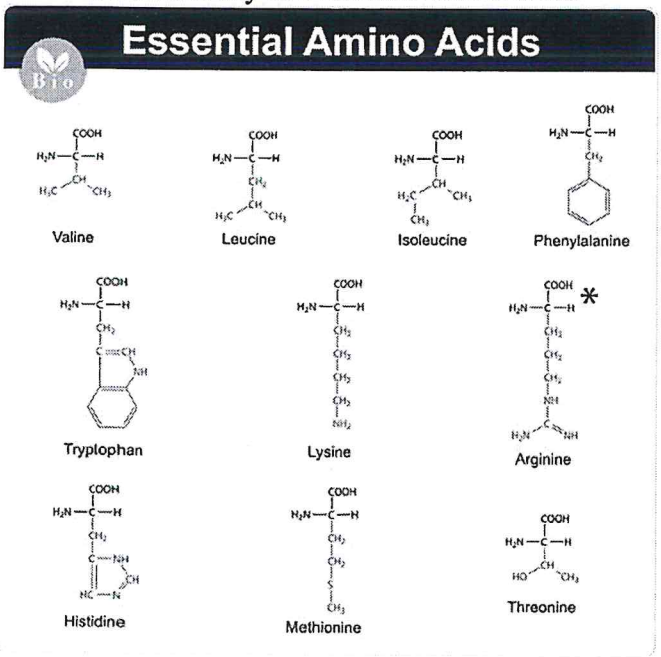
3.Define Mutarotation

Mutarotation is the change in the optical rotation because of the change in the equilibrium between two anomers, when the corresponding stereocenters interconvert.
Cyclic sugars show mutarotation as α and β anomeric forms interconvert. The optical rotation of the solution depends on the optical rotation of each anomer and their ratio in the solution.

4. Classify fatty acids

Saturated fatty acids,
Unsaturated fatty acids,
Cyclic fatty acids.

5. Sketch any two essential amino acids



6. Contrast Transamination and Deamination

The main difference between transamination and deamination is that in transamination, the amine group of an amino acid is exchanged with a keto group of another compound whereas, in deamination, an amino acid loses its amine group.

7. Define ampholytes

Ampholytes are compounds that when dissolved in water (which is itsef an amphoteric compound) can act either as acid or as a base.

Section B (1 x 5 = 5 marks)

(Answer any **ONE** question)

8.Enumerate the classification of carbohydrates

Generally, carbohydrates are classified into four major groups. They are as follows:

1. Monosaccharides.

Monosaccharides are simple sugars., glucose, fructose, galactose

2. Disaccharides

Disaccharides are comprised of two monosaccharides connected by a glycosidic linkage (C-O-C). Cn (H2O)n-1is the general formula for disaccharides. The most common disaccharides forms are lactose, sucrose, and maltose.

3. Oligo saccharides.

Oligo saccharides are comprised of 3-10 monosaccharides connected by a glycosidic linkage Raffinse.

4. Polysaccharides

Polysaccharides are complex carbohydrates that are formed by the method of polymerization of a huge number of monosaccharide monomers. The other name for polysaccharides is also known as glycans.

Starch, Glycogen, Amylose.

9. Describe Cholesterol synthesis.

Cholesterol is an essential component of cell membranes and the precursor for the synthesis of steroid hormones and bile acids.

Cholesterol is a hydrophobic compound.

It consists of four fused hydrocarbon rings (A, B, C and D called steroid nucleus) and it has 8 carbon branched hydrocarbon chain attached to C17 of D-ring.

Ring-A has a hydroxyl group at C3

Ring-B has a double bond between C5 and C6

Step I: synthesis of HMG-coA (β-hydroxy-β-methyl-glutaryl coA)

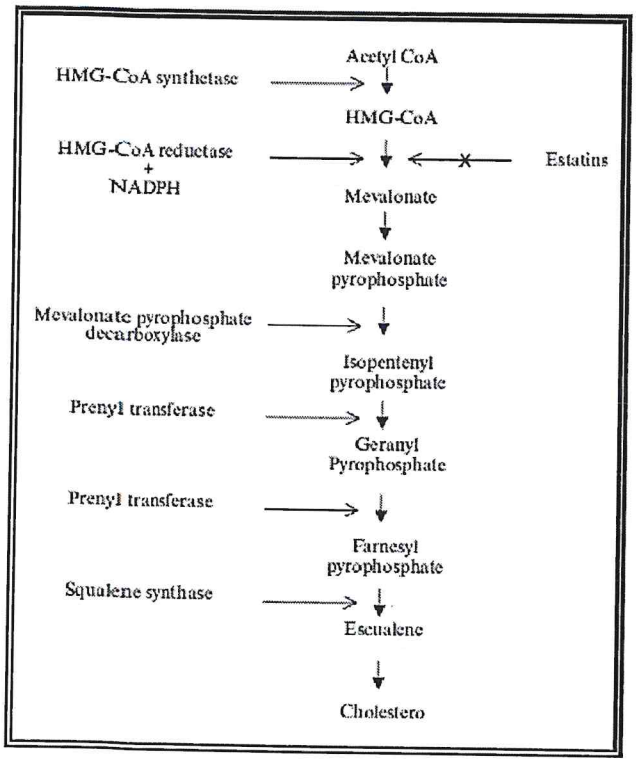
Step II: Reduction of HMG-coA into Mevalonate

Step III: Conversion of Mevalonate to two activated Isoprene units

Step IV: condensation of six activated Isoprene units to form Squalene

Step V: conversion of Squalene to Lanosterol (a four ring steroid nucleus)

Step VI: conversion of lanosterol into cholesterol.



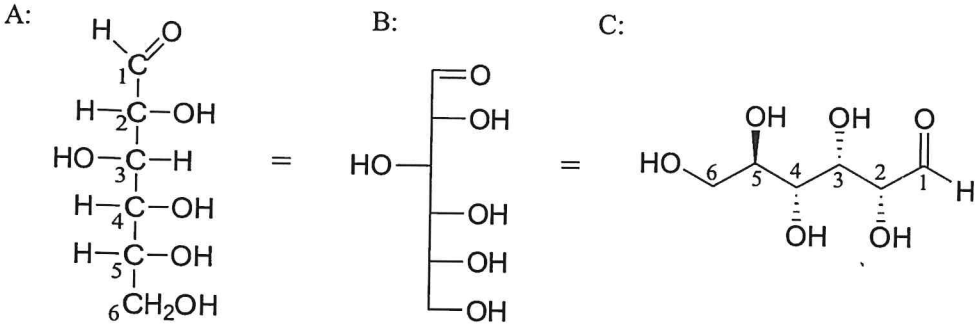
Section C

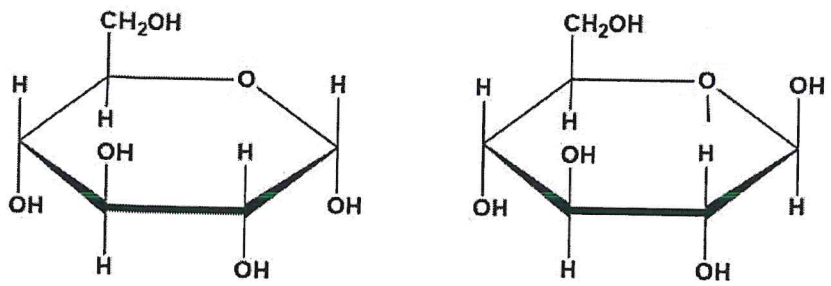
10. Describe the Fischer and Haworth structure of glucose

Fisher projections show sugars in their open chain form.

In a Fischer projection, the carbon atoms of a sugar molecule are connected vertically by solid lines, while carbon-oxygen and carbon-hydrogen bonds are shown horizontally. Stereochemical information is conveyed by a simple rule: vertical bonds point into the plane of the page, while horizontal bonds point out of the page.

A: B: C:





Haworth projection of Glucose

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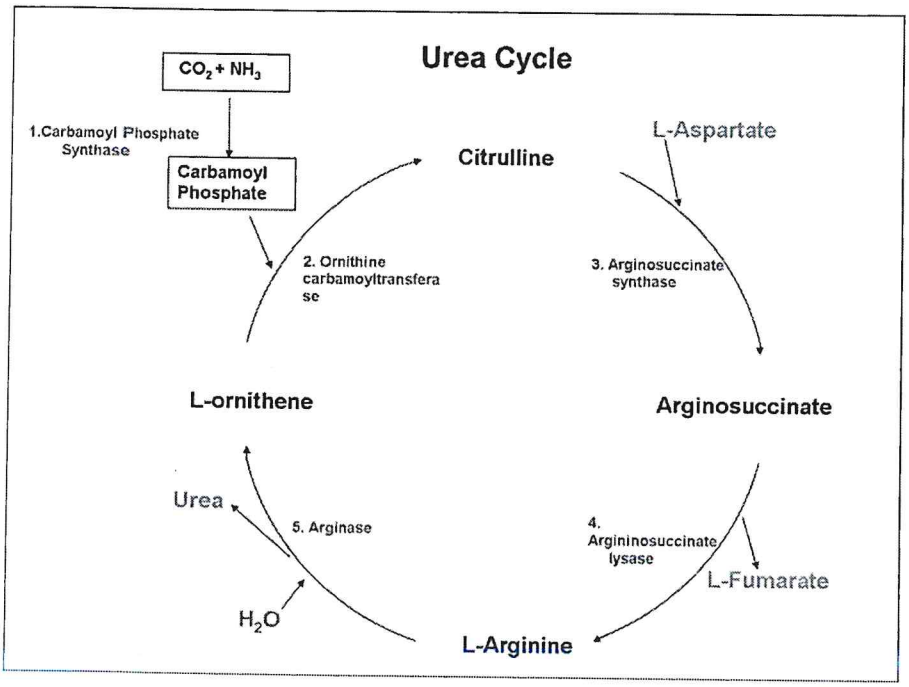
11. Illustrate the Urea cycle with a neat diagram

The urea cycle or ornithine cycle converts excess ammonia into urea in the mitochondria of liver cells.
he urea forms, then enters the blood stream, is filtered by the kidneys and is ultimately excreted in the urine.



The conversion of ammonia into urea through a series of biochemical reactions is known as the urea cycle or ornithine cycle.
It takes place in the liver with the help of mitochondrial and cytosolic enzymes.
It is an important pathway in amphibians and mammals as they help in disposing highly toxic ammonia by converting it into urea.
The animals that excrete in the form of urea are called ureotelic

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Department of Biotechnology

Date : 03-11-2022 **Duration : 1 hour** **Class : II B.Sc. Biotechnology**

Subject Name & Code : Essentials of Biochemistry, SC23A

Section A (5 x 2 = 10 marks)

(Answer any **FIVE** questions)

CO1	BL1	1. Define reducing sugars
CO4	BL1	2. Name pyrimidines
CO1	BL1	3. Define phosphorylation
CO3	BL1	4. Define phospholipids.
CO5	BL 1	5. Recall Active site
CO5	BL 1	6. Define Apoenzyme
CO5	BL 1	7. Define Turnover number

Section B (1 x 5 = 5 marks)

(Answer any **ONE** question)

CO5	BL4	8. Classify Enzymes
CO3	BL2	9. Describe beta oxidation of fatty acids.

Section C (1 x 10 = 10 marks)

(Answer any **ONE** question)

CO1	BL2	10. Describe the Glycolysis cycle.
CO5	BL2	11. Discuss on the factors affecting enzyme activity.

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Section A

(5 x 2 = 10 marks)

(Answer any **FIVE** questions)

1. Define reducing sugars.
   A sugar that serves as a reducing agent due to its free aldehyde or ketone functional groups in its molecular structure. Examples are glucose, fructose, glyceraldehydes, lactose, arabinose and maltose, except for sucrose.

2. Name pyrimidines
   Pyrimidine is one of two classes of heterocyclic nitrogenous bases found in the nucleic acids DNA and RNA: in DNA the pyrimidines are cytosine and thymine, in RNA uracil replaces thymine.

3. Define phosphorylation
   Phosphorylation is a chemical process of adding a phosphate group to an organic compound.
   Phosphorylation is essential for the functioning of proteins. Because this leads to various activities of modification in several enzymes and in turn regulating their functions.

4. Define phospholipids.
   Phospholipids are compound lipids, consisting of phosphoric acids, nitrogen base, alcohol and fatty acids. These compound lipids are major components of the cell membrane and also provide a fluid character to the membranes. In cell membranes, these phospholipids have a hydrophilic head and a hydrophobic tail, which forms the inside of the bilayer.
   Types Of Phospholipid
   There are two types of phospholipids
   Glycerophospholipids
   They are the major types of phospholipids, which occur in the biological membrane. It consists of glycerol-based phospholipids.
   Sphingophospholipids
   They are the important constituents of myelin and are abundantly found in the brain and nervous tissues. It consists of sphingosine as alcohol.
5. Recall Active site
   In biology and biochemistry, the active site is the region of an enzyme where substrate molecules bind and undergo a chemical reaction. The active site consists of amino acid residues that form temporary bonds with the substrate (binding site) and residues that catalyse a reaction of that substrate (catalytic site).
6. Define Apoenzyme.
   Apoenzyme or apoprotein is an enzymatically inactive protein part of an enzyme, which requires a cofactor for its activity. Apart from catalytic RNA, most of the enzymes are proteins. Not all the enzymes require a cofactor. Enzymes that do not require any cofactor are known as simple enzymes, e.g. pepsin, trypsin, etc.
7. Define Turnover number.
   The turnover number of an enzyme, is the number of substrate molecules converted into product by an enzyme molecule in a unit time when the enzyme is fully saturated with substrate.

Section B

(1 x 5 = 5 marks)

(Answer any **ONE** question)

8. Classify Enzymes.

According to the International Union of Biochemists (I U B), enzymes are divided into six functional classes and are classified based on the type of reaction in which they are used to catalyze. The six kinds of enzymes are hydrolases, oxidoreductases, lyases, transferases, ligases and isomerases.

1. Oxidoreductases

These catalyze oxidation and reduction reactions, e.g. pyruvate dehydrogenase, catalysing the oxidation of pyruvate to acetyl coenzyme A.

2. Transferases

These catalyze transferring of the chemical group from one to another compound. An example is a transaminase, which transfers an amino group from one molecule to another.

3. Hydrolases

They catalyze the hydrolysis of a bond. For example, the enzyme pepsin hydrolyzes peptide bonds in proteins.

4. Lyases

These catalyze the breakage of bonds without catalysis, e.g. aldolase (an enzyme in glycolysis) catalyzes the splitting of fructose-1, 6-bisphosphate to glyceraldehyde-3-phosphate and dihydroxyacetone phosphate.

5. Isomerases

They catalyze the formation of an isomer of a compound. Example: phosphoglucomutase catalyzes the conversion of glucose-1-phosphate to glucose-6-phosphate (phosphate group is transferred from one to another position in the same compound) in glycogenolysis (glycogen is converted to glucose for energy to be released quickly).

6. Ligases

Ligases catalyze the association of two molecules. For example, DNA ligase catalyzes the joining of two fragments of DNA by forming a phosphodiester bond.

9. Describe beta oxidation of fatty acids.

Beta-oxidation is the catabolic process by which fatty acid molecules are broken down in the cytosol in prokaryotes and in the mitochondria in eukaryotes to generate acetyl-CoA.

Acetyl-CoA enters the citric acid cycle while NADH and FADH2, which are co-enzymes, are used in the electron transport chain.

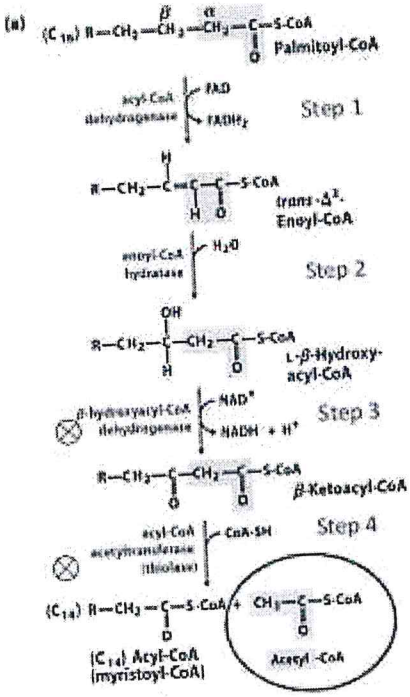
It is referred as "beta oxidation" because the beta carbon of the fatty acid undergoes oxidation to a carbonyl group.

4 Steps of β-oxidation

1. Dehydrogenation of the fatty acyl-CoA to make a trans double bond between α and β carbon.
   - Short, medium, and long chain acyl-CoAdehydrogenases
   - e⁻ removed transferred to FAD
2. Hydration of the double bond

1. Dehydrogenation of the β-hydroxyl group to a ketone
   - e⁻ removed transferred to NAD⁺

1. Acylation – addition of CoA and production of acetyl-CoA



Section C (1 x 10 = 10 marks)

(Answer any **ONE** question)

9. Describe the Glycolysis cycle.

Glycolysis is a cytoplasmic pathway which breaks down glucose into two three-carbon compounds and generates energy. Glucose is trapped by phosphorylation, with the help of the enzyme hexokinase. Adenosine triphosphate (ATP) is used in this reaction and the product, glucose-6-P, inhibits hexokinase.

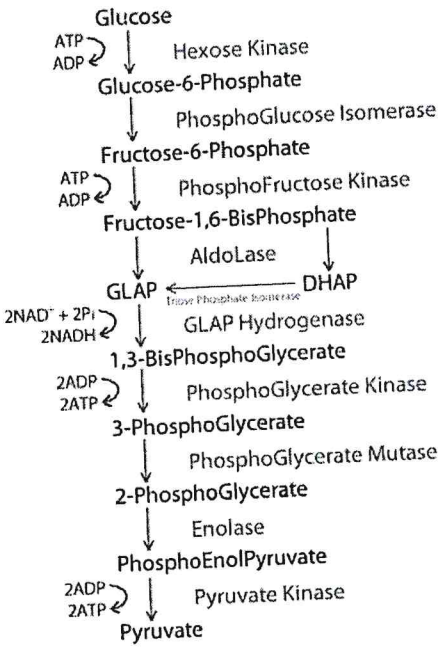
This metabolic pathway was discovered by three German biochemists- Gustav Embden, Otto Meyerhof, and Jakub Karol Parnas in the early 19th century and is known as the EMP pathway (Embden–Meyerhof–Parnas).

It is the process in which a glucose molecule is broken down into two molecules of pyruvate.

The process takes place in the cytoplasm of plant and animal cells.

Six enzymes are involved in the process.

The end products of the reaction include 2 pyruvate, 2 ATP and 2 NADH molecules.



11. Discuss on the factors affecting enzyme activity.

Enzyme activity can be affected by a variety of factors, such as temperature, pH, and concentration. Enzymes work best within specific temperature and pH ranges, and sub-optimal conditions can cause an enzyme to lose its ability to bind to a substrate.

Temperature: Raising temperature generally speeds up a reaction, and lowering temperature slows down a reaction. However, extreme high temperatures can cause an enzyme to lose its shape (denature) and stop working.

pH: Each enzyme has an optimum pH range. Changing the pH outside of this range will slow enzyme activity. Extreme pH values can cause enzymes to denature.

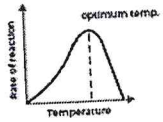
Enzyme concentration: Increasing enzyme concentration will speed up the reaction, as long as there is substrate available to bind to. Once all of the substrate is bound, the reaction will no longer speed up, since there will be nothing for additional enzymes to bind to.

Substrate concentration: Increasing substrate concentration also increases the rate of reaction to a certain point. Once all of the enzymes have bound, any substrate increase will have no effect on the rate of reaction, as the available enzymes will be saturated and working at their maximum rate.

Factors affecting ENZYME activity

Temperature

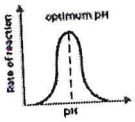
BIG influence
More heat = More kinetic energy



But if too high
enzyme is denatured

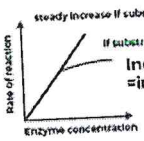
pH

Enzymes have optimum pH



If higher/lower
H+ in acid / OH- in alkaline
can interfere enzyme structure

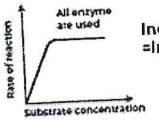
Enzyme concentration



Increase enzyme concentration
=increase rate of reaction

Until substrates amount are limited

Substrate concentration



Increase substrate concentratio
=Increase rate of reaction

Until active site of enzyme are used

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Department of Biotechnology

Date:12-09-2022 **Duration :1 hour** **Class : III B. Sc Biotechnology**

Subject Name : **Animal and Medical Biotechnology**

Section A (5 x 2 = 10)

(Answer any **FIVE** questions)

CO1	BL1	1.Define Cryopreservation
CO1	BL1	2. Define Implantation
CO3	BL1	3. Define HAT medium
CO4	BL1	4. Define Vaccines
CO3	BL1	5. Define Monoclonal antibody
CO1	BL1	6. Explain Artificial insemination
CO1	BL1	7.Name the IVF

Section B (1 x 5 = 5)

(Answer any **ONE** question)

CO4	BL2	8. Explain about synthetic peptide vaccines
CO1	BL1	9. Enumerate the various methods to improve animal breeding

Section C (1 x 10 = 10)

(Answer any **ONE** question)

CO1	BL2	10. Describe ART procedures to treat infertility
CO3	BL2	11. Explain about monoclonal antibody and its applications

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ANSWER KEY

ANIMAL AND MEDICAL BIOTECHNOLOGY

PART A

1. CRYOPRESERVATION

Storage and preservation at very low temperature (-196 c). Semen, fertilized eggs and embryos can also be preserved . DMSO/GLYCEROL are used as cryoprotectants.

2. IMPLANTATION

The attachment of fertilized egg (blastocyst) to the wall of the uterus. It is the start of pregnancy.

3. HAT medium

Hypoxanthine Aminopterin Thymidine medium. Medium used in the production of monoclonal antibodies or hybridoma technology.

4. VACCINES

A substance used to stimulate the production of antibodies and provide immunity against one or several diseases.

5. MONOCLONAL ANTIBODY

A specific and single type of antibody that is produced by hybridoma cells. MAb is directed against a specific antigenic determinant epitope.

6. ARTIFICIAL INSEMINATION

As male produces millions of sperms,the semen can be used to produce several offsprings . This made possible by artificial insemination (AI).Artificial insemination is done on standing animals through a technique known as rectal palpation.

7. IVF

In Vitro Fertilization. The removal of eggs from a women, fertilizing them in the laboratory and then transferring the fertilized eggs (zygotes) into the uterus a few days later.

PART B

8. SYNTHETIC PEPTIDE VACCINES

Fragment of protein antigen sequence

Synthesizing B cells and T cells induce neutralizing immune response with synthetic structure

Short peptide chains mimic antigenic sites of viruses

Epitope

Peptides act as immunogen, conventional vaccines

Peptide of original pathogen is used to immunize organism

Advantages: 20aa, free from unnecessary components, no side effects, Stable, cheap, easy manufacturing

9. METHODS TO IMPROVE ANIMAL BREEDING

Introduction

Approaches for artificial breeding of animals

1. Artificial insemination
    - Semen collection and storage
    - Synchronization of ovulation
    - Sperm sexing
2. Embryo transfer
    - Superovulation
    - Multiple Ovulation with Embryo Transfer (MOET)
    - Embryo splitting
    - Embryo biopsy
    - Embryo sexing
3. In Vitro Fertilization

Oocyte recovery

In vitro maturation (IVM) of oocytes

Fertilization of eggs

Embryo culture

Implantation of embryos

4. Embryo cloning

PART C

10. ART procedures to treat infertility

Introduction

Causes of infertility

Male infertility

Female infertility

Application of ART-Techniques employed in ART

1. Intra Uterine Insemination

2. In Vitro Fertilization and Embryo Transfer

Indications for IVF

Methodology of IVF

Induction of superovulation

Monitoring of ovarian response

Oocyte retrieval

Fertilization in vitro

Embryo transfer

3. Gamete Intrafallopian Transfer

4. Zygote Intrafallopian Transfer

5. Intra Vaginal Culture

8/9/2022

6. Cytoplasmic Transfer

7. Micromanipulation

Intra Cytoplasmic Sperm Injection

Subzonal Insertion

8. Round Spermid Nucleus Injection

9. Assisted Hatching

Cryopreservation

11. MONOCLONAL ANTIBODY AND APPLICATIONS

Introduction

MAb production in yearly years

Salvage pathway

Steps in MAb production

1.Immunization

2.Cell fusion

3.Selection of hybridoma

4.Screening the products

5.Cloning and propagation

6.Characterisation and storage

Application of MAb

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UNIT TEST II

Duration: 1 hour **Class: III B. Sc Biotechnology**

Subject Name: **Animal and Medical Biotechnology**

Section A (5 x 2 = 10)

(Answer any **FIVE** questions)

CO1	BL1	1. Define freezing of semen
CO1	BL2	2. Explain In-vitro maturation
CO3	BL2	3.what is MAbs
CO4	BL1	4.what is Recombinant vaccines
CO3	BL1	5. Define probes
CO1	BL2	6. Explain about transgenic animals
CO1	BL2	7. Explain about cloning strategies

Section B (1 x 5 = 5)

(Answer any **ONE** question)

CO4	BL2	8. Explain about monoclonal antibody and its applications
CO1	BL3	9. Describe ART procedures to treat infertility

Section C (1 x 10 = 10)

(Answer any **ONE** question)

CO1	BL2	10. Explain about synthetic peptide vaccines
CO3	BL3	11. Explain about improve animal breeding

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UNIT TEST II

KEY ANSWERS

Section A

1. **Freezing of semen**

   Men are able to freeze their sperm for use in their own future treatment or to donate to someone else's treatment. Donated sperm usually has to be quarantined for three or six months and screened for infections before it can be used by a recipient.

2. **In-vitro maturation**

   In vitro maturation (IVM) is when a woman's eggs are collected and matured outside the body. This is done as part of an in vitro fertilization (IVF) procedure. A woman's eggs (also called oocytes) are formed before she is born.

3. **MAbs**

   Monoclonal antibodies (also called moAbs or mAbs) are proteins made in laboratories that act like proteins called antibodies in our bodies. Antibodies are parts of your immune system. They seek out the antigens (foreign materials) and stick to them in order to destroy them.

4. **Recombinant vaccines**

   Recombinant vaccines are made using bacterial or yeast cells to manufacture the vaccine. A small piece of DNA is taken from the virus or bacterium against which we want to protect and inserted into the manufacturing cells.

5. **DNA Probes**

A probe is a single-stranded sequence of DNA or RNA used to search for its complementary sequence in a sample genome. The probe is placed into contact with the sample under conditions that allow the probe sequence to hybridize with its complementary sequence.

6. **Transgenic animals**

An animal that has stably incorporated engineered DNA into its germ-line. Such an organism is able to pass the transgene on to all the offspring. It should be stressed that all the cells of a transgenic individual contain the transgene.

7. **Cloning strategies**

Cloning methods rely on molecular biological processes that occur in nature. The techniques are continually being refined and simplified; therefore, many strategies nowadays permit cloning of sequences of interest from their sources more efficiently. These cloning strategies include: PCR cloning strategies.

Section B

8. MONOCLONAL ANTIBODY AND APPLICATIONS

- Introduction
- MAb production in yearly years
- Salvage pathway
- Steps in MAb production
  - 1.Immunization
  - 2.Cell fusion
  - 3.Selection of hybridoma
  - 4.Screening the products
  - 5.Cloning and propagation
  - 6.Characterisation and storage
- Application of MAb

9. ART procedures to treat infertility

- Introduction

- Causes of infertility
  - Male infertility
  - Female infertility
- Application of ART-Techniques employed in ART
  - 1.Intra Uterine Insemination
  - 2.In Vitro Fertilization and Embryo Transfer
    - Indications for IVF
    - Methodology of IVF
      - Induction of super ovulation
      - Monitoring of ovarian response
      - Oocyte retrieval
      - Fertilization in vitro
      - Embryo transfer
  - 3.Gamete Intrafallopian Transfer
  - 4.Zygote Intrafallopian Transfer
  - 5.Intra Vaginal Culture
  - 6.Cytoplasmic Transfer
  - 7.Micromanipulation
    - Intra Cytoplasmic Sperm Injection
    - Subzonal Insertion
  - 8.Round Spermid Nucleus Injection
  - 9.Assisted Hatching
- Cryopreservation

Section C

10. SYNTHETIC PEPTIDE VACCINES

- Fragment of protein antigen sequence
- Synthesizing B cells and T cells induce neutralizing immune response with synthetic structure
- Short peptide chains mimic antigenic sites of viruses

- Epitope
- Peptides act as immunogen ,conventional vaccines
- Peptide of original pathogen is used to immunize organism
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    - Embryo biopsy
    - Embryo sexing
  - 3.In Vitro Fertilization
    - Oocyte recovery
    - In vitro maturation (IVM) of oocytes
    - Fertilization of eggs
    - Embryo culture
    - Implantation of embryos
  - 4.Embryo cloning

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Date: 13.09.2022 **Duration: 1 hour** **Class:** III BSc

Subject Name & Code: Bioinformatics

Section A (5 x 2 = 10)

(Answer any **FIVE** questions)

CO1 BL1 1. Define FASTA sequence

CO1 BL22. Explain the term PDB

CO2 BL1 3. Identify the algorithm used for global alignment

CO2 BL1 2. Distinguish between paralogous and orthologous genes

CO4 BL15. Recall the term ADMET

CO1 BL6 6.Write the expansion of BLAST

CO1 BL17. Tell what is NCBI?

Section B (1 x 5 = 5)

(Answer any **TWO** questions)

CO4 BL6 8.Write in detail about the different stages of drug discovery

CO2 BL2 9. Describe about sequence alignment, gap, score and penalty.

Section C (1 x10 = 10)

(Answer any **ONE** question)

CO4 BL210. Discuss about chemical libraries.

CO1BL3 11. Summarize in detail about scoring matrices

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Answer key

Section A

1. FASTA SEQUENCE- Sequence alignment algorithm and flat file format for representation of sequenced data

>ATGCCTCAGCC

2. PDB Stands for protein data bank

- Structural database shows protein and nucleic acid structure
- Maintained by RCSB at Rutger's University
- URL http://www PDP.org/

3. Algorithm used for global alignment: Needleman wunsch algorithm

4. Paralogs and orthologs gene:Paralogs-Two genes of same or different species but different functionEg. Hemoglobin and myoglobinOrthologs-Different species but same function Eg. Bat wings & human fore arms

5. ADMET;Absorption, Distribution, Metabolism, Excretion and Toxicity. Defines how chemicals are processed in living organism

6. BLAST: Basic Local Alignment Search Tool .Find the region of local similarity between the sequences

7. NCBI:Stands for National center for biotechnology information. Part of US National medicine libraryHas a series of database for biotechnology and biomedicineIt is a primary sequence database

Section B

8. Different stages of drug discovery:

1 Discovery and development

2 Preclinical research

3 Clinical research

4 FDA drug review

5 Post market, drug safety monitoring

9. Sequence alignment gap score and penaltySequence alignment Way to arrange the sequence of DNA, RNA & protein to identify the similarity between the sequences SignificanceTo identify genomic sizeTo study the mutation in sequenceTo validate the gene that cause disease Methods of sequence alignment- Identity- 100% same sequenceSimilar - more or less similar sequenceAlignment scoring , gap penalty Match : positive Mismatch : negative Gap penalty : gapHomology and similarity: HomologsOrthologsParalogs.Types of sequence alignment-Global alignmentAlgorithm : Needle man wunschTool: EMBOSS NeedleLocal alignment: Algorithm: Smith WatermanTool: EMBOSS WaterScoring matricesPAMBLOSUM

Section C

10. Chemical librariesDatabases ACD-Beilstein- CSD- CMC –MDDR- MEDCHEM – SPRESI- WDI

11. Scoring matrices-Set of values that qualifies set of one residue that are being substituted by another .Also called as substitution matrix Positive - matchNegative - mismatch Scoring matrix of nucleotides – simpleScoring matrix of amino acid – complicatedScoring matrices of a DNA sequenceScoring of sequence alignmentMatch - +1 Mismatch: -1Amino acid substitution matrix-PAM Point Accepted Mutation Given by Day Hoff Based on global alignment

8/9/2022

Derived based on evolutionary divergencePAM1. Alignment of sequence of full length and construction of phylogenetic treeBLOSUM-Block Substitution Matrix based on local alignment Derived based on multiple sequence alignmentSeries of block amino acid substitution matrix Sequence pattern called block BLOSUM62 sequences are used in construction of matrix in a share of 62%

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Department of Biotechnology

Date: 01.11.2022 **Duration: 1 hour** **Class: III B. Sc Biotechnology**
Subject Name & Code: **Bioinformatics**

Section A (5 x 2 = 10)
(Answer any **FIVE** questions)

CO1 BL1. 1. Define unrooted tree
CO1 BL2. 2. Explain RASMOL
CO2 BL1. 3. Identify the softwares used in multiple sequence alignment
CO2 BL1. 4. Define Compute pI/Mw
CO4 BL1. 5.Recall the term SCOP and CATH
CO1 BL6. 6.Write the expansion of PHYLIP
CO1 BL1. 7.Tell what is Peptide Mass

Section B (1 x 5 = 5)
(Answer any **ONE** question)

CO4 BL6. 8.Write in detail about Multiple Sequence alignment
CO2 BL2. 9. Describe about PROSITE

Section C (1 x10 = 10)
(Answer any **ONE** question)

CO4 BL2. 10. Discuss about Protein structure prediction
CO1 BL3. 11.Summarize in detail about phylogenetic tree and the methods to construct a phylogenetic tree

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Answer Key

1. Define unrooted tree

Unrooted trees illustrate the relatedness of the leaf nodes without making assumptions about ancestry. They do not require the ancestral root to be known or inferred.

2. Explain RASMOL

RasMol is a computer program written for molecular graphics visualization intended and used mainly to depict and explore biological macromolecule structures, such as those found in the Protein Data Bank.

3. Identify the softwares used in multiple sequence alignment

For gene-level alignment of either protein or nucleotide sequences, use Clustal Omega, Clustal W, or MAFFT.

4. Define Compute pI/Mw

Compute pI/Mw is a tool which allows the computation of the theoretical pI (isoelectric point) and Mw (molecular weight) for a list of UniProt Knowledgebase (Swiss-Prot or TrEMBL) entries or for user entered sequences

5. Recall the term SCOP and CATH

SCOP and CATH are hierarchical domain classification systems. Domains within the same SCOP superfamily have structural and functional similarities that suggest a common evolutionary origin but may not share a detect- able sequence similarity.

6. Write the expansion of PHYLIP

PHYLogeny Inference Package (PHYLIP) is a free computational phylogenetics package of programs for inferring evolutionary trees (phylogenies)

7. Tell what is Peptide Mass

The general approach is to take a small sample of the protein and digest it with a proteolytic enzyme, such as trypsin. Trypsin cleaves the protein after lysine and arginine residues. The resulting mixture of peptides is analyzed by MALDI-TOF mass spectrometry.

8. Write in detail about Multiple Sequence alignment

Multiple Sequence Alignment (MSA) is generally the alignment of three or more biological sequences (protein or nucleic acid) of similar length. From the output, homology can be inferred and the evolutionary relationships between the sequences studied.

Types of Multiple Sequence alignment

- Progressive alignment construction.
- Iterative methods.

Two approaches to multiple sequence alignment (MSA) include **progressive and iterative MSAs**. As the names imply, progressive MSA starts with one sequence and progressively aligns the others, while iterative MSA realigns the sequences during multiple iterations of the process.

Tools

Clustal Omega is a new multiple sequence alignment program that uses seeded guide trees and HMM profile-profile techniques to generate alignments between three or more sequences.

9. Describe about PROSITE

The PROSITE database consists of a large collection of biologically meaningful signatures that are described as patterns or profiles. Each signature is linked to a documentation that provides useful biological information on the protein family, domain or functional site identified by the signature.

Uses

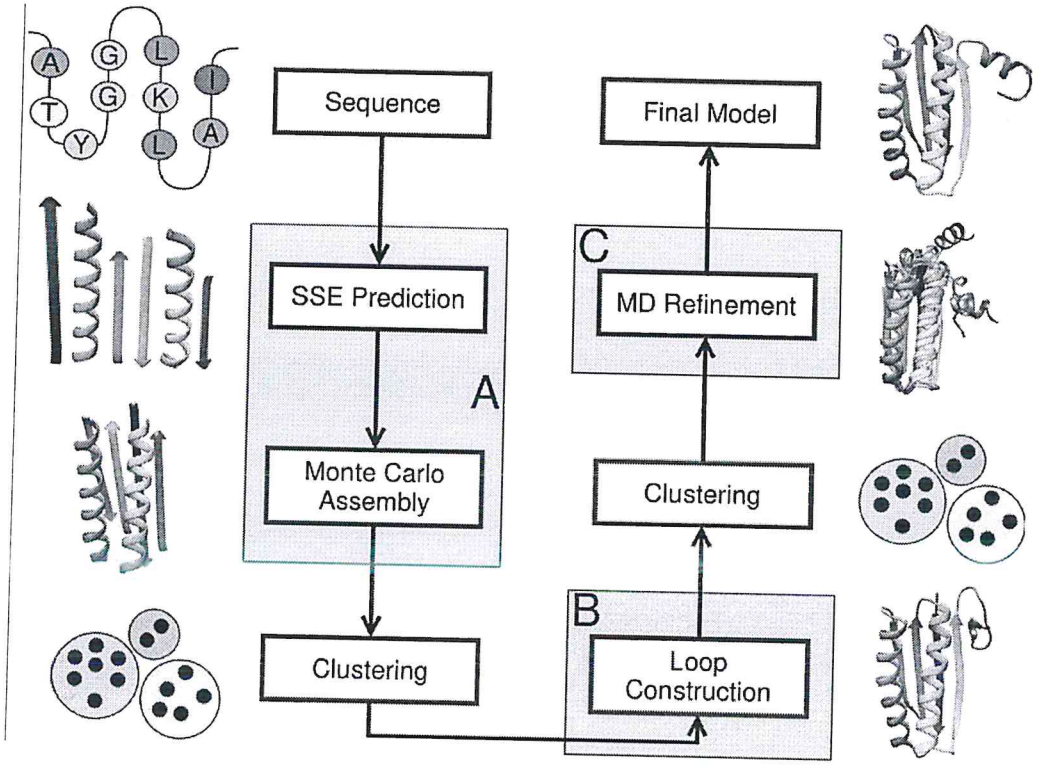
PROSITE, a protein domain database for functional characterization and annotation. PROSITE's uses include identifying possible functions of newly discovered proteins and analysis of known proteins for previously undetermined activity.

This resource supports COVID-19 / SARS-CoV-2 research. Developed by the Swiss-Prot group and supported by the SIB Swiss Institute of Bioinformatics.

The Prosite database uses patterns and profiles that help to identify the possible functions of a new sequence from the existing sequence. This determines the family of protein to which it belongs to. The description of the motif using regular expression syntax can be called as a pattern.

10. Discuss about Protein structure prediction

Protein structure prediction is the inference of the three-dimensional structure of a protein from its amino acid sequence—that is, the prediction of its secondary and tertiary structure from primary structure. Structure prediction is different from the inverse problem of protein design.



11. Summarize in detail about phylogenetic tree and the methods to construct a phylogenetic tree

Building a phylogenetic tree requires four distinct steps: (Step 1) identify and acquire a set of homologous DNA or protein sequences, (Step 2) align those sequences, (Step 3) estimate a tree from the aligned sequences, and (Step 4) present that tree in such a way as to clearly convey the relevant information to others.

There are three main methods for constructing phylogenetic trees: distance-based methods such as neighbour-joining, parsimony-based methods such as maximum parsimony, and character-based methods such as maximum likelihood or Bayesian inference.

Phylogenetic trees represent hypotheses about the evolutionary relationships among a group of organisms. A phylogenetic tree may be built using morphological (body shape), biochemical, behavioral, or molecular features of species or other groups.

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DEPARTMENT OF BIOTECHNOLOGY

UNIT TEST 1 (ODD SEMSTER)

ACADEMIC YEAR 2022-2023

Date: 14-09-2022 **Duration: 1 hour** **Class : III B. Sc. Biotechnology**

Subject Name : **Immunology**

Section A (5 x 2 = 10 marks)

(Answer any **FIVE** questions)

CO1	BL1	1. Define Epitopes
CO1	BL1	2. Define Haptens
CO6	BL1	3. Define Antigen
CO3	BL1	4. Define Antibody
CO2	BL1	5. Name the Fab fragments
CO2	BL1	6. Name the Fc fragment
CO1	BL6	7.Write about NK cells

Section B (1 x 5 = 5 marks)

(Answer any **ONE** question)

CO2	BL2	8. Explain about antibody structure and types with diagram
CO1	BL2	9. Discuss about the innate immunity

Section C (1 x 10 = 10 marks)

(Answer any **ONE** question)

CO2	BL2	10. Explain about monoclonal antibody production and applications
CO1	BL2	11. Describe the humoral mediated immune response

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ANSWER KEY

PART A

1. Define Epitopes

   Antigenic determinant ,recognized by the immune system ,specifically by antibodies,B cells ,or T cells.

2. Define Haptens

   A small molecule combined with a larger carrier proteins , elict the production of antibodies.

3. Define Antigen

   Molecular structure of any foreign particle , stimulates an immune response , binds to a specific antibody.

4. Define Antibody

   Also called as immunoglobulin , large Y shaped protein to identify and neutralize the pathogen.

5. Name the Fab fragments

   Fragment Antigen Binding region is a region on an antibody that binds to antigens , composed of one constant and one variable domain of each of heavy and light chain .

6. Name the FC fragments

   Fragment crystallizable region is the tail region of an antibody that interacts with cell surface receptors called Fc receptors and some proteins of complement system.

7. Write about NK cells

   Non –phagocytic lymphocytes having large granules ,large granular lymphocytes ,component of both innate and adaptive immunity ,constitutes 5-10% of lymphocytes in human peripheral blood.

8/9/2022

PART B

8. Explain about antibody structure and types with diagram

Definition

5 types-IgM, IgD, IgA, IgG, IgE

Diagram with properties

9. Discuss about the innate immunity

Definition

First line of defense against infection

Skin

Mucous membrane

Lysosyme

Interferon etc…

Second line of defense against infection

Phagocytosis

Inflammatory response

PART C

10. Explain about monoclonal antibody production and applications

Introduction

MAb production in yearly years

Salvage pathway

Steps in MAb production

(six steps)

Diagram

Application of MAb

11. Describe the humoral mediated immune response

Introduction

Diagram

Steps involved

Mechanism of humoral immune response

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DEPARTMENT OF BIOTECHNOLOGY
Unit test 2

Date: 02-11-2022 **Duration: 1 hour** **Class: III B. Sc. Biotechnology**
Subject Name: **Immunology**

Section A (5 x 2 = 10 marks)

(Answer any **FIVE** questions)

CO3	BL1	1. Define antigen-antibody interaction
CO3	BL1	2. Define radioimmuno assay
CO3	BL1	3. Define immune diffusion
CO3	BL1	4. Define fluorescent antibody technique uses
CO5	BL1	5. Define Allergen
CO1	BL1	6. Define MALT and GALT
CO4	BL6	7.Write about complement proteins

Section B (1 x 5 = 5 marks)

(Answer any **ONE** question)

CO3	BL2	8. Explain about ELISA with principle
CO1	BL2	9. Describe about Spleen with diagram

Section C (1 x 10 = 10 marks)

(Answer any **ONE** question)

CO3	BL2	10. Explain about immunoelectrophoresis
CO5	BL2	11. Explain about Delayed type hypersensitivity reaction with diagram

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Department of Biotechnology
Unit test 2

Date: 02-11-2022 **Duration: 1 hour** **Class: III B. Sc. Biotechnology**
Subject Name: **Immunology**

ANSWER KEY

SECTION A

1. **Define antigen-antibody interaction**
   Chemical interaction between antibodies generated by B cells of the white blood cells and antigens during the immune reaction.

2. **Define radioimmuno assay**
   A radioimmunoassay is an immunoassay that uses radiolabeled molecules in a stepwise formation of immune complexes.

3. **Define immune diffusion**
   The movement of the antigen or antibody molecules in a diffusion support medium.

4. **Define fluorescent antibody technique uses**
   Detection of rabies virus in brain tissue, mumps virus in throat and urine sediment, and measles virus in conjunctival cells.

5. **Define Allergen**
   A substance that causes an allergic response.

6. **Define MALT and GALT**
   Mucosa-associated lymphoid tissue
   gut-associated lymphoid tissue.

7. **Write about complement proteins**
   Complement is a system of plasma proteins that can be activated directly by pathogens .

SECTION B

8. **Explain about ELISA with principle**
   - enzyme linked immunosorbent assay
   - Detect the binding of antigen antibody
   - Enzyme
   - Types

9. **Describe about Spleen with diagram**
   - •Definition
   - •secondary lymphoid organ
   - •periarteriolar lymphoid sheath (PALS)
   - •Blood-borne antigens
   - •Diagram.

SECTION C

10. Explain about immunoelectrophoresis
- Methods for separation and characterization of proteins based on electrophoresis and reaction with antibodies.
- Immunoelectrophoresis, the antigen mixture is first electrophoresed to separate its constituents by charge.
- The procedure is performed using an agarose gel medium.
- Counterimmunoelectrophoresis.

11. Explain about Delayed type hypersensitivity reaction with diagram.
- Definition
- Diagram.
- Sensitizing phase of DTH
- The CD4+ T cells are activated to form TH cells.
- Effector phase of DTH
- Increased phagocytic activity

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Department of Biotechnology

Date : 15.09.2022 **Duration : 1 hr** **Class : III B.Sc.,**

Subject Name & Code: Pharmaceutical Biotechnology

Section A (5 x 2 = 10)

(Answer any **FIVE** questions)

CO1 BL 1 1. Define Biogeneric drugs.
CO1 BL 2 2. Describe Pharmacodynamics.
CO1 BL 1 3. State HIT.
CO2 BL 1 4. Define Pharmacognosy.
CO2 BL 4 5. Explain Biomimetics and its types
CO2 BL 2 6. Describe Bioavailability.
CO1 BL 2 7. Discuss about Warfarin.

Section B (1 x 5 = 5)

(Answer any **ONE** question)

CO1 BL 4 8. Summarize the pharmacokinetics of a drug
CO2 BL 2 9. Outline Gene therapy with Advantages and Disadvantages.

Section C (1 x 10 = 10)

(Answer any **ONE** question)

CO1 BL 4 10. Explain the drug development process
CO2 BL 4 11. Illustrate Recombinant protein development with example

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Answer Key

Section A

1. Define Biogeneric drugs.

Biogeneric drugs are biological products manufactured after expiry of the patent of innovator biopharmaceuticals.

2. Describe Pharmacodynamics.

The study of drug's molecular, biochemical and physiologic effects or actions.

3. State HIT.

HIT is lead compound which has a desired activity in a compound screen and whose activity is confirmed upon retesting.

4. Define Pharmacognosy.

Physical, chemical and biological properties of drugs or drug substances from natural origin.

5. Explain Biomimetics and its types.

Drug delivery system that imitates the human cell to deliver drug for treating diseases.

Hydrogel, Micelle, Liposomes, Dendrimers, Polymeric carriers, Nanospheres.

6. Describe Bioavailability.

Measurement of the rate and extent active drug that becomes available at the site of action

7. Discuss about Warfarin.

Warfarin is an anticoagulant drug commonly used to prevent blood clot such as deep vein thrombosis and pulmonary embolism.

Section B

8. Summarize the pharmacokinetics of a drug

- Drug interaction in through and out of the body.
- Adsorption, Dissolution, Metabolism and Excretion
- Route of administration
- Bioavailability

9. Outline Gene therapy with Advantages and Disadvantages.

- Insertion of new genetic material in to the cells of an individual for altering and producing therapeutic effects to overcome or control the disease
- Improve immue system mechanisms
- Somatic cell gene therapy
- Germ line cell gene therapy
- Ex vivo and in vivo method of gene therapy

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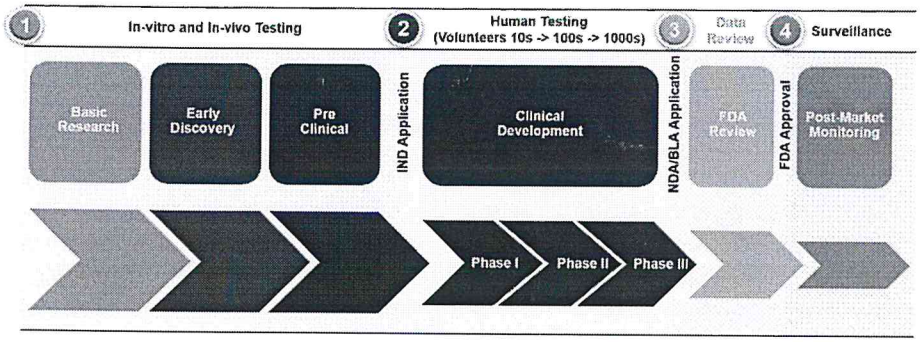
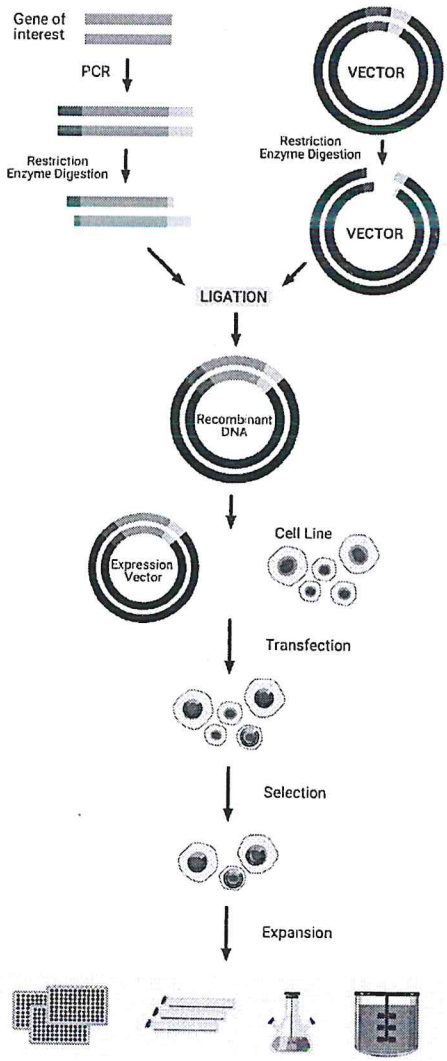
Section C

10. Explain the drug development process



11. Illustrate Recombinant protein development with example



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2022

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Department of Biotechnology

Date :2.11.2022 **Duration : 1 hr** **Class : III B.Sc.,**
Subject Name & Code:Pharmaceutical Biotechnology

Section A (5 x 2 = 10)
(Answer any **FIVE** questions)

CO4 BL 2 1. Define Drug toxicity
CO4 BL 1 2. State LD 50 and ED 50
CO4 BL 1 3. Define Carcinogenecity with example
CO1 BL 1 4. Identify the Orphan drug
CO1 BL 2 5. List out the type of application in pharmaceutical regulation
CO2 BL 2 6. Differentiate NDA and ANDA
CO4 BL 2 7. Categorize by naming the types of ophthalmic drug delivery system

Section B (1 x 5 = 5)
(Answer any **ONE** question)

CO1 BL 2 8. Discuss the Post marketing surveillance of new drug
CO2 BL 2 9. Describe the Microbial Consideration in drug formulation.

Section C (1 x 10 = 10)
(Answer any **ONE** question)

CO1 BL 2 10. Explain any one drug of abuse and its life changing complications, Prevention and Management
CO2 BL 2 11. Summarize Oral drug delivery system with its controlled release system.

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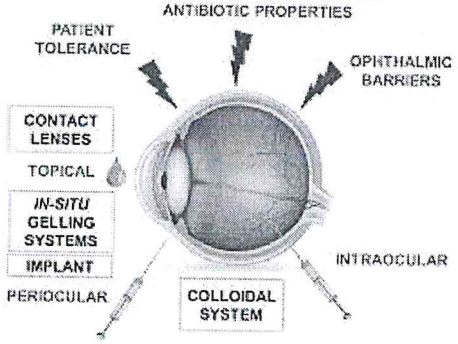
Pharmaceutical Biotechnology
Answer Key
Section A

1. **Define Drug toxicity**
   Drug toxicity refers to the level of damage that a compound can cause to an organism. The toxic effects of a drug are dose-dependent and can affect an entire system as in the CNS or a specific organ such as the liver.
2. **State LD 50 and ED 50**
   LD50, or lethal dose 50 is the lethal dose for 50% of individuals tested. ED50 stands for the effective dose 50, and in this case efficacy is seen as the maximum effect a drug can cause at any given dose. The smaller the ED50, the more potent the drug.
3. **Define Carcinogenecity with example**
   Carcinogenicity is known as the ability of a carcinogen to cause cancer. Any chemical, biomolecule or radionuclide that is directly involved in causing cancer can be considered as a carcinogen. Generally, carcinogens increase the risk of cancer by damaging the genomic materials, altering cellular metabolic processes, or disrupting signaling pathways.
4. **Identify the Orphan drug**
   An orphan drug is a pharmaceutical agent developed to treat medical conditions which, because they are so rare, would not be profitable to produce without government assistance. The conditions are referred to as orphan diseases.
5. **List out the type of application in pharmaceutical regulations**
   - Investigational New Drug
   - New Drug Application
   - Abbreviated New Drug Application
   - Biologics License Application
   - Over The Counter Application
6. **Differentiate NDA and ANDA**

CONCLUSION

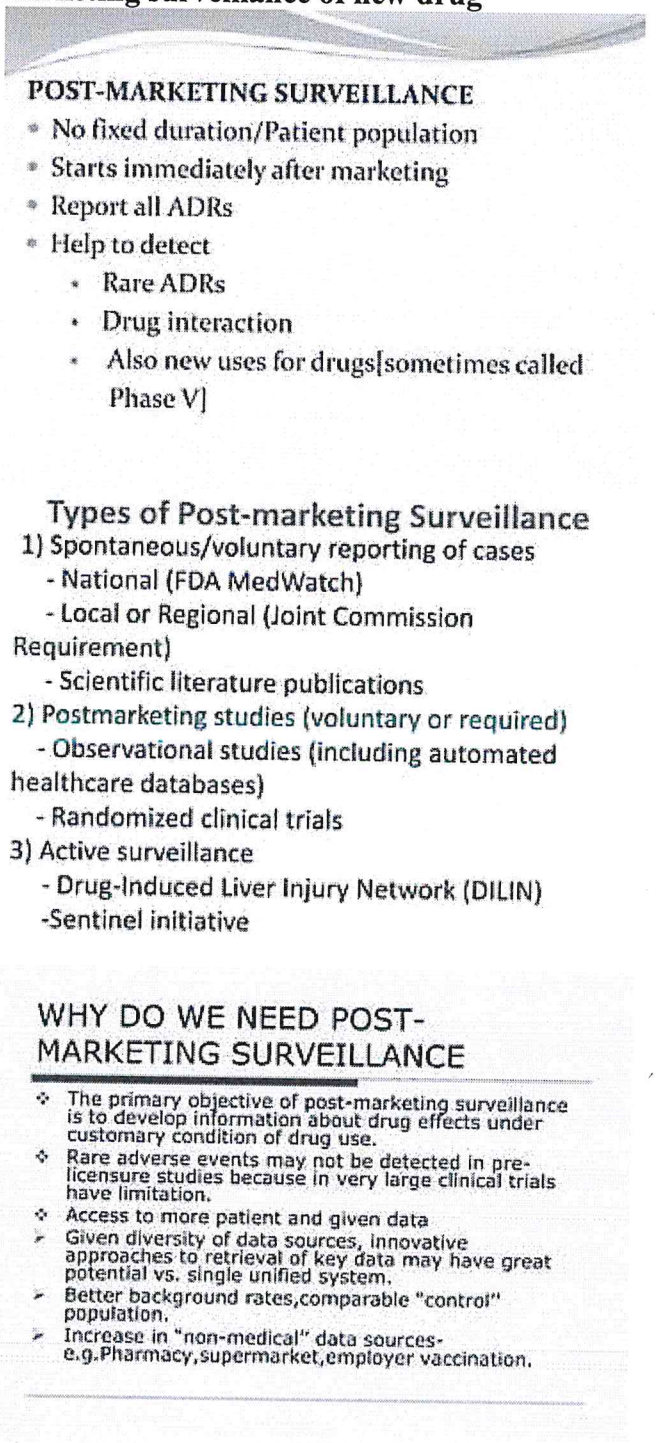
NDA	ANDA
Applicable for new drug	Applicable for generic drug
Take longer time (12-15 years)	Compare to NAD less time taken(1-2 years)
More expenditure of money	Comparatively less
Cost of drugs are more	Cost of drugs are less
Nonclinical studies and clinical investigations are essential	Nonclinical studies and clinical investigations are nonessential except bioavailability and bioequivalence

7. **Categorize by naming the types of ophthalmic drug delivery system**



Section B

8. Discuss the Post marketing surveillance of new drug



9. Describe the Microbial Consideration in drug formulation.

The selection of a sterilization strategy for a drug product that requires aseptic manufacturing is generally determined by the stability of the drug substance. For stable products, terminal sterilization, including heat sterilization or exposure to radiation or chemicals such as ethylene oxide or vaporous hydrogen peroxide, is the preferred strategy. However, most biologic drugs are unstable when exposed to heat, radiation, or chemicals and generally require aseptic manufacturing using sterile filtration. Successful sterile filtration requires a drug product formulation with an

appropriate viscosity and compatibility with the contact surfaces and shear stresses involved in pumping the fluid. Single-use technology is widely used in sterile fill/finish operations today, reducing the turnover time and cross-contamination risk.

Most biologic drugs are unstable when exposed to heat, radiation, or chemicals and generally require aseptic manufacturing. Several elements are to be considered for aseptic processing, the environment, the equipment, the operator, and the air quality. Specifications for each of these elements are illustrated, followed by the application of laminar flow hood and biological safety cabinet. Viral decontamination of biologics is a quality control of paramount importance since many biologics are derived from microbiological sources involving virus or bacteria.

Section C

10. Explain any one drug of abuse and its life changing complications, Prevention and Management

Marijuana refers to the dried leaves, flowers, stems, and seeds from the Cannabis sativa or Cannabis indica plant. The plant contains the mind-altering chemical THC and other similar compounds. Extracts can also be made from the cannabis plant.

People smoke marijuana in hand-rolled cigarettes (joints) or in pipes or water pipes (bongs). They also smoke it in blunts—emptied cigars that have been partly or completely refilled with marijuana. To avoid inhaling smoke, some people are using vaporizers. These devices pull the active ingredients (including THC) from the marijuana and collect their vapor in a storage unit. A person then inhales the vapor, not the smoke. Some vaporizers use a liquid marijuana extract.

Short-Term Effects

When a person smokes marijuana, THC quickly passes from the lungs into the bloodstream. The blood carries the chemical to the brain and other organs throughout the body. The body absorbs THC more slowly when the person eats or drinks it. In that case, they generally feel the effects after 30 minutes to 1 hour.

THC acts on specific brain cell receptors that ordinarily react to natural THC-like chemicals. These natural chemicals play a role in normal brain development and function.

Marijuana over activates parts of the brain that contain the highest number of these receptors. This causes the "high" that people feel. Other effects include:

- altered senses (for example, seeing brighter colors)
- altered sense of time
- changes in mood
- impaired body movement
- difficulty with thinking and problem-solving
- impaired memory
- hallucinations (when taken in high doses)
- delusions (when taken in high doses)
- psychosis (risk is highest with regular use of high potency marijuana)

Long-Term Effects

Marijuana also affects brain development. When people begin using marijuana as teenagers, the drug may impair thinking, memory, and learning functions and affect how the brain builds connections between the areas necessary for these functions. Researchers are still studying how long marijuana's effects last and whether some changes may be permanent.

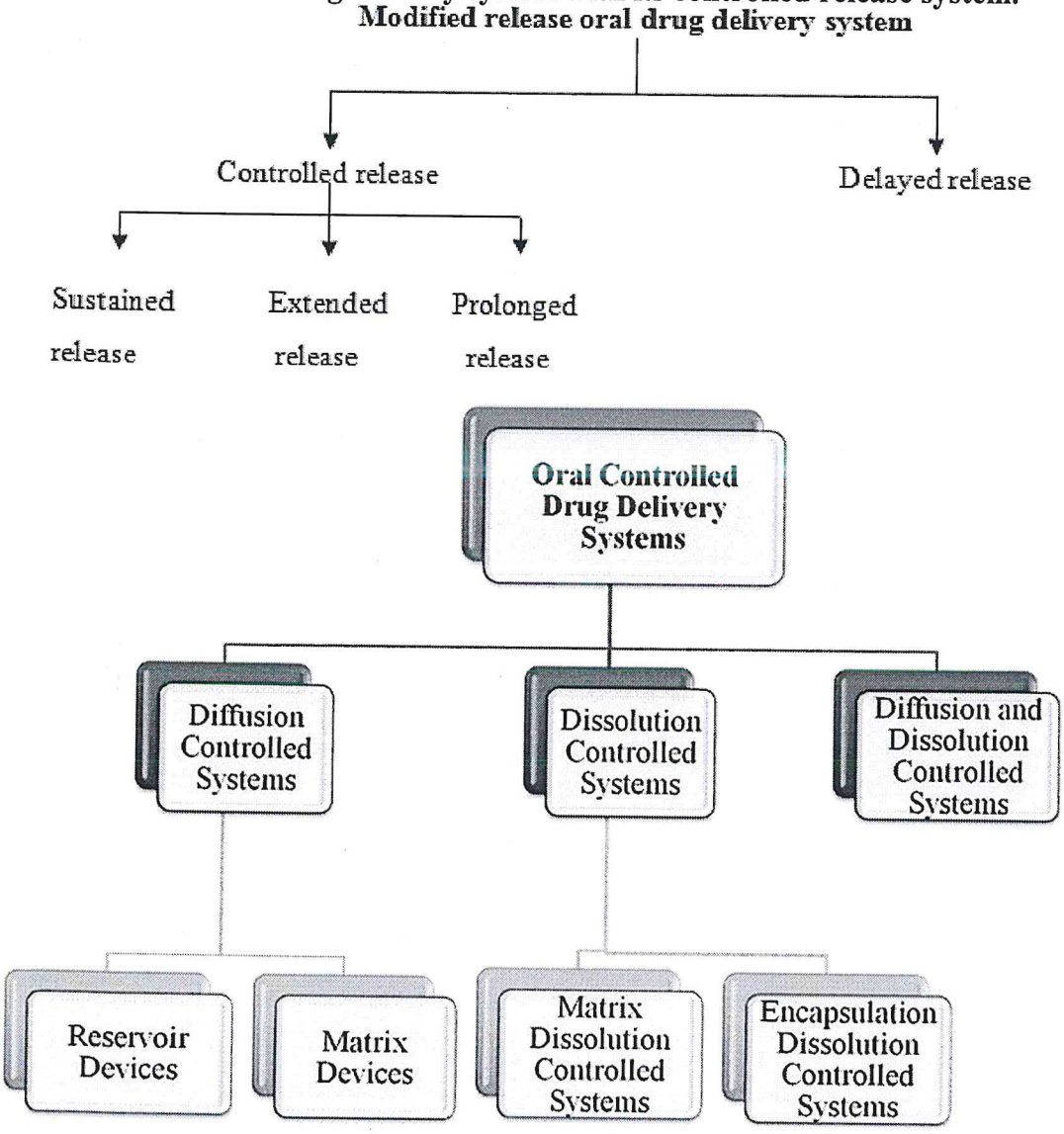
Cognitive-behavioural therapy: A form of psychotherapy that teaches people strategies to identify and correct problematic behaviours in order to enhance self-

control, stop drug use, and address a range of other problems that often co-occur with them.

Contingency management: A therapeutic management approach based on frequent monitoring of the target behaviour and the provision (or removal) of tangible, positive rewards when the target behaviour occurs (or does not).

Motivational enhancement therapy: A systematic form of intervention designed to produce rapid, internally motivated change; the therapy does not attempt to treat the person, but rather mobilize his or her own internal resources for change and engagement in treatment.

11. Summarize Oral drug delivery system with its controlled release system.



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Department of Biotechnology

Date : 31-10-2022 **Duration : 1 hour** **Class :I M.Sc. Biotechnology**
Subject Name & Code: **Biochemistry MDK1A**

Section A (5 x 1 = 5)

(Answer any **FIVE** questions)

CO 4 BL 1 1. Define Zwitterion
CO 4 BL 2 2. Discuss Transamination reaction
CO 4 BL 1 3. List the causes and symptoms of Phenylketonuria
CO 3 BL 1 4. Define and classification of Fatty acids.
CO 3 BL 1 5. Define Beta oxidation of fatty acids
CO 4 BL 1 6. Recall the aromatic amino acids and sulphur containing amino acids
CO 1 BL 2 7. Explain Mutarotation

Section B (2 x 5 = 10)

(Answer any **TWO** questions)

CO 3 BL 2 8. Explain Glycolysis,
CO 3 BL 2 9. Discuss HMP pathway.
CO 4 BL 2 10. Illustrate Urea cycle
CO 4 BL 2 11. Classify proteins based on shape and solubility

Section C (1 x 10 = 10)

(Answer any **ONE** question)

CO 3 BL 2 12. Discuss Cholesterol synthesis.
CO 1 BL 2 13. Classify Carbohydrates with examples

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Section A

(5 x 1 = 5)

(Answer any **FIVE** questions)

1. Define Zwitterion

The term 'Zwitterion' is originally derived from the German word 'zwitter', which can be roughly translated as 'hybrid' or 'hermaphrodite'. A zwitterion is an ion that contains two functional groups. In simple terms, it is an ion possessing both positive and negative electrical charges. Therefore, zwitterions are mostly electrically neutral.

2. Discuss Transamination reaction

Transamination is the most common reaction type catalyzed by PLP-dependent enzymes. It is a biologically important process by which living cells reversibly transfer the amino group from an amine (e.g., γ-aminobutyrate) or α-amino acid (e.g., aspartate) to an α-keto carboxylic acid (e.g., α-ketoglutarate).

3. List the causes and symptoms of Phenylketonuria

Phenylketonuria (PKU) is a rare genetic condition that causes an amino acid called phenylalanine to build up in the body. Amino acids are the building blocks of protein. Phenylalanine is found in all proteins and some artificial sweeteners.

PKU symptoms can range from mild to severe. The most severe form of this disorder is known as classic PKU. An infant with classic PKU may appear normal for the first few months of their life. If the baby isn't treated for PKU during this time, they'll start to develop the following symptoms:

seizures
tremors, or trembling and shaking
stunted growth
hyperactivity
skin conditions such as eczema
a musty odor of their breath, skin, or urine

4. Define and classification of Fatty acids.

They are classified into three types based on their degree of saturation/unsaturation in the carbon chain:

If there is no double bond, the fatty acid is saturated.

If there is one double bond, the fatty acid is monounsaturated,

Cyclic fatty acids- They have a cyclic unit with three, five, or even six carbon atoms, similar to prostaglandins.

5. Define Beta oxidation of fatty acids

Beta-oxidation is the catabolic process by which fatty acid molecules are broken down in the cytosol in prokaryotes and in the mitochondria in eukaryotes to generate acetyl-CoA.

Acetyl-CoA enters the citric acid cycle while NADH and FADH2, which are co-enzymes, are used in the electron transport chain.

It is referred as "beta oxidation" because the beta carbon of the fatty acid undergoes oxidation to a carbonyl group.

6. Recall the aromatic amino acids and sulphur containing amino acids

Methionine and cysteine are the two primary sulfur-containing amino acids in mammals. Methionine is an essential amino acid, obtained by dietary intake while cysteine is non-essential and a metabolite of methionine metabolism.

Tyrosine, phenylalanine and tryptophan are the three aromatic amino acids (AAA) involved in protein synthesis.

7. Explain Mutarotation

Mutarotation is a difference in the specific rotation of plane-polarized light, due to the change in the equilibrium between two anomers in the solution. Any molecule to show mutarotation must have hemiketal or hemiacetal group. Mutarotation property was first observed in sugar.

Section B

(2 x 5 = 10)

(Answer any **TWO** questions)

8. Explain Glycolysis

Glycolysis is a cytoplasmic pathway which breaks down glucose into two three-carbon compounds and generates energy. Glucose is trapped by phosphorylation, with the help of the enzyme hexokinase. Adenosine triphosphate (ATP) is used in this reaction and the product, glucose-6-P, inhibits hexokinase.

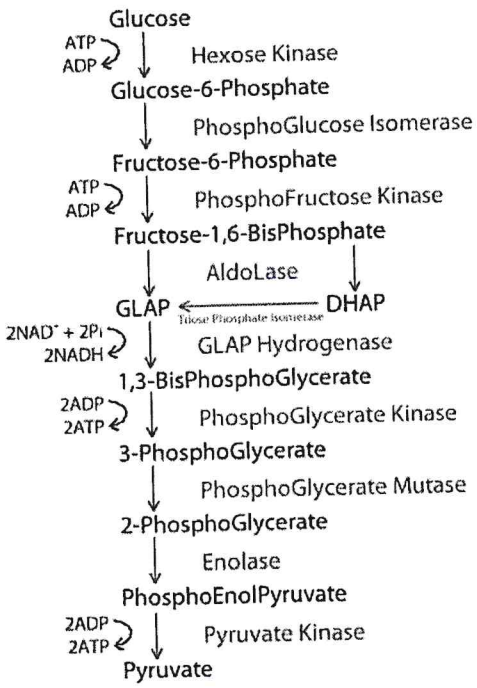
This metabolic pathway was discovered by three German biochemists- Gustav Embden, Otto Meyerhof, and Jakub Karol Parnas in the early 19th century and is known as the EMP pathway (Embden–Meyerhof–Parnas).

It is the process in which a glucose molecule is broken down into two molecules of pyruvate.

The process takes place in the cytoplasm of plant and animal cells.

Six enzymes are involved in the process.

The end products of the reaction include 2 pyruvate, 2 ATP and 2 NADH molecules.



9. Discuss HMP pathway.

The hexose monophosphate (HMP) shunt, also known as the pentose phosphate pathway or phosphogluconate pathway, is a metabolic pathway that runs parallel to glycolysis. This pathway produces NADPH and intermediates required for the synthesis of nucleic acids and amino acids. Let us study the pathway in detail.

Features of the HMP Shunt

It is an anabolic pathway that takes place in the cytosol for most organisms. However, in plants, it takes place in plastids.

The pathway takes place in two distinct phases: oxidative and non-oxidative phases.

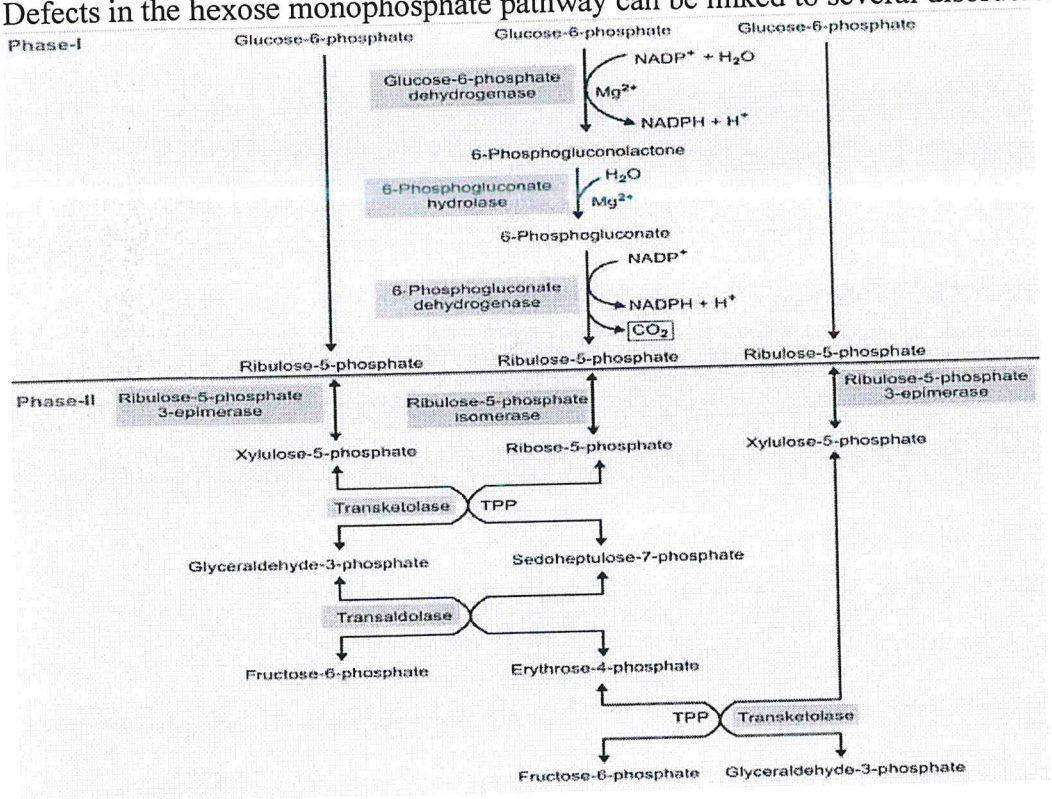
The reactions of this pathway are enzyme catalysed.

The products obtained from the pathway include NADPH, which is used in biosynthesis in cells, ribose-5-phosphate, which is used in the synthesis of nucleic acid and nucleotides, and erythrose-4-phosphate, which is used for the synthesis of aromatic amino acids.

In humans, this pathway is most active in mammary glands, adrenal cortex, adipose tissue, erythrocytes, testes and liver.

The HMP shunt is a tightly controlled metabolic pathway that is connected with other pathways, such as glycolysis and gluconeogenesis, depending upon the metabolic needs of the body.

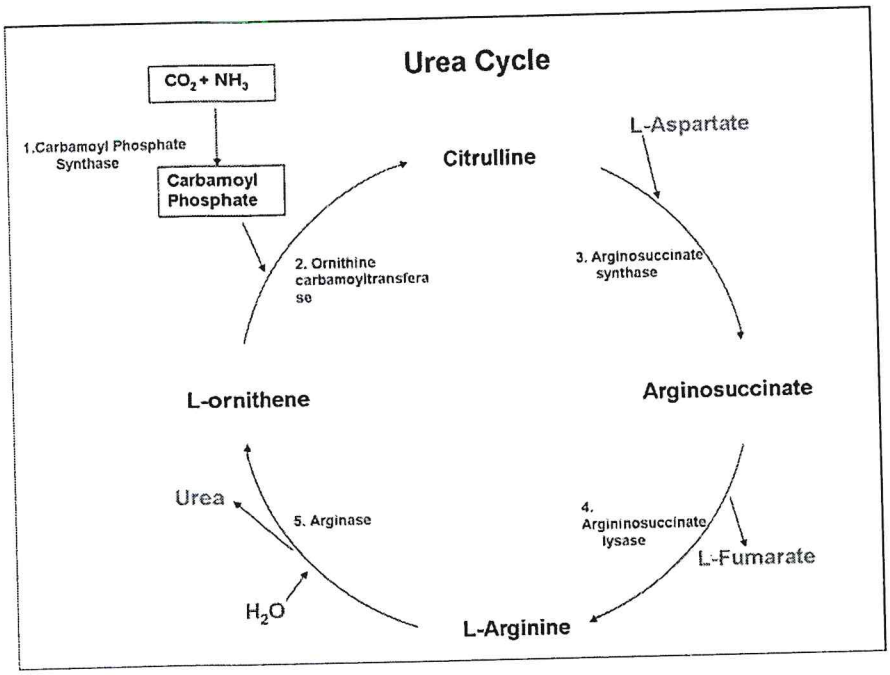
Defects in the hexose monophosphate pathway can be linked to several disorders.



10. Illustrate Urea cycle

The urea cycle or ornithine cycle converts excess ammonia into urea in the mitochondria of liver cells.

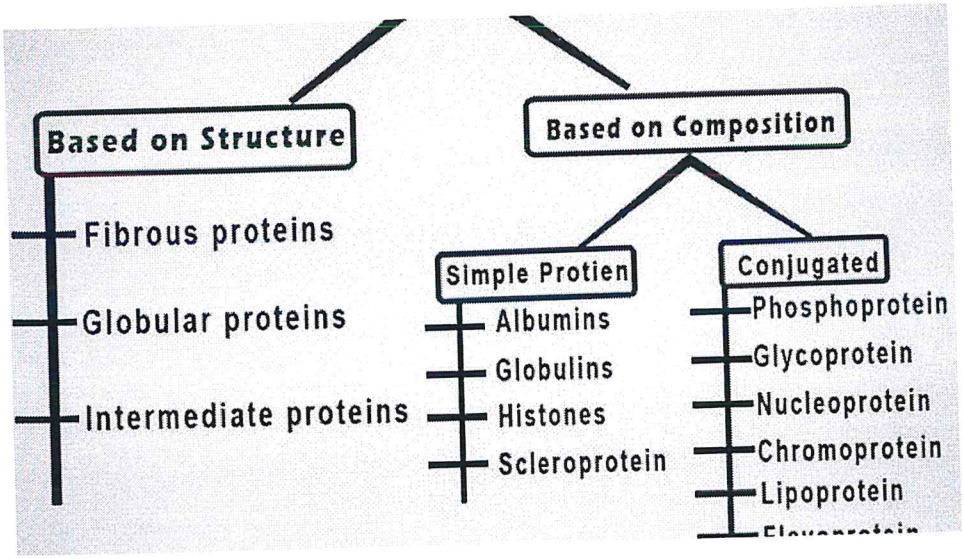
he urea forms, then enters the blood stream, is filtered by the kidneys and is ultimately excreted in the urine.



The conversion of ammonia into urea through a series of biochemical reactions is known as the urea cycle or ornithine cycle.
It takes place in the liver with the help of mitochondrial and cytosolic enzymes.
It is an important pathway in amphibians and mammals as they help in disposing highly toxic ammonia by converting it into urea.
The animals that excrete in the form of urea are called ureotelic

11. Classify proteins based on shape and solubility
Protein classification based on shape
On the basis of their shape, proteins may be divided into two classes: fibrous and globular.

Fibrous proteins
They have primarily mechanical and structural functions, providing support to the cells as well as the whole organism.
These proteins are insoluble in water as they contain, both internally and on their surface, many hydrophobic amino acids. The presence on their surface of hydrophobic amino acids facilitates their packaging into very complex supramolecular structures.
Globular proteins
Most of the proteins belong to this class.
They have a compact and more or less spherical structure, more complex than fibrous proteins. In this regard, motifs, domains, tertiary and quaternary structures are found, in addition to the secondary structures.
They are generally soluble in water but can also be found inserted into biological membranes (transmembrane proteins), thus in a hydrophobic environment.

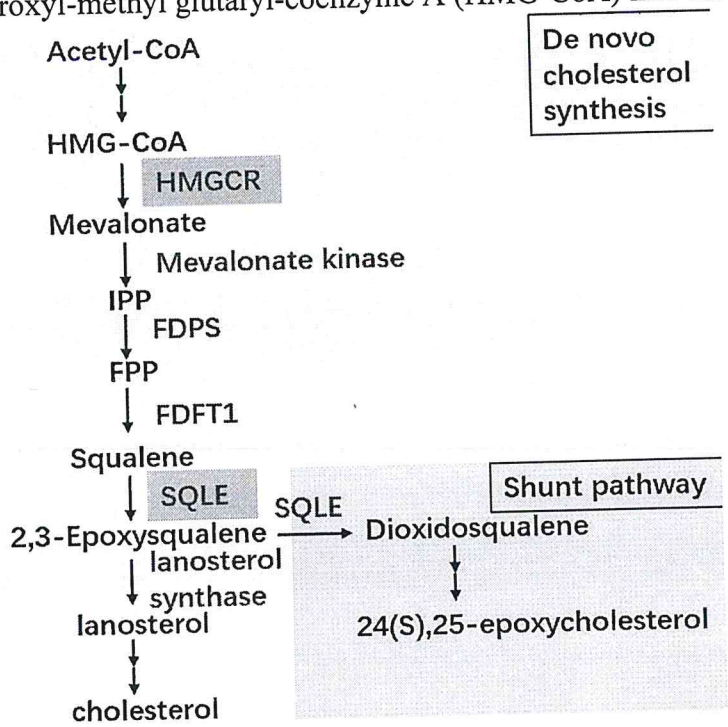


Section C (1 x 10 = 10)

(Answer any **ONE** question)

12. Discuss Cholesterol synthesis.

Cholesterol is synthesized via a cascade of enzymatic reactions known as the mevalonate pathway. This series of reactions is primarily regulated by a rate-limiting step involving the conversion of hydroxyl-methyl glutaryl-coenzyme A (HMG-CoA) into mevalonate.



Cholesterol is an extremely important biological molecule that has roles in membrane structure as well as being a precursor for the synthesis of the steroid

hormones, the bile acids, and vitamin D. Both dietary cholesterol, and that synthesized de novo, are transported through the circulation in lipoprotein particles. The same is true of cholesteryl esters, the form in which cholesterol is stored in cells. Due to its important role in membrane function, all cells express the enzymes of cholesterol biosynthesis.

13. Classify Carbohydrates with examples

Carbohydrate is a group of organic compounds occurring in living tissues and foods in the form of starch, cellulose, and sugars.

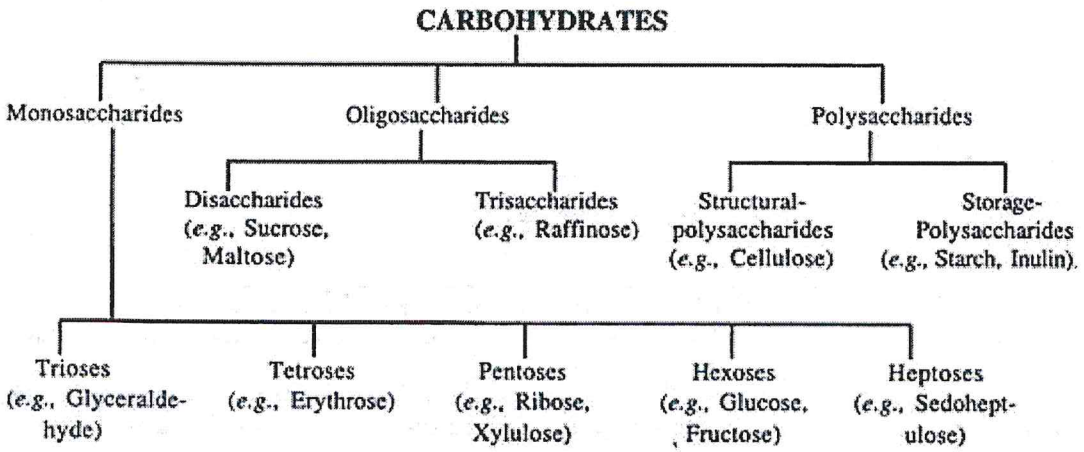


Fig. 13.1. Classification of the Carbohydrates

Monosaccharide carbohydrates are those carbohydrates that cannot be hydrolyzed further to give simpler units of polyhydroxy aldehyde or ketone. If a monosaccharide contains an aldehyde group then it is called aldose and on the other hand, if it contains a keto group then it is called a ketose.

On hydrolysis, disaccharides yield two molecules of either the same or different monosaccharides. The two monosaccharide units are joined by oxide linkage which is formed by the loss of water molecule and this linkage is called glycosidic linkage.

Sucrose is one of the most common disaccharides which on hydrolysis gives glucose and fructose. Maltose and Lactose (also known as milk sugar) are the other two important disaccharides.

Polysaccharides contain long monosaccharide units joined together by glycosidic linkage.

Most of them act as food storage for e.g. Starch. Starch is the main storage polysaccharide for plants.

It is a polymer of α glucose and consists of two components-Amylose and Amylopectin.

Cellulose is also one of the polysaccharides that are mostly found in plants.

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Department of Biotechnology

2022-2023

UNIT TEST II

Subject Name &Code: Biochemistry MDK1A Date: 1/12/2022

Section A (5 x 1 = 5)

(Answer any FIVE questions)

CO3. 1. What are essential fatty acids?

CO3. 2. Write the significance of ketone bodies.

CO4. 3. What is oxidative deamination of aminoacids?

CO4. 4. How is pyruvate converted to acetyl CoA?

CO5. 5. What is a zwitter ion?

CO5. 6. What is m-RNA?

CO5. 7. What are purine bases?

Section B (2 x 5 = 10)

(Answer any TWO questions)

Answer questions each in 200 words.

CO4. 8. What are the functions of proteins?

CO4. 9. Explain the helical structure of proteins.

CO5. 10.What are nucleosides and nucleotides?

CO5. 11. Write the formation of uric acid.

Section C (1 x 10 = 10)

(Answer any ONE question)

CO5. 12. Explain the hormonal regulation ofcarbohydrate metabolism.

CO4. 13. Elaborate on pyrimidine biosynthesis.

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Department of Biotechnology

Duration : 1 hour Class : I M.Sc. Biotechnology

Subject Name &Code: Biochemistry MDK1A **(Unit II)**

Section A (5 x 1 = 5)

(Answer any FIVE questions)

CO3. 1. What are essential fatty acids?

The term essential fatty acids (EFA) refers to those polyunsaturated fatty acids (PUFA) that must be provided by foods because these cannot be synthesized in the body yet are necessary for health. There are two families of EFA, omega-3 (ω-3) and omega-6 (ω-6).

CO3. 2. Write the significance of ketone bodies.

Ketone bodies are produced by the liver and used peripherally as an energy source when glucose is not readily available. The two main ketone bodies are acetoacetate (AcAc) and 3-beta-hydroxybutyrate (3HB), while acetone is the third, and least abundant, ketone body.

CO4. 3. What is oxidative deamination of aminoacids?

Oxidative deamination is a form of deamination that generates α-keto acids and other oxidized products from amine-containing compounds, and occurs primarily in the liver

CO4. 4. How is pyruvate converted to acetyl CoA?

Pyruvate—three carbons—is converted to acetyl CoA, a two-carbon molecule attached to coenzyme A. A molecule of coenzyme A is a necessary reactant for this reaction, which releases a molecule of carbon dioxide and reduces a NAD+ to NADH.

CO5. 5. What is a zwitter ion?

A zwitterion is an ion that contains two functional groups. In simple terms, it is an ion possessing both positive and negative electrical charges. Therefore, zwitterions are mostly electrically neutral (the net formal charge is usually zero).

CO5. 6. What is m-RNA?

Messenger RNA (abbreviated mRNA) is a type of single-stranded RNA involved in protein synthesis.

CO5. 7. What are purine bases?

Adenine and Guanine

Section B (2 x 5 = 10)

(Answer any TWO questions)

Answer questions each in 200 words.

CO4. 8. What are the functions of proteins?

Proteins are large, complex molecules that play many critical roles in the body. They do most of the work in cells and are required for the structure, function, and regulation of the body's tissues and organs.

Proteins serve many functions in cells. They act as enzymes that catalyze chemical reactions, provide structural support, regulate the passage of substances across the cell membrane, protect against disease, and coordinate cell signaling pathways.

CO4. 9. Explain the helical structure of proteins.

The α helix, a common structural motif of proteins, consists of a right-handed helix with a repeat length of 3.6 amino acid residues per helical turn. The α helix is stabilized by hydrogen bonds between an amide hydrogen of one amino acid and a carbonyl oxygen four amino acids away.

CO5. 10. What are nucleosides and nucleotides?

Nucleosides are responsible for encoding, transmitting and expressing genetic information in all living things. Nucleotides are building blocks of nucleic acids DNA and RNA. Nucleotides are composed of a nitrogenous base, a five-carbon sugar (ribose or deoxyribose), and at least one phosphate group.

CO5. 11. Write the formation of uric acid.

Uric acid is a chemical created when the body breaks down substances called purines. Purines are normally produced in the body and are also found in some foods and drinks. Foods with high content of purines include liver, anchovies, mackerel, dried beans and peas, and beer

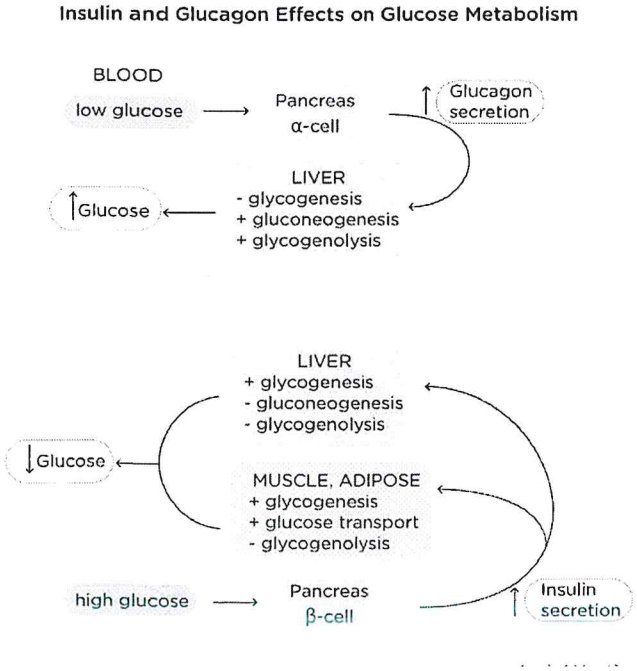
Section C (1 x 10 = 10)

(Answer any ONE question)

CO5. 12. Explain the hormonal regulation ofcarbohydrate metabolism.

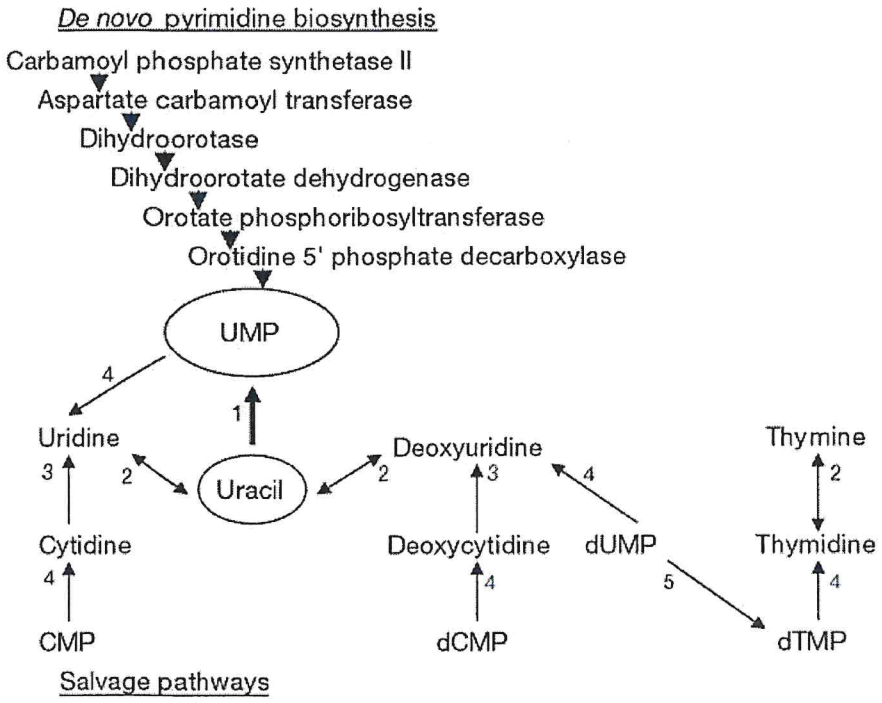
Insulin and glucagon are the primary hormones involved in maintaining a steady level of glucose in the blood, and the release of each is controlled by the amount of nutrients currently available.

In fact, eight key hormones help the body (and the metabolism) function properly—insulin, leptin, triiodothyronine, cortisol, ghrelin, progesterone, testosterone, and estrogen.



CO4. 13. Elaborate on pyrimidine biosynthesis.
Pyrimidine de novo synthesis is a demonstration that compartmentation within different parts of the cell – cytosol, mitochondria, chloroplasts – enhances the mode of regulation and flexibility of a metabolic pathway.

Through negative feedback inhibition, the end-products UTP and UDP prevent the enzyme CAD from catalyzing the reaction in animals. Conversely, PRPP and ATP act as positive effectors that enhance the enzyme's activity.



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Department of Biotechnology

UNIT TEST I

Date : 1-11-2022 **Duration : 1 hour** **Class :I M.Sc. Biotechnology**

Subject Name & Code: **Molecular Genetics & MDK1B**

Section A (5 x 1 = 5)

(Answer any **FIVE** questions)

CO 1 BL 1 1. Define chromosome
CO 1 BL 2 2. Discuss nucleosome
CO 1 BL 1 3. Describe down syndrome
CO 2 BL 1 4. Define genetic code
CO 2 BL 1 5. Define turner syndrome
CO 2 BL 1 6. Define klinefelter syndrome
CO 2 BL 2 7. Define codon

Section B (2 x 5 = 10)

(Answer any **TWO** questions)

CO 2 BL 2 8. Discuss DNA repair
CO 1 BL 2 9. Discuss solenoid structure of DNA
CO 1 BL 2 10. Describe the Colinearity of proteins
CO 2 BL 2 11. Describe chromosomal abnormalities

Section C (1 x 10 = 10)

(Answer any **ONE** question)

CO 1 BL 2 12. Explain the experiments to prove DNA as a genetic material
CO 2 BL 2 13. Explain about DNA replication

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Department of Biotechnology

UNIT TEST I

Date : 1-11-2022 **Duration : 1 hour** **Class :I M.Sc. Biotechnology**

Subject Name & Code: **Molecular Genetics & MDK1B**

Section A

1. Define chromosome

Chromosomes are structures found in the center (nucleus) of cells that carry long pieces of DNA. DNA is the material that holds genes. It is the building block of the human body. Chromosomes also contain proteins that help DNA exist in the proper form.

2. Discuss nucleosome

A nucleosome is the basic repeating subunit of chromatin packaged inside the cell's nucleus. In humans, about six feet of DNA must be packaged into a nucleus with a diameter less than a human hair, and nucleosomes play a key role in that process.

3. Describe down syndrome

Down syndrome is a condition in which a person has an extra chromosome. Chromosomes are small "packages" of genes in the body. They determine how a baby's body forms and functions as it grows during pregnancy and after birth. Typically, a baby is born with 46 chromosomes.

4. Define genetic code

Each gene's code uses the four nucleotide bases of DNA: adenine (A), cytosine (C), guanine (G) and thymine (T) — in various ways to spell out three-letter "codons" that specify which amino acid is needed at each position within a protein.

5. Define turner syndrome

Turner syndrome, a condition that affects only females, results when one of the X chromosomes (sex chromosomes) is missing or partially missing. Turner syndrome can cause a variety of medical and developmental problems, including short height, failure of the ovaries to develop and heart defects.

6. Define klinefelter syndrome

Klinefelter syndrome is a genetic condition that results when a boy is born with an extra copy of the X chromosome. Klinefelter syndrome is a genetic condition affecting males, and it often isn't diagnosed until adulthood.

7. Define codon

A sequence of three consecutive nucleotides in a DNA or RNA molecule that codes for a specific amino acid. Certain codons signal the start or end of translation. These are called start or stop (or termination) codons.

Section B

8. Discuss DNA repair

Most damage to DNA is repaired by removal of the damaged bases followed by resynthesis of the excised region. Some lesions in DNA, however, can be repaired by direct reversal of

the damage, which may be a more efficient way of dealing with specific types of DNA damage that occur frequently.

At least five major DNA repair pathways—base excision repair (BER), nucleotide excision repair (NER), mismatch repair (MMR), homologous recombination (HR) and non-homologous end joining (NHEJ)—are active throughout different stages of the cell cycle, allowing the cells to repair the DNA damage.

9. Discuss solenoid structure of DNA

In the solenoid structure, the nucleosomes fold up and are stacked, forming a helix. They are connected by bent linker DNA which positions sequential nucleosomes adjacent to one another in the helix. The nucleosomes are positioned with the histone H1 proteins facing toward the centre where they form a polymer.

10. Describe the colinearity of proteins

Colinearity is the concept that nucleotide sequences in genes dictate amino acid sequences in proteins. It includes three steps: initiation, elongation, and termination. After the mRNA is processed, it carries the instructions to a ribosome in the cytoplasm. Translation occurs at the ribosome, which consists of rRNA and proteins.

11. Describe chromosomal abnormalities

A chromosomal abnormality, or chromosomal aberration, is a disorder characterized by a morphological or numerical alteration in single or multiple chromosomes, affecting autosomes, sex chromosomes, or both.

- Down syndrome (Trisomy 21).
- FragileX syndrome.
- Klinefelter syndrome.
- Triple-X syndrome.
- Turner syndrome.
- Trisomy 18.
- Trisomy 13.

Section C

12. Explain the experiments to prove DNA as a genetic material

DNA, or deoxyribonucleic acid, is the hereditary material in humans and almost all other organisms. Nearly every cell in a person's body has the same DNA.

Alfred Hershey and Martha Chase took an effort to find the genetic material in organisms. Their experiments led to an unequivocal proof to DNA as genetic material. Bacteriophages (viruses that affect bacteria) were the key element for Hershey and Chase experiment.

The Hershey–Chase experiments were a series of experiments conducted in 1952 by Alfred Hershey and Martha Chase that helped to confirm that DNA is genetic material. Based on the observation, Griffith concluded that R strain bacteria had been transformed by S strain bacteria. The R strain inherited some 'transforming principle' from the heat-killed S strain bacteria which made them virulent. And he assumed this transforming principle as genetic material.

13. Explain about DNA replication

Replication occurs in three major steps: the opening of the double helix and separation of the DNA strands, the priming of the template strand, and the assembly of the new DNA segment. During separation, the two strands of the DNA double helix uncoil at a specific location called the origin.

DNA replication requires other enzymes in addition to DNA polymerase, including DNA primase, DNA helicase, DNA ligase, and topoisomerase.

DNA polymerase I (for filling small DNA segments during replication and repair processes) DNA polymerase III (It is the main replicating enzyme) Helicase (separate double-stranded DNA into single strands allowing each strand to be copied) DNA gyrase (reduces supercoiling which builds up during DNA unwinding)

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UNIT TEST II

Date : 2-12-2022 **Duration : 1 hour** **Class :I M.Sc. Biotechnology**
Subject Name & Code: **Molecular Genetics & MDK1B**

Section A (5 x 1 = 5)
(Answer any **FIVE** questions)

CO 1 BL 1 1. Define allele frequency.

CO 1 BL 2 2. Discuss pseudo gene

CO 1 BL 1 3. Describe VNTR.

CO 2 BL 1 4. Define non-sense mutation.

CO 2 BL 1 5. Define transition DNA damage.

CO 2 BL 1 6. Define transversion in DNA damage.

CO 2 BL 2 7. Define Tn3

Section B (2 x 5 = 10)
(Answer any **TWO** questions)

CO 2 BL 2 8. Discuss about Lac operon.

CO 1 BL 2 9. Discuss about complex transposons

CO 1 BL 2 10. Describe about genetic drift.

CO 2 BL 2 11. Describe about inbreeding.

Section C (1 x 10 = 10)
(Answer any **ONE** question)

CO 1 BL 2 12. Explain radiation induced mutation.

CO 2 BL 2 13. Explain hardy-Weinberg equation.

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2022-2023

UNIT TEST II

KEY ANSWERS

Section A

1. Define allele frequency.

   Allele frequency, or gene frequency, is the relative frequency of an allele (variant of a gene) at a particular locus in a population, expressed as a fraction or percentage. Specifically, it is the fraction of all chromosomes in the population that carry that allele over the total population or sample size.

2. Discuss pseudo gene

   A pseudogene is a segment of DNA that structurally resembles a gene but is not capable of coding for a protein. Pseudogenes are most often derived from genes that have lost their protein-coding ability due to accumulated mutations that have occurred over the course of evolution.

3. Describe VNTR.

   Variable number of tandem repeats (VNTR) is a location in DNA where a short nucleotide sequence is organized as a tandem repeat with variations in length between individuals.

4. Define non-sense mutation.

   A nonsense mutation is a point mutation in a sequence of DNA that results in a premature stop codon, or a nonsense codon in the transcribed mRNA, and in a truncated, incomplete, and usually nonfunctional protein product. The functional effect of a nonsense mutation depends on the location of the stop codon within the coding DNA.

5. Define transition DNA damage.

   Damage to DNA includes any deviation from the usual double helix structure.Simplest mutations are switching of one base for another base. In transition one pyrimidine is substituted by another pyrimidine and purine with another purine.

6. Define transversion in DNA damage.

A transversion in DNA damage is the substitution of differently shaped bases [e.g., a purine for a pyrimidine].

7. Define Tn3.

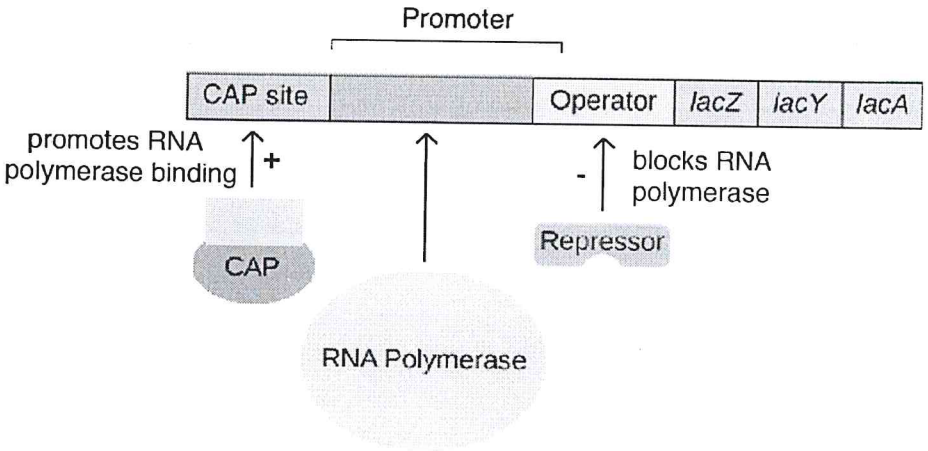
The Tn3-family of Replicative Transposonsof the Tn3 family form a widespread and remarkably homogeneous group of bacterial transposable elements in terms of transposition functions and an extremely versatile system for mediating gene reassortment and genomic plasticity owing to their modular organization.

SECTION B

8. Discuss about Lac operon.

- The *lac* operon contains three genes: *lacZ*, *lacY*, and *lacA*. These genes are transcribed as a single mRNA, under control of one promoter.
- Genes in the *lac* operon specify proteins that help the cell utilize lactose. *lacZ* encodes an enzyme that splits lactose into monosaccharides (single-unit sugars) that can be fed into glycolysis. Similarly, *lacY* encodes a membrane-embedded transporter that helps bring lactose into the cell.
- In addition to the three genes, the *lac* operon also contains a number of regulatory DNA sequences. These are regions of DNA to which particular regulatory proteins can bind, controlling transcription of the operon.

The *lac* operon:

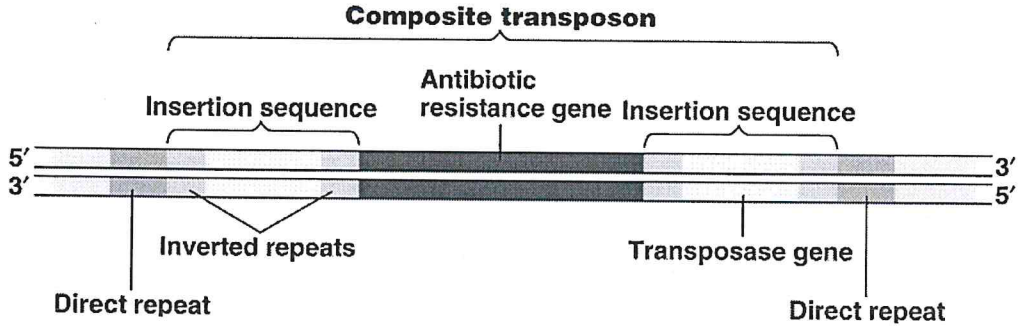


- The promoter is the binding site for RNA polymerase, the enzyme that performs transcription.

- The operator is a negative regulatory site bound by the *lac* repressor protein. The operator overlaps with the promoter, and when the *lac* repressor is bound, RNA polymerase cannot bind to the promoter and start transcription.
- The CAP binding site is a positive regulatory site that is bound by catabolite activator protein (CAP). When CAP is bound to this site, it promotes transcription by helping RNA polymerase bind to the promoter.

9. Discuss about complex transposons

- Transposons (Tn) or complex transposons are several thousand base pair long, and have genes that code for one or more proteins which might include resistance factors in bacteria acting against antibiotics.
- A distinguishing character of a transposon is the presence of identical, inverted terminal repeat (IR) sequences ranging from 8 to 38 base pairs (b.p.)
- These inverted repeats are unique to different types of transposons.
- A short (less than ten b.p.) sequence is present on either side of a transposon.
- The insertion of transposon causes duplication of a singular target sequence, which then appear as direct repeats flanking the inserted transposable element.
- The flanking direct repeats are not considered part of the transposon. These repeat sequences themselves act like IS or IS-like segments.



10. Describe about genetic drift.

Genetic drift is an evolutionary change in allelic frequencies of a population as a matter of chance. It occurs in very small populations, but its effects are strong. It occurs due to an error in selecting the alleles for the next generation from the gene

pool of the current generation. It does not occur due to any environmental influences.In large populations, the allele frequency of the genes remains relatively stable because the genes are not affecting fitness and do not have a natural selection pressure against the alleles.
Types of genetic drift are:
In the bottleneck effect, the population size severely decreases due to competition, predators, or diseases.The frequency of certain alleles in a population changes because the organisms that carry them are eliminated. The others increase in number because they are the only alleles left.This is observed during natural disasters like volcanic eruptions, earthquakes, etc., leading to the death of most of the population.
In the founder effect, a new population is founded in a new location due to physical or geographical barriers. The new population formed does not interact and mate with the original population.As a result, the allelic frequencies of the new population will be different from the original population.
Eg: The American Bison was once hunted to such an extent that it became endangered. The population which has recovered today show very few genetic variations.

11. Describe about inbreeding.

When two closely related organisms ancestrally mate and produce offspring, it is considered inbreeding. Therefore, the offspring of such a relationship are called inbred.This is referred to as incest in humans, which has a strong negative connotation.

- Sexual relationships between close relatives are detrimental to the health of inbred children and frowned upon in modern society
- The closer the relatives are, the more risk that any children will have dysfunction or deformations as a result of the lack of genetic diversity

Offspring of inbreeding have an increased risk of homozygosity and are more likely to present with recessive traits that have been carried in the family. Some of these recessive traits are relatively inconsequential, like blue eye color, but some recessive traits are undesirable and/or dangerous.

Inbreeding for multiple generations increases these risks even more and also increases risks of developing genetic diseases

Inbreeding *can* have benefits in some cases in non-human species. For example, inbreeding is popular in domesticating animals and creating new breeds suited to particular tasks or roles. This practice is also used in attempts to produce more ideal livestock and crops.

- In these situations, inbreeding can increase the likelihood of offspring having some desirable characteristics
- However, it still also comes with increased risks for negative effects as well as unforeseen complications with the exacerbation of the "desirable" traits

SECTION C

12. Explain radiation induced mutation.

- Gene mutations resulting from radiation-induced damage to DNA have been produced experimentally in many types of organisms. In general, the frequency of a given mutation increases in proportion to the dose of radiation in the low-to-intermediate dose range.
- Ionizing radiation induces gene mutations (point mutations, deletions and insertions) as well as chromosome damage in mammalian cells.
- Mutation. A mutation is a change in a DNA sequence. Mutations can result from DNA copying mistakes made during cell division, exposure to ionizing radiation, exposure to chemicals called mutagens, or infection by viruses.
- What are the 3 main reason of mutation?
- Mutations arise spontaneously at low frequency owing to the chemical instability of purine and pyrimidine bases and to errors during DNA replication. Natural exposure of an organism to certain environmental factors, such as ultraviolet light and chemical carcinogens (e.g., aflatoxin B1), also can cause mutations.

- Germline mutations occur in gametes. Somatic mutations occur in other body cells.
- Chromosomal alterations are mutations that change chromosome structure.
- Point mutations change a single nucleotide.
- Frameshift mutations are additions or deletions of nucleotides that cause a shift in the reading frame.

Radiation may alter the DNA within any cell. Cell damage and death that result from mutations in somatic cells occur only in the organism in which the mutation occurred and are therefore termed somatic or nonheritable effects. Cancer is the most notable long-term somatic effect.

non-ionizing radiation:

- Radiofrequency (RF) radiation used in many broadcast and communications applications.
- Microwaves used in the home kitchen.
- Infrared radiation used in heat lamps.
- Ultraviolet (UV) radiation from the sun and tanning beds.

Effects of radiation damage

These symptoms include loss of appetite, fatigue, fever, nausea, vomiting, diarrhea, and possibly even seizures and coma. This seriously ill stage may last from a few hours up to several months. People who receive a high radiation dose also can have skin damage.

When ionizing radiation causes DNA damage (mutations) in male or female reproductive ("germ") cells, that damage can be transmitted to the next generation (F1). This is in contrast to mutations in somatic cells, which are not transmitted.

flow, genetic hitchhiking, founder effect, meiotic drive, population bottleneck, inbreeding and assortative mating."

Genotype frequencies and allele frequencies are related to each other in a way that it is the square expansion of such allele frequencies. In other words, the law conveys that in a population, it is possible to estimate the expected frequencies of genotypes under a certain limited set of assumptions, provided the frequency of different alleles in a population is already known.

Take a case of a single locus with only two alleles indicated by A and a with corresponding frequencies f(A) = p and f(a) = q respectively, then the genotype frequencies that can be expected under limited condition being random mating is

$f(AA) = p^2$ for AA homozygotes

$f(aa) = q^2$ for aa homozygotes

$f(Aa) = 2pq$ for heterozygotes

The Hardy Weinberg Equation can be represented by

$$p^2 + q^2 + 2pq = 1$$

The allele frequencies p and q remain constant in the absence of any kind of influences such as mutation, natural selection, genetic drift, etc from one to another generation. This is how the equilibrium can be reached.

Listed below are a few assumptions for the law:

- Only sexual reproduction can take place
- Process of mating is random
- The size of the population is indefinitely large
- Entities are diploid
- Generations do not overlap
- Equality of allele frequencies in terms of sexes
- No traces of gene flow, selection, mutation, migration or admixture

In case there is any breach with regard to the above-mentioned assumptions, it can lead to discrepancies from the expected outcome. The consequences are completely dependent on the deduction that has been digressed.

The law mentions that a population shall have Hardy Weinberg proportions (given genotypic frequencies) once a single generation of random mating is carried out. In case the assumption of random mating is breached, this population will not possess Hardy Weinberg proportions. The most common source of a non-random mating is inbreeding. It leads to the rise in the homozygosity of all genes.

Breaching any one of these 4 assumptions can cause the population at each generation to still possess the Hardy–Weinberg proportions, however, with time, there will be a change in the allele frequencies.

Mutation – it has a mild impact on the allele frequencies. The rate of mutation is in this order 10-4 to 10-8. Mostly, modifications to the allele frequencies are of this order. Even if there

persists a sturdy selection against the alleles in the population, recurrent mutations will conserve it.

Selection – typically this leads to a change in the allele frequencies and is a rapid one. Few types of selections, the selected ones can result in equilibrium with no loss of alleles, namely balancing selection, while some other selections such as directional selection can gradually result in the loss of alleles.

Size of the population being small can lead to a random alteration in the allele frequencies which can be attributed to the sampling effect known as genetic drift. When alleles are found in a fewer copy, sampling effects are significant.

Migration – two or more than two populations can be associated together, genetically with migration. Here, amongst the populations, the allele frequencies have the tendency to become more homozygous. Essentially, a few migration models are the Wahlund effect (non-random mating). Hardy–Weinberg proportions typically are invalid for such models.

However, the Hardy-Weinberg equilibrium model is not applicable to haploid pathogens. In the event of a population not being found in Hardy-Weinberg equilibrium, one of the assumptions in this law then gets violated. This conveys that selection, non-random mating or migration has influenced the population, in which case experiments are carried out and hypotheses are advanced in order to understand the reasons behind the non-equilibrium of the population.

Complete dominance:

Allele frequencies can be detected in the presence of complete dominance when Hardy-Weinberg equilibrium prevails wherein it is not possible to differentiate between two genotypes. Two genotypes AA and Aa having the same phenotype as a result of complete dominance of A over a can help determine the allele frequencies from frequencies of the individuals indicating recessive phenotype aa. Here, the frequency of aa individual should be equivalent to the square of the frequency of the recessive allele.

Multiple alleles:

Calculation of genotypic frequencies at a locus with more than two alleles is allowed in the Hardy Weinberg principle, for instance in the ABO blood groups. Three alleles are present in IA, IB, IC with p,q and r frequencies respectively where $p + q + r = 1$. With random mating, the genotype of a population will be given by $(p + q + r)^2$

Frequencies of harmful recessive alleles:

The law can also be applied to estimate the frequency of heterozygous carriers of recessive genes that are harmful. In a population, two alleles, A and a are at an autosomal locus with p and q frequencies respectively, and $p + q = 1$, then AA, Aa and aa genotypes will have the following frequency, $p^2 + q^2 + 2pq$. In case, the aa genotype tends to express a phenotype that is harmful, such as cystic fibrosis, then in the population, the proportion of the affected individuals shall be q^2, the recessive allele frequency of the heterozygous carrier shall be 2pq.

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2022

SRM ARTS AND SCIENCE COLLEGE
Department of Biotechnology

Date : 2-11-2022 **Duration : 1 hour Class :I M.Sc. Biotechnology**
Subject Name & Code: **Molecular Cell Biology**

Section A (5 x 1 = 5)

(Answer any **FIVE** questions)

CO3	BL1	1. Define Apoptosis.
CO1	BL2	2. State Chargaff's Rule.
CO1	BL2	3. Define Nucleic Acid with its types.
CO3	BL2	4. Sketch the basic structure of four nucleotides
CO1	BL1	5. Define G0 phase
CO1	BL1	6. Name the negative regulators of cell cycle
CO1	BL1	7. Define CDKs

Section B (2 x 5 = 10)

(Answer any **TWO** questions)

CO3	BL6	8. Write the process of cell cycle in detail with a neat diagram
CO3	BL6	9. Write short notes on intrinsic pathway of Apoptosis
CO2	BL2	10. Compare the types of DNA with diagram
CO2	BL2	11. Comment on DNA structure with diagram

Section C (1 x 10 = 10)

(Answer any **ONE** question)

CO1	BL1	11. Enumerate the process of cell cycle regulation
CO2	BL2	12. Summarize RNA. Types, Structure with diagram and its function.

(CO: Mark CO/CO2/CO3/CO4/CO5/CO6) (BL: Blooms Taxonomy Level 1/2/3/4/5/6)

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MOLECULAR CELL BIOLOGY

Answer Key

SECTION A

1) Define apoptosis

Apoptosis is a form of programmed cell death that occurs in multicellular organisms. Biochemical events lead to characteristic cell changes and death. These changes include blebbing, cell shrinkage, nuclear fragmentation, chromatin condensation, DNA fragmentation, and mRNA decay.

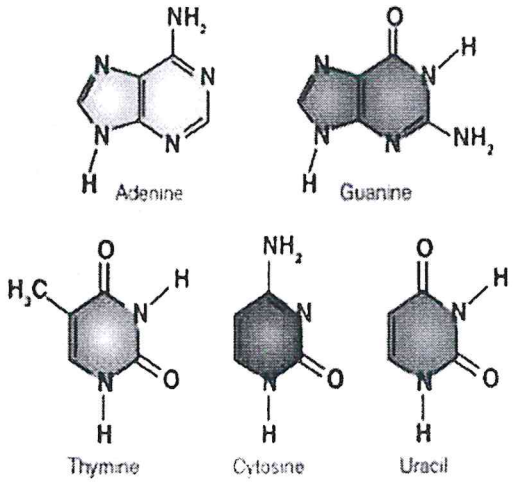
2) State chargaff's rule

Chargaff's rule states that the amount of adenine (A) is equal to that of thymine (T) and the amount of guanine is equal to that of cytosine (C) in an organism.

3) Define nucleic acid with its type

Nucleic acids are naturally occurring chemical compounds that serve as the primary information carrying molecules in cells. They play an especially important role in directing protein synthesis. The two main classes of nucleic acids are deoxyribonucleic acid (DNA) and ribonucleic acid (RNA).

4) sketch the basic structure of four nucleotides



5) Define G0 phase

The G□ phase describes a cellular state outside of the replicative cell cycle. Classically, cells were thought to enter G□ primarily due to environmental factors, like nutrient deprivation, that limited the resources necessary for proliferation. Thus, it was thought of as a resting phase.

6) Name the negative regulators of the cell cycle

Negative regulator molecules (Rb, p53, and p21) act primarily at the G1 checkpoint and prevent the cell from moving forward to division until damaged DNA is repaired. P53 halts the cell cycle and recruits' enzymes to repair damaged DNA; if DNA cannot be repaired, p53 triggers apoptosis to prevent duplication.

7) Define CDK's

CDKs are key regulatory enzymes involved in cell proliferation through regulating cell-cycle checkpoints and transcriptional events in response to extracellular and intracellular signals.

SECTION B

8) Write the process of cell cycle with neat diagram

Cell cycle is a sequence of events that take place in four stages (G1, S, G2and M phase) for the successful division of a cell. It is broadly divided into two parts- interphase (prepares the cell for the next mitosis) and mitotic phase (cell division).

Cell cycle is the ordered sequence of events that takes place in a cell while it is preparing for cell division. The cell cycle is a four-stage process- G1 (gap 1) stage, S (synthesis) phase, G2 (gap 2) phase and M (mitosis) phase.

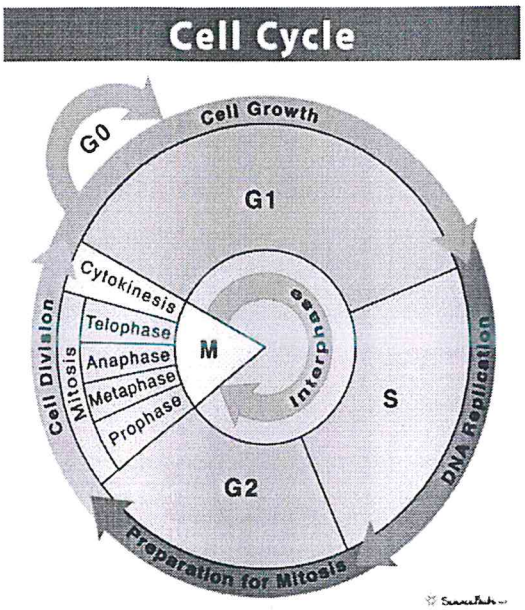
A cell cycle is an ordered sequence of events by which a cell duplicates its genome, synthesizes the other constituents of the cell and eventually divides to form two daughter cells. It has four stages- G1, S, G2 and M phase. The interphase is the longest phase as it includes G1, S and G2 phases of the cell cycle. The cell then leaves interphase, undergoes mitosis and marks the completion of division with the formation of daughter cells. As the cell division is over and the daughter cells are formed, each daughter cell enters their own interphase and begins a new cell cycle.

Phases of cell cycle:

- A eukaryotic cell divides once in every 24hrs. The cell cycle is divided into two basic phases- interphase and mitosis phase.

- Mitosis phase (1-2hrs) □ It begins with nuclear division followed by karyokinesis and cytokinesis.
- Interphase (22hrs approx.) □ This is the resting phase of the cell during which it prepares for the next division.

- G1 phase: Cell is metabolically active and grows continuously but DNA replication doesn't occur.
- S phase: DNA replication takes place. DNA per cell doubles up.- G2 phase: Proteins are synthesized in preparation for mitosis while the cell continues to growup.



9) Write short note on intrinsic pathway of apoptosis

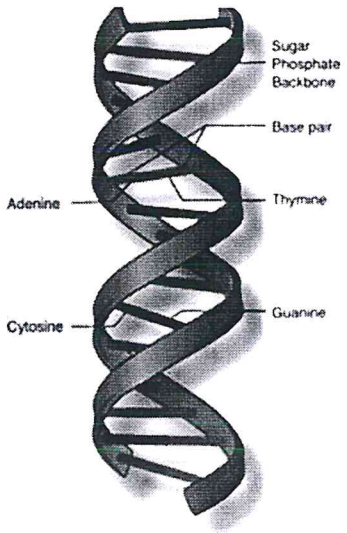
The intrinsic signaling pathways that initiate apoptosis involve a diverse array of non-receptor-mediated stimuli that produce intracellular signals that act directly on targets within the cell and are mitochondrial-initiated events. The stimuli that initiate the intrinsic pathway produce intracellular signals that may act in either a positive or negative fashion. Negative signals involve the absence of certain growth factors, hormones and cytokines that can lead to failure of suppression of death programs, thereby triggering apoptosis. In other words, there is the withdrawal of factors, loss of apoptotic suppression, and subsequent activation of apoptosis. Other stimuli that act in a positive fashion include, but are not limited to, radiation, toxins, hypoxia, hyperthermia, viral infections, and free radicals.

10) Compare types of DNA with diagram

	B form DNA	A form DNA	Z form DNA
Helical sense	Right handed	Right handed	Left handed
Major groove	Present	Present	Absent
bp/helical tern	10.5	11	12
Glycosyl bond conformation	Anti	Anti	Anti (for pyrimidines) and syn (for Purines)
Helix rise/bp	3.4Å	2.6Å	3.7Å
Base tilt	6°	20°	7°
Structure			

11) Comment on DNA with structure

Ans: DNA is a polymer composed of two polynucleotide chains that coil around each other to form a double helix. The polymer carries genetic instructions for the development, functioning, growth and reproduction of all known organisms and many viruses. DNA and ribonucleic acid (RNA) are nucleic acids. Alongside proteins, lipids and complex carbohydrates (polysaccharides), nucleic acids are one of the four major types of macromolecules that are essential for all known forms of life. The structure of the DNA double helix. The atoms in the structure are color-coded by element and the detailed structures of two base pairs are shown in the bottom right.



SECTION C

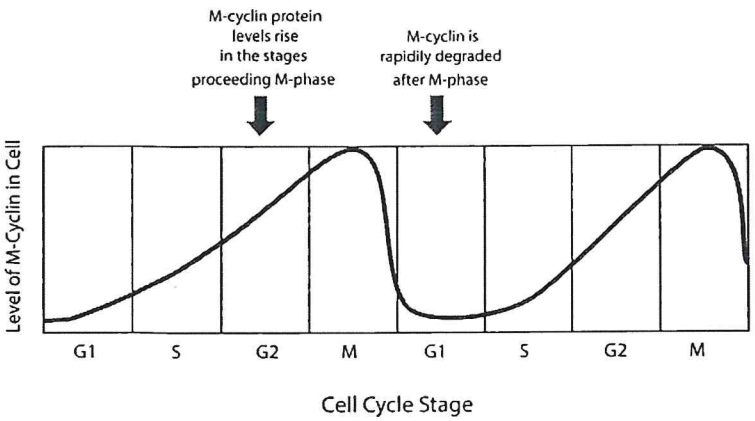
12) Enumerate the process of cell cycle regulation

Regulator Molecules of the Cell Cycle

In addition to the internally controlled checkpoints, two groups of intracellular molecules regulate the cell cycle. These regulatory molecules either promote the progress of the cell to the next phase (positive regulation) or halt the cycle (negative regulation). Regulator molecules may act individually, or they can influence the activity or production of other regulatory proteins. Therefore, the failure of a single regulator may have almost no effect on the cell cycle, especially if more than one mechanism controls the same event. However, the impact of a deficient or non-functioning regulator can be wide-ranging and possibly fatal to the cell if multiple processes are affected.

Positive Regulation of the Cell Cycle

Two groups of proteins, called **cyclins** and **cyclin-dependent kinases (Cdks),** are termed, positive regulators. They are responsible for the progress of the cell through the various checkpoints. The levels of **cyclin** proteins fluctuate throughout the cell cycle in a predictable pattern (This is the origin of their name. Cyclin levels "cycle" up and down throughout the cell cycle.). Both external and internal signals trigger increases in the trigger the expression of cyclins that are specific to each stage of the cell cycle. After the cell moves to the next stage of the cell cycle, the cyclins that were active in the previous stage are polyubiquitinated and degraded by the proteasome. One such cyclin, M-cyclin, which is associated with the M-phase of the cell cycle, is described in Figure.



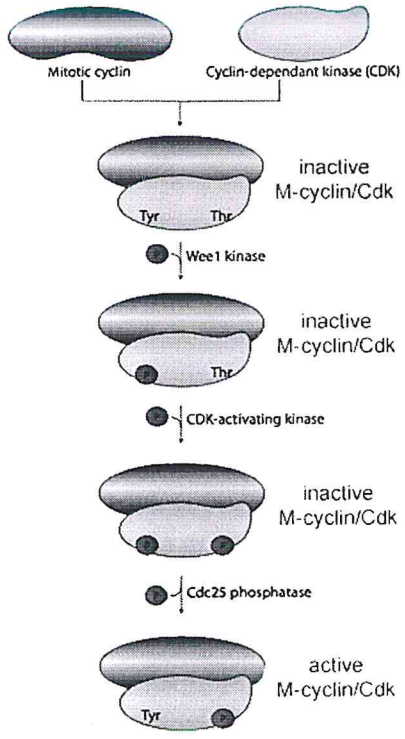
M Cyclin. M-cyclin is the cyclin associated with the M-phase of the cell cycle.

Cyclins regulate the cell cycle only when they are tightly bound to **Cdks**. To be fully active, the Cdk/cyclin complex must also be phosphorylated in specific locations. Like all kinases, Cdks are kinase enzymes that phosphorylate other proteins. Phosphorylation activates the protein by changing its shape. The proteins phosphorylated by Cdks are involved in advancing the cell to the next phase. The levels of Cdk proteins are relatively stable throughout the cell cycle; however, the concentrations of cyclin fluctuate and determine when active Cdk/cyclin complexes

form. The different cyclins and Cdks bind at specific points in the cell cycle and thus regulate different checkpoints.

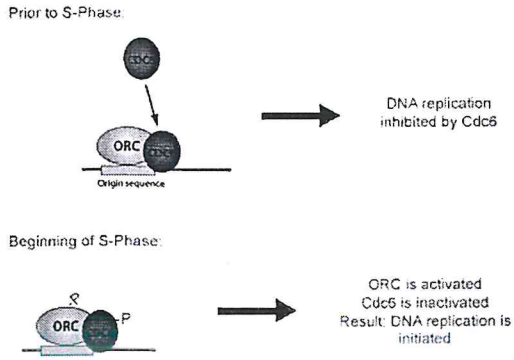
In eukaryotes, cyclins and Cdks are designated with letters and numbers, respectively (examples: Cyclin B and Cdk2). For the purposes of this text, cyclin and Cdks will be named after the stage of the cell cycle where they are active. For example, "M cyclin" refers to the cyclin that is at its highest level during M phase, and "G_1-S cyclin/Cdk" refers to the cyclin/Cdk complex active at the transition between the G_1 and S phases.

In some cases, cyclin/Cdk complexes must be further modified before Cdks have full kinase activity. Often Cdks are phosphorylated at "activating" sites on the protein and dephosphorylated at "inhibitory" sites. These sites are sidechains of specific serine, tyrosine, or threonine residues within the protein. One example is the activation of the **M-cyclin/Cdk** complex (Figure 13-9). Before M-phase, the M-cyclin/Cdk complex is phosphorylated at an inhibitory site by the kinase **Wee1**, inactivating M-cyclin/Cdk activity. Next, M-cyclin/Cdk is phosphorylated at an activating site by **CDK-activating kinases (Cak)**. Lastly, at the beginning of M-phase, the phosphatase **Cdc25** removes the inhibitory phosphate, which leads to the activation of M-cyclin/Cdk. Active M-cyclin/Cdk can then phosphorylates target proteins needed in the progression of M-phase, such as APC and lamins.



Activation of mitotic cyclin/Cdk complex. The M-Phase cyclin/Cdk complex is inactive until inhibitory phosphates have been removed and activating phosphates have been added to the protein. This ensures the specific timing of M-Phase cyclin/Cdk kinase activity in the cell cycle.

Another example of cyclin/Cdk activity occurs at the transition between the G_1 and S phases. In G_1, proteins needed to initiate DNA replication and an inhibitory protein called **Cdc6** assemble at origins of replication (Figure 13-10) (refer to Chapter 13 for more on Cdc6 and its role in DNA replication). This is called the pre-replication complex and forms to prevent DNA replication until the appropriate time in the cell cycle. At the beginning of S-phase, the S-cyclin/Cdk complex phosphorylates proteins in the pre-replication complex to recruit helicases and DNA polymerases to the origin of replication. The S-cyclin/Cdk complex phosphorylates Cdc6, which inactivates the inhibitory protein. Collectively, this ensures that DNA replication occurs, and only once, during the cell cycle.



Regulation of the initiation of DNA Replication by the S-Cdk/cyclin complex. Cdc6 is a protein that binds to the pre-replication complex to prevent the start of DNA replication. At the beginning of S-phase, the S-cyclin/Cdk complex phosphorylates Cdc6 to inactive it. The S-cyclin/Cdk complex also phosphorylates proteins in the pre-replication complex to recruit enzymes needed for DNA replication.

Negative Regulation of the Cell Cycle

The second group of cell-cycle regulatory molecules is negative regulators, which stop the cell cycle in comparison to what we just discussed where positive regulators cause the cell cycle to progress. The best understood negative regulatory molecules are retinoblastoma protein and p53.

Retinoblastoma (Rb) proteins are a group of tumor-suppressor proteins, which function to prevent tumor growth by inhibiting cell division (refer to Chapter 15 for more on tumor suppressors). Much of what is known about cell-cycle regulation comes from research conducted with cells that have lost regulatory control. All three of these regulatory proteins were discovered to be damaged or non-functional in cells that had begun to replicate uncontrollably (i.e., became cancerous). In each case, the main cause of the unchecked progress through the cell cycle was a faulty copy of the regulatory protein.

Rb primarily acts primarily the G1-S checkpoint. Rb, which largely monitors cell size, exerts its regulatory influence on other positive regulator proteins. In the active, dephosphorylated state, Rb binds to proteins called transcription factors, most commonly, E2F. Transcription factors "turn on" specific genes, allowing the production of proteins encoded by that gene. When Rb is

bound to E2F, the production of proteins necessary for the G_1/S transition is blocked. In response to growth factor signaling molecules (refer to Chapter 12 for more on growth factor signaling) the cell will increase in size. This triggers the phosphorylation of Rb by the G_1-S cyclin/Cdk complex. Phosphorylation of Rb causes its inactivation, resulting in the release E2F and the expression of proteins needed to progress to S phase (Figure 13-11).

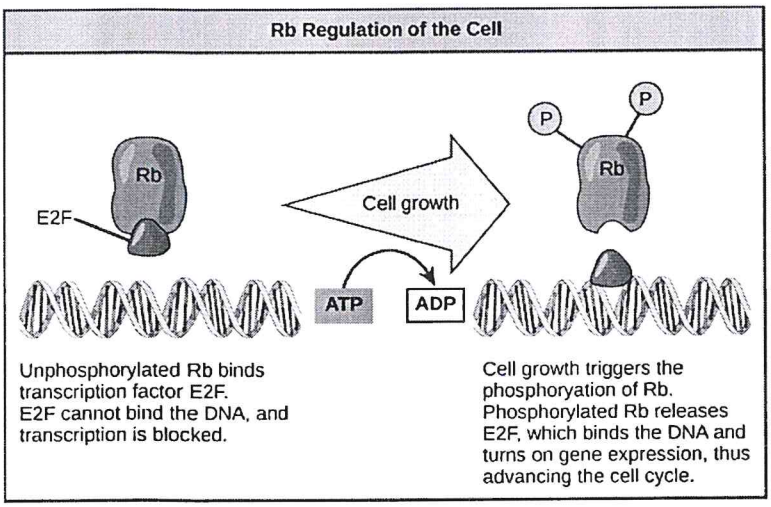
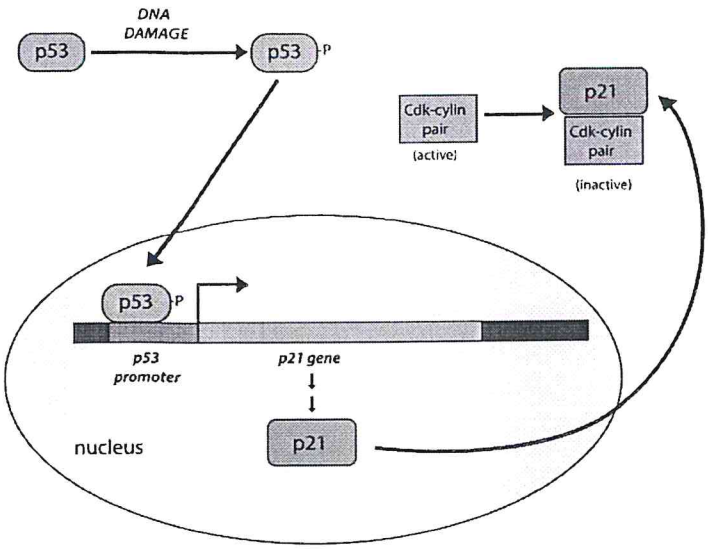


Figure 13-11: Retinoblastoma. Retinoblastoma (Rb) binds to and inhibits the transcription factor E2F.

Another important negative regulator of the cell cycle is the **tumor suppressor p53**. p53 is a multi-functional protein that has a major impact on the commitment of a cell to division because it acts when there is damaged DNA in cells that are undergoing preparatory processes during G_1 (and G_2, to a lesser extent). p53 is a transcription factor that regulates the expression of over 50 genes that control cell cycle arrest, DNA damage repair, and cell death. Additionally, p53 has transcription factor-independent functions in cells. p53 is often referred to as the "guardian of the genome" because of the significant role it plays in regulating the cell cycle.

One example of the actions of p53 occurs at the G_1-S checkpoint (Figure 13-12). In a resting cell, p53 is produced in the cytoplasm and rapidly degraded by the cell. If damaged DNA is detected, p53 is phosphorylated, which stabilizes p53 and prevents its degradation. Phosphorylated p53 translocates to the nucleus where it binds to its promoter to induce the expression of the gene **p21**. p21 is a cyclin inhibitor protein, meaning it can bind to and inhibit the activity of cyclin/Cdk complexes. Inhibition of cyclin/Cdks by p21 causes the cell cycle to arrest. This allows time for repair of DNA damage through the actions of other p53-controlled genes. If the DNA cannot be repaired, p53 can trigger apoptosis to prevent the duplication of damaged chromosomes.

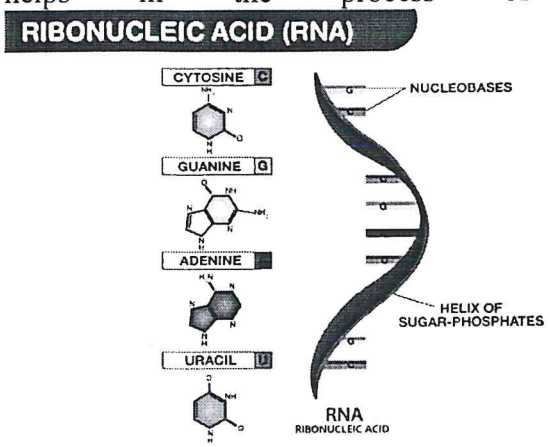


p53 and p21. The tumor suppressor p53 is produced and then rapidly degraded by the cell. In response to DNA damage, p53 is phosphorylated.

13) Summarize RNA. Types, Structure with diagram and its function

Structure of RNA

RNA is a ribonucleic acid that helps in the synthesis of proteins in our body. This nucleic acid is responsible for the production of new cells in the human body. It is usually obtained from the DNA molecule. RNA resembles the same as that of DNA, the only difference being that it has a single strand unlike the DNA which has two strands and it consists of an only single ribose sugar molecule in it. Hence is the name Ribonucleic acid. RNA is also referred to as an enzyme as it helps in the process of chemical reactions in the body.



Basic Structure of RNA

The basic structure of RNA is shown in the figure below- The ribonucleic acid has all the components same to that of the DNA with only 2 main differences within it. RNA has the same nitrogen bases called the adenine, Guanine, Cytosine as that of the DNA except for the Thymine

which is replaced by the uracil. Adenine and uracil are considered as the major building blocks of RNA and both of them form base-pair with the help of 2 hydrogen bonds.

RNA resembles a hairpin structure and like the nucleotides in DNA, nucleotides are formed in this ribonucleic material (RNA). Nucleosides are nothing but the phosphate groups which sometimes also helps in the production of nucleotides in the DNA.

Functions of RNA

The ribonucleic acid – RNA, which are mainly composed of nucleic acids, are involved in a variety of functions within the cell and are found in all living organisms including bacteria, viruses, plants, and animals. These nucleic acid functions as a structural molecule in cell organelles and are also involved in the catalysis of biochemical reactions. The different types of RNA are involved in various cellular process. The primary functions of RNA:

- Facilitate the translation of DNA into proteins
- Functions as an adapter molecule in protein synthesis
- Serves as a messenger between the DNA and the ribosomes.
- They are the carrier of genetic information in all living cells
- Promotes the ribosomes to choose the right amino acid which is required in building up of new proteins in the body.

RNA Types

There are various types of RNA, out which most well-known and most commonly studied in the human body are:

- tRNA – Transfer RNA

The transfer RNA is held responsible for choosing the correct protein or the amino acids required by the body in-turn helping the ribosomes. It is located at the endpoints of each amino acid. This is also called as soluble RNA and it forms a link between the messenger RNA and the amino acid.

- rRNA-Ribosomal RNA

The rRNA is the component of the ribosome and are located within the in the cytoplasm of a cell, where ribosomes are found. In all living cells, the ribosomal RNA plays a fundamental role in the synthesis and translation of mRNA into proteins. The rRNA is mainly composed of cellular RNA and are the most predominant RNA within the cells of all living beings.

- mRNA – Messenger RNA.

This type of RNA functions by transferring the genetic material into the ribosomes and pass the instructions about the type of proteins, required by the body cells. Based on the functions, these types of RNA is called the messenger RNA. Therefore, the mRNA plays a vital role in the process of transcription or during the protein synthesis process.

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Department of Biotechnology

Date : 5-12-2022 **Duration : 1 hour Class :I M.Sc. Biotechnology**
Subject Name & Code: **Molecular Cell Biology**

Section A (5 x 1 = 5)

(Answer any **FIVE** questions)

CO5	BL1	1. Define carcinogens.
CO2	BL2	2. State Replication.
CO2	BL2	3. List out the Post-Translational Modification.
CO3	BL2	4. Sketch the basic structure Nucleus
CO1	BL1	5. Define FRET
CO1	BL1	6. Differentiate between Tight and Gap junctions
CO4	BL1	7. Define MAP Kinase

Section B (2 x 5 = 10)

(Answer any **TWO** questions)

CO4	BL6	8. Write the process of Cell Signalling by JAK-STAT pathway
CO1	BL6	9. Write short notes on Biomembranes-structural organization
CO2	BL2	10. Distinguish between Replication, Transcription and Translation
CO2	BL2	11. Comment on regulation of Vesicular Transport

Section C (1 x 10 = 10)

(Answer any **ONE** question)

CO	BL1	11. Elaborate on Lamp brush chromosome structure
CO2	BL2	12. Summarize on Passive and Active Transport.

(CO: Mark CO/CO2/CO3/CO4/CO5/CO6) (BL: Blooms Taxonomy Level 1/2/3/4/5/6)

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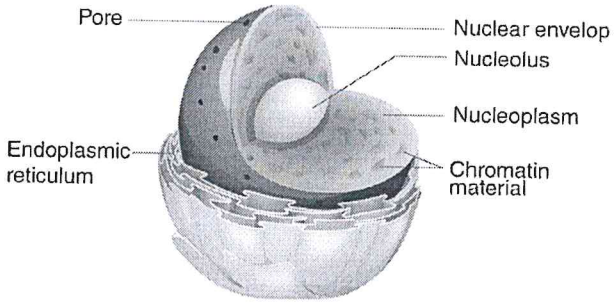
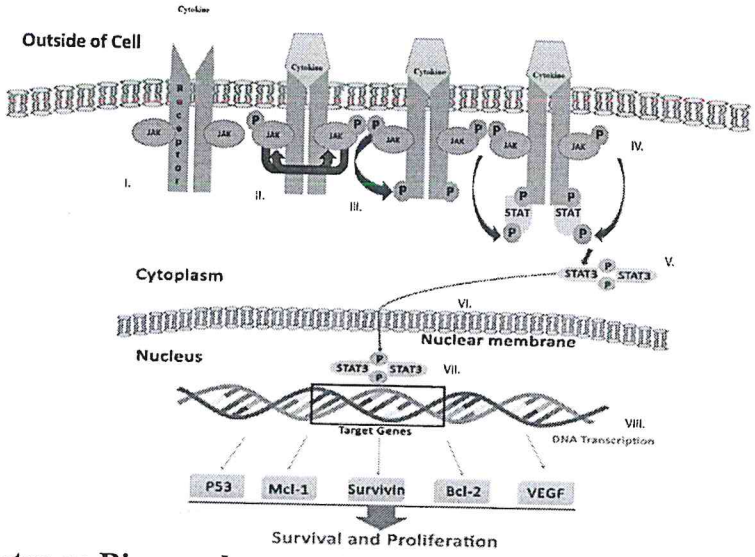
Molecular Cell Biology
Answer Key
Section A

1. **Define Carcinogens**
   Any substance that causes cancer is known as a carcinogen. But simply because a substance has been designated as a carcinogen does not mean that the substance will necessarily cause cancer.
2. **State Replication.**
   DNA replication is the process by which a double-stranded DNA molecule is copied to produce two identical DNA molecules. Replication is an essential process because, whenever a cell divides, the two new daughter cells must contain the same genetic information, or DNA, as the parent cell.
3. **List out the Post-Translational Modification.**
   - Phosphorylation
   - Acetylation
   - Hydroxylation
   - Methylation
   - Glycosylation
   - AMPylation
   - Lipidation
   - Ubiquitination
   - Deamidation
   - Proteolysis
4. **Sketch the basic structure Nucleus**

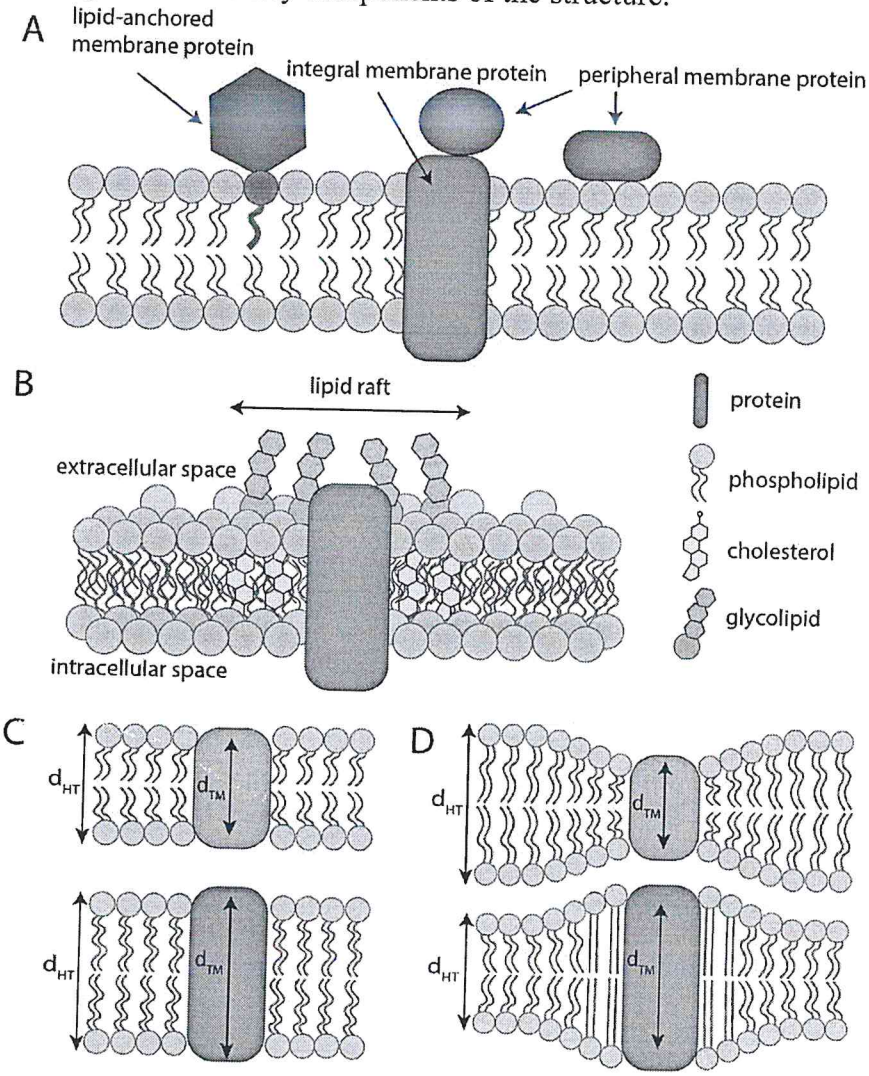


5. **Define FRET**
   Förster resonance energy transfer (FRET), fluorescence resonance energy transfer, resonance energy transfer (RET) or electronic energy transfer (EET) is a mechanism describing energy transfer between two light-sensitive molecules (chromophores)



9. Write short notes on Bio membranes-structural organization

Biological membranes consist of a double sheet (known as a bilayer) of lipid molecules. This structure is generally referred to as the phospholipid bilayer. In addition to the various types of lipids that occur in biological membranes, membrane proteins and sugars are also key components of the structure.

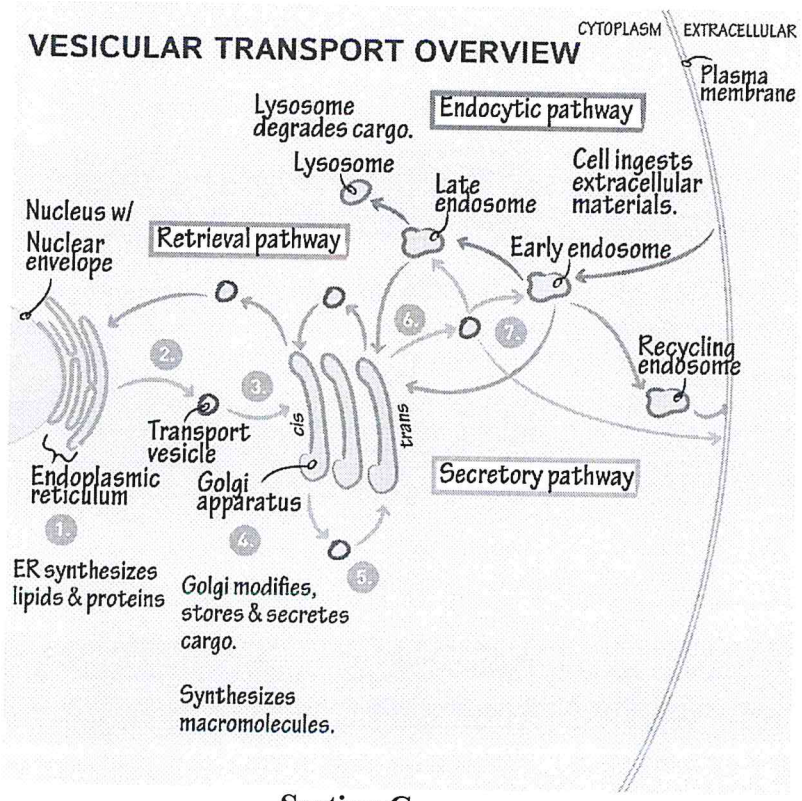


10. Distinguish between Replication, Transcription and Translation

Central Dogma Comparison Table

	Replication	Transcription	Translation
How does the process start?	Origin Recognition Proteins bind at an Origin of Replication and pull the double helix apart, creating the initial bubble. Helicase begins to expand the bubble and primase makes the first primers to initiate daughter strand synthesis.	Transcription starts with the recruitment phase where RNA plymerase is told to bind to the promoter (TATA box), which is a sequence of DNA strands that tell RNA polymerase in which location to begin transcribing (5'->3').	For prokaryotes, translation starts at the AUG next to the Shine-Delgarno sequence, occurs in the cytoplasm. However,in eukaryotes, translation starts at the MET or first 5' AUG and then AUG will go into the P-site, making the initiation complex.
How do bases pair? How is that involved in the process?	Strict base pairing (one pyrmidine, one purine) is used in the process of replication. The pairs consist of G:C, C:G, and T:A, A:T. In DNA replication, two parent strands are demonstrated as an example to be copied or new DNA to be synthesized. Strands are anti-parallel and allow for perfect replication.	Transcription uses strict base pairing when RNA is made using a DNA template. Again, hydrogen bonding causes the DNA and RNA to be antiparallel strands. Pairing is A:U, U:A, C:G, or G:C.	Translation depends on complementary base pairing between codons on mRNA and anticodons on tRNA. Every set of three nucleotides on the mRNA is called a codon and each codon is complementary to an anticodon on the tRNA strand.T is replaced with U (uracil) {G:C, C:G, A:U, U:A}.
What is the Purpose or Function of the process?	The purpose of replication is to copy the genome so the genetic material can be duplicated between cells when a cell divides.	Transcription's sole purpose or function is to is to make a RNA copy of a gene's DNA sequence. This polynucleotide is anti-parallel to the original DNA template.	Translation is the process that uses the information coded in the nucleotide sequences of RNAs to assemble polypeptides.
How is Information represented or used in the process?	The original strand of DNA will serve as a template for the making of complementary daughter strands. The complementary base pairs are made by DNA polymerase as it identifies or reads the nucleotide sequence strands.	Same as replication, transcription uses a parent DNA strand as a template to copy, the specific information is located in the genes that the explain the instructions to synthesize RNA.	The information to make a polypeptide is encoded in the mRNA as three letter codons. tRNAs "read" these codons by anticodon/codon base pairing, bringing the correct amino acid into the ribosome.

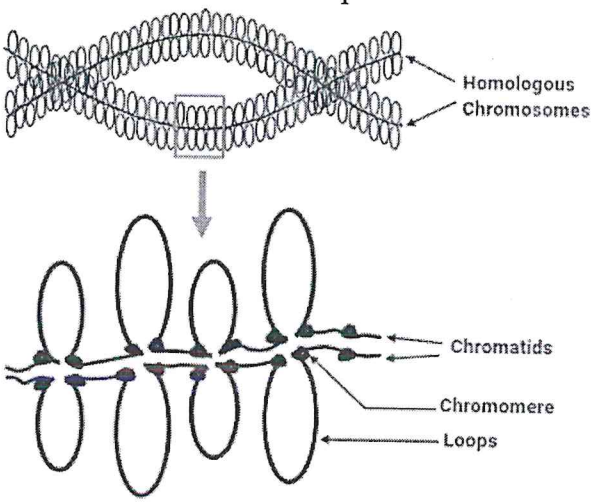
11. Comment on regulation of Vesicular Transport



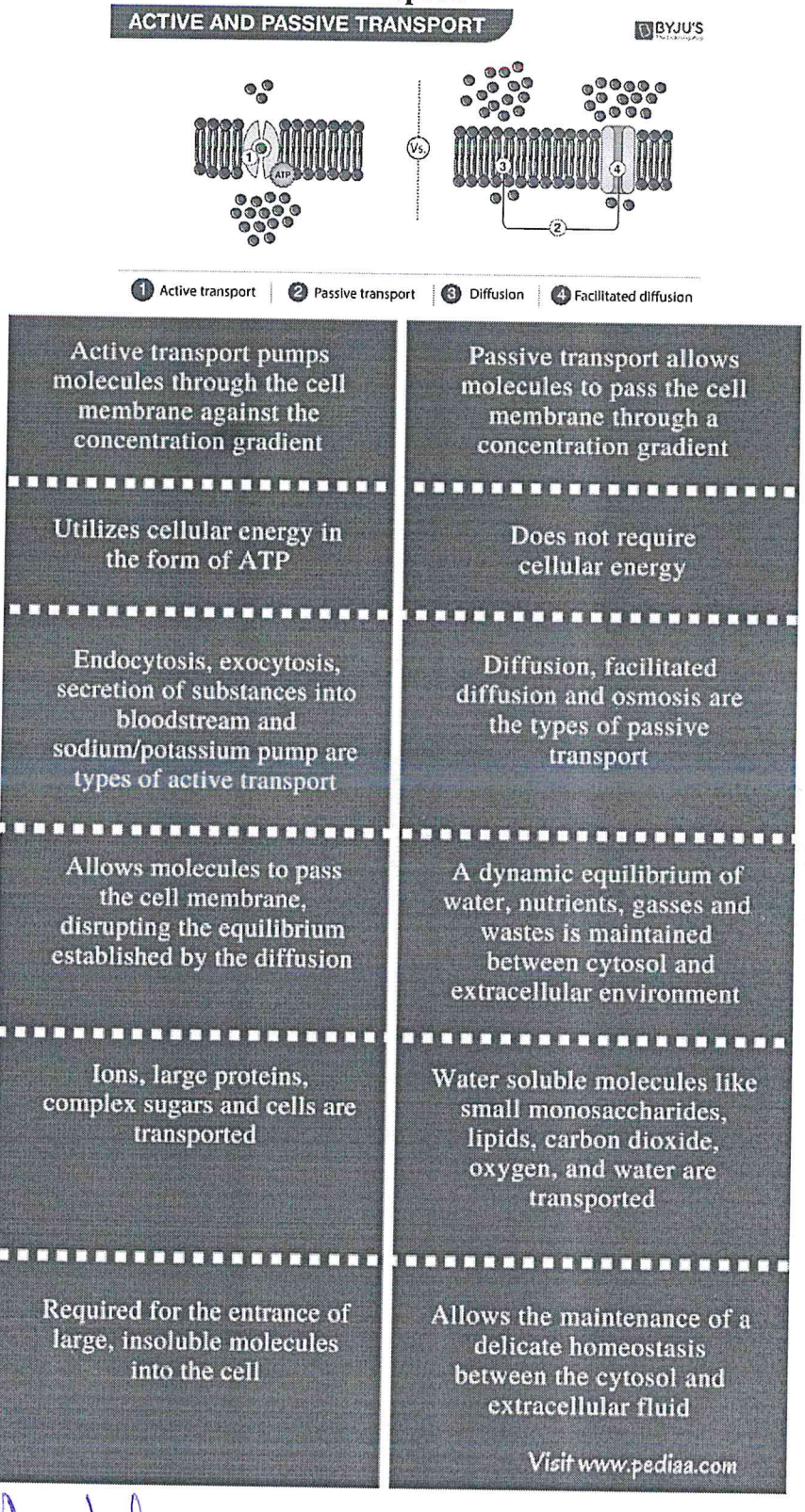
Section C

12. Elaborate on Lamp brush chromosome structure

- Lampbrush chromosomes are a type of chromosome found in the developing oocytes of most animals, with the exception of mammals.
- Walther Flemming and Ruckert were the first to describe them in 1882.
- Lampbrush chromosomes can be found in the nuclei of vertebrates like fish, amphibians, reptiles, and birds' oocytes.
- The chromomeres unfold, forming large lateral loops.Chromosomes appear like a lamp cleaning brush.Hence, the name lampbrush chromosomes.
- The lateral loops are active sites of transcription



13. Summarize on Passive and Active Transport.



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Department of Biotechnology

Date : 04-11-2022 **Duration : 1 hour** **Class :I M.Sc. Biotechnology**
Subject Name & Code: **Bioinstrumentation**

Section A (5 x 1 = 5)
(Answer any **FIVE** questions)

CO 1 BL 1 1. Define Resolving power
CO 1 BL 1 2. Name the mirror used in light microscope
CO 1 BL 1 3. Define refractive index.
CO 6 BL 1 4. Define Absorbance and transmittance
CO 3 BL 1 5. Define chemical shift
CO 4 BL 1 6. Recall main parts of mass spectroscopy
CO 4 BL 1 7. Define mass analyzer

Section B (2 x 5 = 10)
(Answer any **TWO** questions)

CO 1 BL 2 8. Describe in brief the phase contrast microscope
CO 1 BL 2 9. Describe about fluorescence microscope
CO 4 BL 2 10. Illustrate types of mass analyzer
CO 4 BL 1 11. Define applications of Nuclear Magnetic Resonance Spectroscopy

Section C (1 x 10 = 10)
(Answer any **ONE** question)

CO 1 BL 2 12. Explain principle, working mechanism and applications of Scanning electron microscope
CO 4 BL 2 13. Classify principle, instrumentation and applications of Mass Spectrocscopy.

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6. **Differentiate between Tight and Gap junctions**

TIGHT JUNCTION	GAP JUNCTION
A specialized connection of two adjacent animal cell membranes, such that, space usually lying between them is absent	A linkage of two adjacent cells consisting of a system of channels extending across a gap from one cell to the other, allowing the passage
Also known as occluding junctions and zonulae occludentes	Also known as nexus and macula communicans
Occur in the epithelia of vertebrates	Occur in all types of tissues, except in fully-developed skeletal muscles and mobile cells types
Contain plasma membranes, which are very tightly pressed against each other due to bound proteins	Consist of cytoplasmic channels from one to the other cytoplasm, surrounding with membrane proteins
Contain proteins called claudins	Contain proteins called connexins
Regulate the movement of water and solutes between epithelial layers	Allows the direct chemical communication between adjacent cytoplasm
Prevent the leakage of extracellular fluid across the epithelial cell layer	Allow the movement of ions, sugars, amino acids, and other small molecules between cells

Visit www.PEDIAA.com

7. **Define MAP Kinase**

Mitogen-activated protein kinases (MAPKs) are protein Ser/Thr kinases that convert extracellular stimuli into a wide range of cellular responses. MAPKs are among the most ancient signal transduction pathways and are widely used throughout evolution in many physiological processes

Section B

8. **Write the process of Cell Signalling by JAK-STAT pathway**

The JAK-STAT signaling pathway is a chain of interactions between proteins in a cell, and is involved in processes such as immunity, cell division, cell death, and tumour formation. The pathway communicates information from chemical signals outside of a cell to the cell nucleus, resulting in the activation of genes through the process of transcription. There are three key parts of JAK-STAT signalling: Janus kinases (JAKs), signal transducer and activator of transcription proteins (STATs), and receptors (which bind the chemical signals).Disrupted JAK-STAT signalling may lead to a variety of diseases, such as skin conditions, cancers, and disorders affecting the immune system.

SECTION A

CO1 BL1 1. Define resolving power

Formation of distinguished images of objects
Angular distance

CO1 BL1 2. Name the mirror used in light microscope

Concave mirror
Light reflection

CO1 BL1 3. Define refractive index

Ratio of speed of the vaccum, greater density
N = c/v

CO6 BL1 4. Define absorbance and transmittance

Quantity of light absorbed
Quantity of light pass through

CO3 BL1 5. Define chemical shift

Resonant frequency of an atomic nucleus
Standard magnetic field

CO4 BL1 6. Recall main parts of mass spectroscopy

Ion sources
Inlet system
Mass analyzer
Detector

CO4 BL1 7. Define mass analyzer

Takes ionized masses and separates them
Based on charge to mass ratio

SECTION B

CO1 BL2 8. Describe in brief the phase contrast microscope

Conversion of phase shifts in light
Enhances contrast of images of transparent and colorless specimens
Visualization of cells and cell components
Diagrammatic representation of phase contrast microscope
Components (annular disc, phase plate)

CO1 BL2 9. Describe about fluorescence microscope

Wavelength of light absorbed by fluorophores
Light source (xenon arc lamp or mercury-vapor lamp, high power LEDs & lasers)
Excitation filter, dichroic mirror, emission filter
Epifluorescence microscope (fluoropore excitation and fluorescence detection)
Expression of fluorescent protein and autofluorescence

CO4 BL2 10. Illustrate types of mass analyzer

Quadrupole mass analyzer (passing of ions, radiofrequency and voltage complex oscillations)

Time of flight mass analyzer (sorting of ions in absence of magnetic field)
Magnetic sector mass analyzer (beam focusing, ion accelerator, electron trap, ion repeller, filament, gas inflow)
Double focusing (high reproducibility, sensitivity and dynamic range)
Quadrupole ion trap mass analyzers (3-D quadrupole ion traps)
Ion cyclotron resonances (m/z ratios, receiver plate, trap plate, transmitter plate)

CO4 BL1 11. Define applications of Nuclear Magnetic Resonance Spectroscopy

Structure of proteins, amino acids, carotenoids, organic acids, lipid fractions, water mobility
Drug discovery, structural conformation, pharmaceutical effects
TopSpin and MestReNova softwares
Identification of structural isomers
Detection of H-bonding

SECTION C

CO1 BL2 12. Explain principle, working mechanism and applications of Scanning Electron Microscope

Cell surface coated with heavy metal
Emission of electrons
3-D images of exterior cells
Magnification range
Condenser aperture, electron gun, detector, objective aperture, chamber
Diagrammatic representation of SEM
Primary fixation, rinsing, secondary fixation, dehydration, drying, mounting, coating
Characterization of solid materials

CO4 BL2 13. Classify principle, instrumentation and applications of Mass Spectroscopy

Newton's second law of motion and momentum
Mass to charge ratio calculation
Plotting ions of varying masses on a mass spectrum
Sample injection, electron source, electron beam ionization, magnet, magnetic field, detector
Ion sources, accelerator, deflector
Mass analyzer (Time of Flight, Quadrupole, magnetic sector, ion trap, orbitrap, tandem MS)
Types of mass spectrometer (MALDI-TOF, ICP-MS, DART-MS, SIMS)
Applications (elemental and isotopic analysis, organic and bio-organic analysis, structural elucidation, characterization of ionic species and chemical reactions, mass spectral imaging)

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SRM ARTS AND SCIENCE COLLEGE
Department of Biotechnology

Date : 06/12/022 **Duration : 1 hour** **Class :I M.Sc. Biotechnology**
Subject Name & Code: **Bioinstrumentation**

Section A (5 x 1 = 5)
(Answer any **FIVE** questions)

CO 2 BL 1 1. Define pH
CO 2 BL 1 2. Name the types of centrifugation
CO 3 BL 1 3. Define blotting.
CO 4 BL 1 4. Define electrophoresis
CO 3 BL 1 5. Define microarray
CO 4 BL 1 6. Recall main parts of X-ray spectroscopy
CO 2 BL 1 7. Define sedimentation coefficient

Section B (2 x 5 = 10)
(Answer any **TWO** questions)

CO 2 BL 2 8. Describe in brief principle and application of paper chromatography
CO 3 BL 2 9. Describe about SDS PAGE
CO 4 BL 2 10. Illustrate theory and application of UV-Visible Spectroscopy
CO 4 BL 1 11. Define applications of Atomic Absorption Spectroscopy

Section C (1 x 10 = 10)
(Answer any **ONE** question)

CO 2 BL 2 12. Explain principle, working mechanism and applications of gel filtration chromatography
CO 3 BL 2 13. Classify principle, instrumentation and applications of ELISA.

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Section A

1. Define pH
Potential of hydrogen
Specify the acidity or basicity of an aqueous solution

2. Name the types of centrifugation
Separation of molecules – different densities
Rate of centrifugation – revolutions per minute

3. Define blotting.
Identification of specific molecules out of a mixture
Transfer of macromolecules to solid-phase membrane support

4. Define electrophoresis
Separation of DNA, RNA or protein molecules
Based on size and electrical charge

5. Define microarray
A multiplex lab-on-a chip, binding of complementary sequences
Simultaneous detection of thousands of genes from a sample

6. Recall main parts of X-ray spectroscopy
Measurement of transitions from core electronic states to the excited
Characterization of materials using x-ray radiation

7. Define sedimentation coefficient
Characterization of sedimentation during centrifugation
Ratio of particles sedimentation velocity to the applied acceleration ($s=v_t/\alpha$)

Section B

8. Describe in brief principle and application of paper chromatography
Separation of low molecular weight mass compounds
Based on distribution between stationary phase and mobile phase
Paper strips or sheets as the absorbent
Discovered by Martin in the year 1943
Selecting a suitable type of development, suitable filter paper, prepare the sample, spot the sample
Chromatogram development – by immersing in the mobile phase, capillary action is performed

9. Describe about SDS PAGE

A discontinuous electrophoretic system developed by Ulrich K. Laemmli
Separation of proteins with molecular masses between 5 and 250 kDa
Charges molecule separates depending upon the mobility of the charged species
Smaller molecules migrate faster due to less resistance during electrophoresis
SDS unfolds both soluble and insoluble membrane proteins and coats them with negative charges
Diagrammatic representation of SDS-PAGE setup

10. Illustrate theory and application of UV-Visible Spectroscopy

Light absorbed by the matter resulting in an increase in the energy content of the atoms or molecules
Absorption of Ultraviolet radiations results in excitation of electrons from the ground state
More easily the excited electrons the longer the wavelength of light they can absorb
Four possible types of transitions occurs
Diagrammatic representation of UV Vis spectroscopy
Tungsten filament lamp as a source, monochromator, sample and reference cells, detector, amplifier, recording devices

11. Define applications of Atomic Absorption Spectroscopy

Detection of metals within a sample
Utilized in pharmacology, archaeology, manufacturing, mining, and forensics
Relatively inexpensive to use
Determines the composition and concentration of regulated metals in environmental samples
High sensitivity and high accuracy
Determination of trace elements in artificial fibres
In pharmaceutical industry to determine if a metal catalyst after a drug has been purified

Section C

12. Explain principle, working mechanism and applications of gel filtration chromatography

Also known as size exclusion chromatography
Stationary phase is a porous matrix and the mobile phase is the buffer that flows in between the matrix
Small molecules migrate deep into the pores and will be retarded more than larger molecules
Used to separate compounds such as small molecules, proteins, protein complexes, polysaccharides and nucleic acids
Size analysis and determination

Removal of large protein molecules and complexes
Assessment of sample purity
Separation of bound from unbound isotopes

13. Classify principle, instrumentation and applications of ELISA.

Detection and quantification of peptides, proteins, antibodies and hormones
Enzyme conjugated with the antibody reacts with colorless substrate, generate colored product called chromogenic substrate
Sensitivity of detection depends upon the amplification of signal during the analytic reaction
Optical density vs concentration curve is prepared
Types of ELISA: direct ELISA, indirect ELISA, sandwich ELISA and competitive ELISA
Detection of Ebola, pernicious anaemia, AIDS, rotavirus, syphilis, lyme disease, zika virus, carcinoma of the epithelial cells

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Department of Biotechnology

Date: 12.09.2022 **Duration: 1 hour** **Class:**II MSC
Subject Name &Code:Bioinformatics MDK3A

Section A (5 x 1 = 5)

(Answer any **FIVE** questions)

CO1BL1 1. Define FASTA sequence
CO1BL2 2. Explain the term Genomics
CO1 BL13.Identify any two types of molecular visualization tools
CO5 BL1 4.State what is meant by a lead compound?
CO1BL15.Recall the expansion of DDBJ and PDB
CO1 BL6 6.Write the expansion of BLAST
CO5 BL17.Tell what is QSAR?

Section B (2 x 5 = 10)

(Answer any **TWO** questions)

CO5 BL6 8.Write in detail about the different stages of drug discovery
CO1 BL2 9.Explain in detail about Dot-plot matrix method
CO1BL6 10.Write in detail about BLAST tool
CO1 BL211.Describeabout the protein visualization tools

Section C (1 x10 = 10)

(Answer any **ONE** question)

CO5 BL212. Summarize the applications of bioinformatics in medicine
CO1BL313. Give a sketch of the different databases available in bioinformatics

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Answer key

SECTION A

1. **Define FASTA sequences.**

   FASTA -Flat File Sequence Format

   Uses parson and Lipman algorithm

   We can use it to search similarity between 2 sequences and also any gap of sequence of same type as the query sequence.

2. **Define the term genomics.**

   It is the branch of molecular biology concerned with the structure, function, evolution and mapping of genomes. It is the study of all the genes of a person

3. **Identify any 2 types of molecular visualization tools.**

   RASMOL, CHIMERA

4. **State what is meant by a lead compound.**

   It is a compound for which the chemical structure has been identified and which exhibit promising pharmacological activity on selected targets.

5. **Recall the expansion of DDBJ and PDB.**

   DDBJ- DNA Data Bank of Japan

   PDB- Protein Data Bank

6. **Write the expansion of BLAST.**

   Basic Local Alignment Search Tool

7. **Tell what is QSAR.**

   Quantitative Structure Activity Relationship.

It is used for known ligand. This study established a link between the ability of a certain molecules to perform desired function and properties of that molecule.

SECTION B

8. Write in detail about the different stages of drug discovery.

Drug discovery involves four major stages

a) Early drug discovery- Researchers collaborate to identify and optimize potential leads to a specific target. The leads must elicit a desirable effect on a specific biological target implicated in a disease, to treat it. This stage has Target identification and validation, lead generation and optimization.

b) Pre- clinical phase- the substances identified during early drug discovery are refined, optimized and extensively tested in a laboratory and in animal or alternative models.

c) Clinical phases- It involves phases 1, 2 3, 4.

d) Regulatory approval- the drug analyzed is submitted to the appropriate authorities for review. Before a drug or vaccine can be sold.

9. Explain in detail about Dot- plot matrix method.

It is a graphical method used to compare 2 biological sequences and identifying regions of close similarity after sequence alignment. It is a type of recurrence plot. It is used to study evolutionary relationship. It uses two software,

Dotlet- Dotlet is a free online software used as a tool for diagonal plotting of sequences.

Dotplot(+)-Dot-plot (+) software is used to identify the overlapping portions of two sequences and to identify the repeats and inverted repeats of a particular sequence.

10. Write in detail about BLAST tool.

- The Basic Local Alignment Search Tool (BLAST) finds regions of local similarity between sequences. The program compares nucleotide or protein sequences to sequence databases and calculates the statistical significance of matches.
- BLAST can be used to infer functional and evolutionary relationships between sequences as well as help identify members of gene families.
- Types of BLAST:

  Nucleotide BLAST- compares nucleotide to nucleotide

BLASTx- Translated nucleotide to proteins

tBLASTn- Protein to translated nucleotide

Protein BLAST- Protein to Protein

- E-value = number of alignments expected by chance with a particular score or better
- The lower the E value, the more significant the score is.

  The E-value is dependent on the length of the query sequence and the size of the database

11. Describe about protein visualization tools.

Molecular visualization is fundamental in the current scientific literature, textbooks and dissemination materials. It provides an essential support for presenting results, reasoning on and formulating hypotheses related to molecular structure. Tools for visual exploration of structural data have become easily accessible on a broad variety of platforms thanks to advanced software tools that render a great service to the scientific community.

RasMol is a computer program written for molecular graphics visualization intended and used mainly to depict and explore biological macromolecule structures, such as those found in the Protein Data Bank.

Chimera is a program for the interactive visualization and analysis of molecular structures and related data, including density maps, trajectories, and sequence alignments.

SECTION C

12. Summarize the applications of bioinformatics in medicine.

Bioinformatics has various applications in medicine ranging from research in genes, drugs to prevention. Let's take a look at the applications of bioinformatics in medicine:

- **Pharmaceuticals:** Bioinformatics researchers have played a quintessential role in pharmaceutical research especially for infectious diseases. Moreover, bioinformatics has also innovated personalized medicine research thus bringing new discoveries in terms of drugs that can be personalized to someone's genetic pattern.

- **Prevention:** Just like pharmaceuticals, bioinformatics can be combined with epidemiology to create preventive medicine by understanding causes of health issues, community healthcare infrastructure, disease patterns, etc.
- **Therapy:** Bioinformatics can also be useful for gene therapy especially for individual genes that have been adversely affected. This application of bioinformatics has been researched by genetics scientists who have found that someone's genetic profile can be better with the help of bioinformatics.
- Bioinformatics is a blend of Computer Science, Statistics, and Biology and is used in various fields from veterinary science to crop improvement. Let us explore some of the uses of bioinformatics in-depth in different fields:
- Drug discovery is one of the main applications of Bioinformatics. **Computational biology**, an essential element of bioinformatics help scientists to analyze the disease mechanism process and validate new and cost-effective drugs.
- The course of research in Veterinary Science has achieved an advanced level with the help of Bioinformatics. In this field, the application of Bioinformatics ranges specifically focuses on sequencing projects of animals including cows, pigs, and sheep. This has led to the development in overall production as well as the health of livestock. Moreover, Bioinformatics has helped scientists to discover new tools for the identification of vaccine targets.
- Gene Therapy is a process through which genetic materials are incorporated into unhealthy cells in order to treat, cure as well as prevent diseases. Analyzing protein targets, identifying cancer types, evaluating data, assessing MicroRNA, etc are some of the applications of Bioinformatics in Gene Therapy.

13. Give a sketch of the different databases available in bioinformatics.

There are a small number of bioinformatics centers of excellence worldwide that have taken on the responsibility to collect, catalogue and provide open access to published biological data-available as database.

The EMBL-European Bioinformatics Institute (EMBL-EBI)

The US National Center for Biotechnology Information (NCBI)

The National Institute of Genetics in Japan (NIG)

8/9/2022

Primary databases are populated with experimentally derived data such as nucleotide sequence, protein sequence or macromolecular structure. Experimental results are submitted directly into the database by researchers, and the data are essentially archival in nature. Once given a database accession number, the data in primary databases are never changed: they form part of the scientific record.

Secondary database comprise data derived from the results of analyzing primary data, often referred to as curated databases

They are highly curated, often using a complex combination of computational algorithms and manual analysis

Hybrid Database - Many data resources have both primary and secondary characteristics.

For example, UniProt accepts primary sequences derived from peptide sequencing experiments. However, UniProt also infers peptide sequences from genomic information

Some databases have different 'branches' for primary and secondary data.

ArrayExpress suite of data resources: ArrayExpress contains experimentally-derived functional genomics data whereas the Expression Atlas uses a subset of high-quality data from the ArrayExpress to derive knowledge about gene expression patterns under different conditions.

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UNIT TEST II

Date : 31-10-2022 **Duration : 1 hour Class :II M.Sc. Biotechnology**

Subject Name & Code: **Bioinformatics & MDK3A**

Section A (5 x 1 = 5)
(Answer any FIVE questions)

CO3 BL1. 1. Define unrooted tree

CO5 BL2. 2. Explain RASMOL

CO3 BL1. 3. Identify the softwares used in multiple sequence alignment

CO5 BL1. 4. Define computer pI/Mw

CO1 BL1. 5. Recall the term SCOP and CATH

CO3 BL6. 6. Write the expansion of PHYLIP

CO5 BL1. 7. Tell what is peptide mass

Section B (2 x 5 = 10)
(Answer any TWO questions)

CO3 BL6. 8. Write in detail about Multiple Sequence alignment
CO5 BL2. 9. Describe about PROSITE
CO5 BL2. 10. Discuss about Protein structure prediction
CO3 BL3. 11. Summarize in detail about phylogenetic tree and the methods to construct a phylogenetic tree

Section C (1 x 10 = 10)
(Answer any ONE question)

CO3 BL6. 12. Write in detail about Multiple Sequence alignment
CO5 BL2. 13. Discuss about Protein structure prediction

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2022-2023
UNIT TEST II

Subject & Code: Bioinformatics& MDK3A

Section A

CO3 BL1. 1. Define unrooted tree

An unrooted phylogenetic tree is a phylogenetic diagram which lacks a common ancestor or a basal node. This type of a tree does not indicate the origin of evolution of the groups of interest. It depicts only the relationship between organisms irrespective of the direction of the evolutionary time line.

CO5 BL2. 2. Explain RASMOL

RasMol stands as Raster display of Molecules. It is a free software for visualizing molecular structures that can be run on Windows-based, Maccintosh or Unix PCs. With it one can view the three dimensional structures of many types of molecules including proteins and nucleic acids.

CO3 BL1. 3. Identify the softwares used in multiple sequence alignment

- One package usually employed is MEGA.MEGA is a multiplatform software focused on phylogenetic analyses.
- Jaalview and STRAP a multiple alignment editor and view.

CO5 BL1. 4. Define computer pI/Mw

Computer pI/Mw is a tool that calculates the isoelectric point and molecular weight of an input sequence. The sequence can be input in the FASTA format, the output is the pI and molecular weight for the entire length of the sequence. The pI/Mw for the protein sequence represented by Swissprot entry ID.

CO1 BL1. 5. Recall the term SCOP and CATH

Protein can be assigned to broadstructural classes based on secondary structure content.

CATH – Class Architecture Topology Homologous super family.
SCOP – Structural Classification Of Protein. CATH has 4 broad classes
CATH has 4 broad classes but SCOP uses more detailed description of structural classes. CATH was using 4 classes reflecting secondary structure content. SCOP on other hand has more divisions separating out more small groups like membrane and coiled proteins.

CO3 BL6. 6. Write the expansion of PHYLIP

PHYLIP-(the phylogeny inference package) is a package of programs for inferring phylogenies (evolutionary trees). It is most widely-distributed phylogeny package.

CO5 BL1. 7. Tell what is peptide mass

Peptide mass fingerprinting is a high throughput protein identification technique in which an unknown protein is digested with endoprotease to yield the constituent small peptides. The accurate mass of these peptides is determined by MS analysis. This gives the peak list of peptides of the unknown protein.

SECTION B

CO3 BL6. 8. Write in detail about Multiple Sequence alignment

Multiple sequence alignment is a alignment more than 2 sequence. We could aligned several DNA or protein sequence.

USES OF MSA:

- Phylogenetic analysis
- Conserved domains
- Protein structure comparison and prediction
- Conserved regions in promoters

The multiple sequence alignment assumes that the sequences are homologous, they descend from a common ancestor. The algorithms will try to align homologous positions or regions with the same structure or function.

Multiple alignment are much more difficult that pair wise alignments. The memory and time required for solving the alignment problem would increase geometrically with the length of every sequence. When we use a multiple dimensional matrix. We can solve this problem but the result might not be optimal.

Usually the multiple sequence algorthims assume that the sequences are similar in all its length and they behave like global alignment algorithms. They also assume that there are not many insertions and deletions. The algorthim will work for some sequence but not for other.

PROGRESSIVE CONSTRUCTION ALGORITHMS:

In MSA, it is quite common that the algorithms use a progressive alignment strategy. These methods are fast and allow to align 1000s of sequence.

Before starting the alignment, as in the pair-wise case, we have to decide which is the scoring schema that we are going to use for the matches, gaps and gap extensions.

The aim of the alignment would be to get the MSA with the highest score possible.

The idea behind progressive constructed algorithm is to build the pair-wise alignment of the more closely related sequence and then align the distant ones.

So, the first step in the algorithm is to create all the pairewise alignments and to create a matrix with the scores between the pairs.

Once we have the matrix we can determine the hierarchial relation. We use different fast algorithm like UPGMA or neighbour joining method that help in deciding the hierarchy. They are known as guide trees.

The disadvantage of progressive alignment algorithm is that errors introduced at any point are not revised in the subsequent steps.

TOOLS USED IN MSA:

- CLUSTALW
- MAFFT
- T-Coffee
- Clustal Omega
- Muscle

SOFTWARE FOR MSA:

One package usually employed is MEGA it focuses on phylogenetic analysis.
Jalview and STRAP a multiple alignment editor and viewer.

CO5 BL2. 9. Describe about PROSITE

It is a database of protein families and domains. It is a method of determining what is the function of uncharacterized proteins translated from genomic or cDNA sequences. It consists of a database of biologically significant sites and patterns formulated in such a way that with appropriate computational tools it can rapidly and reliably identify which known family of protein the new sequence belongs to.

It consists of entries describing the domains, families and functional sites as well as amino acid patterns, signatures, and profiles in them. These are manually curated by a team of the Swiss Institute of Bioinformatics and tightly integrated into Swiss-Prot protein annotation. PROSITE was created in 1988 by Amos Bairoch. It is the sequence pattern database that primarily uses a single consensus pattern or sequence signature to characterize a protein function and a sequence family.

The PROSITE database is based on Swiss Prot to annotate domains with the help of ProRule, which provides functional annotation associated with a specific domain in a UniProtKB/Swiss-Prot format. Among the 983 different types of (DNA-binding) domain, repeat or zinc finger found in UniProtKB/Swiss-Prot, 696 (~70%) are annotated with the help of PROSITE descriptors using information from ProRule. The usage of PROSITE and ProRule during the annotation process facilitates the transfer of the positions of biologically meaningful sites, such as active or binding sites and disulfide bonds, and ensures that all useful information that can be associated with a domain will be added to UniProtKB/Swiss-Prot entries.

Characterization of protein families is done by the single most conserved motif observed in a multiple sequence alignment of known homologous. These conserved motifs are usually related to biological functions such as active sites or binding sites.

The search in Prosite does not require an exact match in structure. Prosite enable searches using complex patterns. It is possible to search textually using regular expressions (often simply referred to as patterns) for names of known proteins. It is also possible to scan a protein sequence using PROSITE for structural pattern matches. Results are checked manually to determine how well the patterns have performed; ideally, there should be only correct matches (so called true-positives), no incorrect matches (false-positives).

The major problem with the PROSITE patterns is that some of the sequence patterns are too short to be specific and database is relatively small and motif searches often yield no results

when there are true motif matches present. PROSITE is a database of protein domains that can be searched by either regular expression patterns or sequence profiles.

STRUCTURE OF PROSITE ENTRIES

Prosite entries are deposited in two distinct files. The first file contains the pattern and lists of all matches in the pattern version of Swiss-Prot. The second is a documentation file that provides details of the characterized family and a description of the biological role of the chosen motif(s) and a supporting bibliography. In the data file, each entry contains both an identifier (ID), which is an acronym for the family, and an accession number (AC). The word PATTERN tells us to expect a regular expression. A title, or description of the family, is contained in the DE line, and the pattern itself resides on PA lines. The NR line provides details about the derivation and diagnostic performance of diagnostic power of the pattern.

CO5 BL2. 10. Discuss about Protein structure prediction

PROTEIN STRUCTURE

- drug design,
- medicinal application
- bio-industrial applications

Proteins are one of the important fundamental units of living cells. Proteins have a wide range of functions such as DNA replication, catalysis of metabolic reactions and transportation of molecules from one location to another. Proteins differ from one another in their structure, primarily in the sequence of amino acids. The structure explains the different levels of organization of a protein molecule. The protein structure is classified into primary, secondary, tertiary and quaternary. The linear sequence the polypeptide chain of amino acids refers to the primary structure of proteins. The intermolecular and intramolecular hydrogen bonding between the amide groups in primary structure of protein from secondary structure. Alpha helices and beta sheets are the two important secondary structure of protein. The three dimensional structure of a single protein molecule refers to the tertiary structure. The quaternary structure is formed by several protein molecules or polypeptide chains.

The primary structure of protein is based on the simple linear arrangement of amino acid residue sequences.

The secondary protein structure is generally based on the binding pattern of the amino hydrogen and carboxyl oxygen atoms between amino acid sequences throughout the peptide backbone . There are two kinds of protein secondary structure, and those are alpha helices and beta strands.

The tertiary structure is about the three-dimensional structure of monomeric and multimeric molecules. In this structure, alpha helix and beta strands formed a globular structure together.

The folding structure of this kind of protein is initiated by the hydrophobic bond, di-sulphide bond, salt bridge and also H-bond.

The quaternary structure is built up through dimeric and/or multimeric molecules stabilized by the non-covalent bonds.

The structural annotation of a protein is key understanding towards the function of a protein.

Recently, a number of techniques have been developed to determine the threedimensional structure of protein, namely electron microscopy, spectroscopy, X-ray crystallography and nuclear magnetic resonance (NMR).

COMPUTATIONAL STRATERGIES

- Homology modelling techniques or comparative techniques
- Protein threading or protein fold recognition
- Ab initio or de novo techniques.

HOMOLOGY MODELLING

- template selection
- amino acid sequence alignment between template and target protein
- alignment correction and model backbone construction;
- side chain generation and optimization
- overall model optimization, assessment and verification.

PROTEIN THREADING

- Protein threading specifically targets the protein with same fold level that means it aligns the sequence to the template structure while homology modelling is for comparatively easier target which aligns the sequence to the template sequence only .
- There are specific interactions between the amino acid sequences that affect the protein folding like hydrogen bond, hydrophobic bond, Van der Waals interaction, electrostatic force.

STEPS INVOLVED

1. Library of core fold templates which represents the template structures (protein data bank database).
2. The compatibility between the aligned amino acid sequences and template fold including the compatibility evaluation.
3. Search for the best option to optimize the target sequence and the template structure alignment.
4. Evaluate the best match based on statistical significance.

ABINITIO MODELING

- But if homologs do not exist in the resource or existing homologs cannot be identified, then another way out must be found.
- In this case, ab initio modeling has been found.
- It is used to predict comparatively complex protein structure such as tertiary structure .
- This method requires a large number of computational resources to predict the structure of complex one.
- In this modelling, a conformational search has been done based on the designed energy function which generates possible compatible conformations (decoy structure) and the most suitable one should be picked up
- Ab initio modelling generally depends on three key factors, those are as follows: energy function design, conformational search engine and model selection strategy
- Protein Structure - popular computational methods which are good in search of conformational space those are Monte Carlo (MC) and molecular dynamics (MD). MC and MD both need large computational resources

- MD simulation is being used to understand the movement of atoms of protein

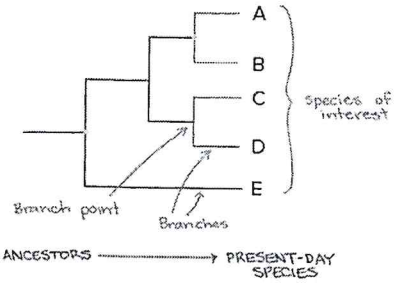
CONCLUSION

- structure prediction- fills the gap between sequences and available protein structures
- development of proteomics
- Scope for future development- make more progress in development of remote sequence detection as well as the accurate identification of novel protein sequences .

CO3 BL3. 11. Summarize in detail about phylogenetic tree and the methods to construct a phylogenetic tree

- Phylogenetics is the study of genetic relatedness of individuals of the same, or different, species.
- Through phylogenetics, evolutionary relationships can be inferred.
- A phylogenetic tree may be rooted or unrooted, depending on whether the ancestral root is known or unknown, respectively.
- A phylogenetic tree's root is the origin of evolution of the individuals studied.
- Branches between leaves show the evolutionary relationships between sequences, individuals, or species, and branch length represents evolutionary time.
- When constructing and analyzing phylogenetic trees, it is important to remember that the resulting tree is simply an estimate and is unlikely to represent the true evolutionary tree of life.
- Various methods can be used to construct a phylogenetic tree. The two most commonly used and most robust approaches are maximum likelihood and Bayesian methods.

ANATOMY OF THE PHYLOGENETIC TREE



DISTANCE-MATRIX METHODS

- Distance-matrix methods are rapid approaches that measure the genetic distances between sequences.
- After having aligned the sequences through multiple sequence alignment, the proportion of mismatched positions is calculated.
- From this, a matrix is constructed that describes the genetic distance between each sequence pair.
- In the resulting phylogenetic tree, closely-related sequences are found under the same interior node, and the branch lengths represent the observed genetic distances between sequences.

TYPES OF DISTANCE-MATRIX METHODS

- Neighbor joining (NJ), and Unweighted Pair Group Method with Arithmetic Mean (UPGMA) are two distance-matrix methods.
- NJ and UPGMA produce unrooted and rooted trees, respectively.
- NJ is a bottom-up clustering algorithm.
- Advantages-NJ are its rapid speed, regardless of dataset size, and that it does not assume an equal rate of evolution amongst all lineages.
- Despite this, NJ only generates one phylogenetic tree, even when there are several possibilities.
- UPGMA is an unweighted method, meaning that each genetic distance contributes equally to the overall average.
- UPGMA is not a particularly popular method as it makes various assumptions, including the assumption that the evolutionary rate is equal for all lineages.

MAXIMUM PARSIMONY

- Maximum parsimony attempts to reduce branch length by minimizing the number of evolutionary changes required between sequences.
- The optimal tree would be the shortest tree with the fewest mutations.
- All potential trees are evaluated, and the tree with the least amount of homoplasy, or convergent evolution, is selected as the most likely tree.
- Since the most-parsimonious tree is always the shortest tree, it may not necessarily best represent the evolutionary changes that have occurred.
- Also, maximum parsimony is not statistically consistent, leading to issues when drawing conclusions.

MAXIMUM LIKELIHOOD

- Despite being slow and computationally expensive, maximum likelihood is the most commonly used phylogenetic method used in research papers, and it is ideal for phylogeny construction from sequence data
- Maximum likelihood is based on the concept that each nucleotide site evolves independently, enabling phylogenetic relationships to be analyzed at each site.
- The maximum likelihood method can be carried out in a reasonable amount of time for four sequences.
- If more than four sequences are to be analyzed, then basic trees are constructed for the initial four sequences, and further sequences are subsequently added, and maximum likelihood is recalculated.

BAYESIAN INFERENCE

- Bayesian inference methods assume phylogeny by using posterior probabilities of phylogenetic trees.
- A posterior probability is generated for each tree by combining its prior probability with the likelihood of the data.
- A phylogeny is best represented by the tree with the highest posterior probability.
- Not only does Bayesian inference produce results that can be easily interpreted; it can also incorporate prior information and complex models of evolution into the analysis, as well as accounting for phylogenetic uncertainty.

SECTION C

CO3 BL6. 12. Write in detail about Multiple Sequence alignment

Multiple sequence alignment is a alignment more than 2 sequence. We could aligned several DNA or protein sequence.

USES OF MSA:

- Phylogenetic analysis
- Conserved domains
- Protein structure comparison and prediction
- Conserved regions in promoters

The multiple sequence alignment assumes that the sequences are homologous, they descend from a common ancestor. The algorithms will try to align homologous positions or regions with the same structure or function.

Multiple alignment are much more difficult that pair wise alignments. The memory and time required for solving the alignment problem would increase geometrically with the length of every sequence. When we use a multiple dimensional matrix. We can solve this problem but the result might not be optimal.

Usually the multiple sequence algorthims assume that the sequences are similar in all its length and they behave like global alignment algorithms. They also assume that there are not many insertions and deletions. The algorthim will work for some sequence but not for other.

PROGRESSIVE CONSTRUCTION ALGORITHMS:

In MSA, it is quite common that the algorithms use a progressive alignment strategy. These methods are fast and allow to align 1000s of sequence.

Before starting the alignment, as in the pair-wise case, we have to decide which is the scoring schema that we are going to use for the matches, gaps and gap extensions.

The aim of the alignment would be to get the MSA with the highest score possible.

The idea behind progressive constructed algorithm is to build the pair-wise alignment of the more closely related sequence and then align the distant ones.

So, the first step in the algorithm is to create all the pairewise alignments and to create a matrix with the scores between the pairs.

Once we have the matrix we can determine the hierarchial relation. We use different fast algorithm like UPGMA or neighbour joining method that help in deciding the hierarchy. They are known as guide trees.

The disadvantage of progressive alignment algorithm is that errors introduced at any point are not revised in the subsequent steps.

TOOLS USED IN MSA:

- CLUSTALW
- MAFFT
- T-Coffee
- Clustal Omega
- Muscle

SOFTWARE FOR MSA:

One package usually employed is MEGA it focuses on phylogenetic analysis.
Jalview and STRAP a multiple alignment editor and viewer.

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Department of Biotechnology

UNIT TEST 1 (ODD SEMSTER)

ACADEMIC YEAR 2022-2023

Date : 13-09-2022 **Duration : 1 hour** **Class : II M.Sc. Biotechnology**

Subject Name & Code : **Immunology, MDK3B**

Section A (5 x 1 = 5 marks)

(Answer any **FIVE** questions)

CO2	BL1	1.Define Antigen
CO2	BL1	2. Define Haptens
CO3	BL1	3. Define Antibody
CO1	BL1	4. Name the NK cell
CO3	BL1	5. Define the paratope
CO2	BL1	6. Identify APC
CO1	BL1	7. Define immunity

Section B (2 x 5 = 10 marks)

(Answer any **TWO** questions)

CO2	BL2	8. Discuss the functions of macrophage with diagram
CO2	BL2	9. Discuss the Dendritic cells, Basophils and Neutrophils
CO3	BL6	10. Write the applications of monoclonal antibodies
CO1	BL2	11. Discuss the types of immunity

Section C (1 x 10 = 10 marks)

(Answer any **ONE** question)

CO2	BL2	11. Explain the T cell and B cell development
CO3	BL2	12. Explain the monoclonal antibody production.

(CO: Mark CO/CO2/CO3/CO4/CO5/CO6) (BL: Blooms Taxonomy Level 1/2/3/4/5/6)

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Answer key

SECTION A

1. Define Antigen

   Molecular structure of any foreign particle, Stimulates an immune response, bind to a Specific Antibody.

2. Define Haptens

   A small molecule combined with a larger carrier protein, elicit the production of antibodies

3. Define Antibody

   Large, Y-shaped protein to identify and neutralize the pathogen, glycoproteins produced by B-cells.

4. Name the NK cell

   Natural Killer cell, NK-LGL (Natural Killer – Large Granular Lymphocytes), identify tumor cells and virus infected cells and kills them.

5. Define Paratope

   Antigen binding site, small region of the antibody which recognize and bind to an antigen, contains parts of antibody's heavy and light chains.

6. Identify APC

   Antigen Processing and Presenting Cells, Macrophage, Dendritic cells, B cells.

7. Define Immunity

   Resistance acquired towards injury caused by microorganism and their products.

SECTION B

8. Discuss the functions of macrophage with diagram
   - Definition
   - Diagram
   - Phagocytosis
   - Antigen processing and presentation (APC)
   - Secretion of factors

9. Discuss the Dendritic cells, Basophils and Neutrophils

- Myeloid cells
- Definition for dendritic cells , basophils and neutrophils
- Diagram
- Activation and Functions

10. Write the applications of monoclonal antibodies

- Serological
- Diagnosis
- Therapeutic
- Immuno purification
- Protein purification
- Miscellaneous applications

11. Discuss the types of Immunity

- Definition
- Innate immunity – inborn
- Acquired immunity -Passive and Active- naturally and artificially acquired.

SECTION C

12. Explain the T cell and B cell development

- T cell and B cell definition
- Developmental Stages (flow chart)
- Surface markers
- B cells – Bone marrow, B cells proliferation, B cells maturation, Primary and Secondary immune response
- T cells - Bone marrow, T cell proliferation, Cell mediated immunity

13. . Explain the Monoclonal antibody production

- Monoclonal antibody explanation
- Fusion of Immunization mouse with antigen (antigen antibody forming cells)and myeloma cells with PEG
- HAT selection medium
- Screening culture

- Cloning hybridoma cells
- Freezing and expand for bulk production
- Purification of monoclonal antibody

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DEPARTMENT OF BIOTECHNOLOGY
Unit test II

Date : 01-11-2022 **Duration : 1 hour** **Class : II M.Sc. Biotechnology**
Subject Name & Code : **Immunology, MDK3B**

Section A (5 x 1 = 5 marks)

(Answer any **FIVE** questions)

CO2 BL1 1.Define MALT, GALT
CO4 BL1 2. Name the complement proteins
CO4 BL1 3. Define Active and passive immunity
CO3 BL1 4. Define Vaccines
CO1 BL1 5. Define lymphnode
CO4 BL1 6. Identify ADCC cells
CO1 BL1 7. Define Hematopoiesis

Section B (2 x 5 = 10 marks)

(Answer any **TWO** questions)

CO1 BL2 8. Discuss about the spleen with diagram
CO1 BL2 9. Decribe about Thymus with diagram
CO4 BL6 10. Write about sensitization and effector phase of type 1V hypersensitivity.
CO1 BL2 11. Discuss about innate immunity

Section C (1 x 10 = 10 marks)

(Answer any **ONE** question)

CO1 BL2 11. Explain the humoral mediated immune response with neat diagram.
CO4 BL2 12. Explain the type 1 hypersensitivity reaction with neat diagram.

(CO: Mark CO/CO2/CO3/CO4/CO5/CO6) (BL: Blooms Taxonomy Level 1/2/3/4/5/6)

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Department of Biotechnology
Unit test II

Date : 01-11-2022 **Duration : 1 hour** **Class : II M.Sc. Biotechnology**
Subject Name & Code : **Immunology, MDK3B**

ANSWER KEY

Section A

1. Define MALT, GALT
   Mucosal Associated Lymphoid Tissue (MALT) such as Gut Associated Lymphoid Tissue (GALT) are the secondary lymphoid organs, trap antigen and provide sites for mature lymphocytes to interact with antigen.

2. Name the Complement proteins
   Denoted by the capital letter C with numbers such as C1, C2, C3, C4, C5, C6, C7, C8, and C9. C1 has three subunits: C1q, C1r, C1s. C2-C5 have two components: a (smaller subunit) and b (larger subunit).

3. Define Active and Passive immunity
   Active immunity - Own immune system is responsible for protecting from a pathogen,
   Passive immunity – immunity gained from someone

4. Define Vaccines
   A preparation, to stimulate the body's immune response against disease. Administered through injection, mouth or sprayed into nose.

5. Define Lymph Nodes
   Secondary lymphoid organ, encapsulated been shaped structure, packed with lymphocytes, macrophages and dendritic cells, encounter antigen that enter tissue spaces.

6. Identify ADCC cells
   Antibody-Dependent Cellular Cytotoxicity. NK cells, macrophage, monocyte, neutrophils, eosinophils, mediated by human T lymphocytes.

7. Define Hematopoiesis
   Production of all cellular components of blood and blood plasma or body produces blood cells. Occurs within the hematopoietic system, includes organs and tissues such as bone marrow, liver and spleen.

Section B

8. Discuss about the spleen with diagram
    - Definition
    - Diagram with parts
    - Lymphatics system, lymphocytes, filter and stores blood cells and destroys old cells.

9. Describe about Thymus with diagram
    - Definition
    - Diagram with parts
    - Lymphatic system, produce and matures the lymphocytes, protections against diverse pathogen

10. Write about sensitization and effector phase of type 1V hypersensitivity reaction
    - Type IV hypersensitivity reaction definition
    - Sensitization phase – initial exposure to antigen and antigen specific memory T cells development.
    - Effector phase- cytokines and other mediators produced by immune cells

11. Discuss about innate immunity
    - Definition
    - First line of defence – skin, mucous membrane, interferons, lysozyme, complement system
    - Second line of defence – phagocytic cells, macrophage and neutrophils, inflammatory mediators

Section C

12. Explain the humoral mediated immune response with neat diagram.
    - Definition for humoral immunity
    - Diagram with label
    - Mechanism – APC, endocytosis, antigen processing, peptide MHC complex, antigen presentation, TH cells, class II MHC complex through TCR,
    - Activation of B cells – cloned, plasma cells – antibody, memory cells

13. Explain the type 1 hypersensitivity reaction with neat diagram
    - Hypersensitivity definition
    - Type 1 hypersensitivity reaction
    - Immunoglobulin E (IgE)
    - Anaphylaxis, Allergen, Atopy
    - Diagram
    - mechanism

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Department of Biotechnology

Date : 14-09-2022 **Duration : 1 hour** **Class : II M.Sc. Biotechnology**

Subject Name & Code : **Bioprocess technology, MDK3C**

Section A (5 x 1 = 5 marks)

(Answer any **FIVE** questions)

CO1	BL1	1.Define Fermentation
CO2	BL1	2. Define fermentor
CO2	BL1	3. State the use of impeller
CO2	BL1	4. Name the Sparger
CO2	BL1	5. Define the Baffles
CO6	BL1	6. List the antifoam agents
CO6	BL1	7. Name the immobilized reactors

Section B (2 x 5 = 10 marks)

(Answer any **TWO** questions)

CO2	BL2	8. Discuss the fluidized and packed bed reactor
CO2	BL6	9. Write about the Air lift fermentor
CO1	BL2	10. Summarize the microbial cell culture
CO1	BL2	11. Describe the bubble column and Tower Fermentor

Section C (1 x 10 = 10 marks)

(Answer any **ONE** question)

CO2	BL2	11. Explain the continuous stirred tank reactor
CO2	BL2	12. Describe the mechanically stirred tank reactor

(CO: Mark CO/CO2/CO3/CO4/CO5/CO6) (BL: Blooms Taxonomy Level 1/2/3/4/5/6)

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SECTION A

1. Define Fermentation

Metabolic process

Produces chemical changes in organic substrates

Four types of fermentation

2. Define Fermentor

Large sterile vessel

Contains optimum conditions

Economically useful products

3. State the use of impeller

Increase the pressure and flow of fluid

Extracts energy from and reduces the pressure of a flowing fluid

Three types of impeller

4. Name the Sparger

Small 1-2 mm holes

Bottom of the fermentor

Consists of glass wool

5. Define the baffles

Thin metal tubes at sides

$1/10^{th}$ size of fermentor tank

Prevent vortex formation

6. List the antifoam agents

Preventing antifoam agents

Examples: oils, certain esters, alcohols, glycerine

7. Name the immobilized reactors

Uses beads to immobilize cells/organisms

Type: Fluidized bed reactor, Packed bed reactor

SECTION B

8. Discuss the fluidized and packed bed reactor

Fluidized Bed Reactor

Consists of immobilized cells/enzymes

Microcarrier made of dextran, alginate, collagen

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Nutrient and media is continuously supplied in a CSTR

Sparger present in aerobic culture at the bottom

Baffles for controlling the vortex formation

4 baffles present

Biofermented liquid can be got out through the outlet

Fermentor attached to a pH control which checks the pH and adds acid or base

Nutrients can be added continuously

Products collected at the outlet

No need to stop the fermentor

Production of industrially valuable products

12. Describe the mechanically stirred tank reactor

The reactor most widely employed for culturing of biological agents

They are contractors where the well-mixed among phases is obtained mainly by internal mechanical agitation

A storage equipment for high-pressure gases

These geometries include impeller types, baffle designs, tank shapes etc.

Impellers for mechanical agitation of stirred tanks are typically grouped as turbines for low/medium viscosity fluids

Depends on the choice of vessels and impeller geometry

Runs at steady state with continuous flow of reactants and products

The feed assumes a uniform composition throughout the reactor, exit stream has the same composition as in the tank

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Department of Biotechnology

Date : 02-11-2022 **Duration : 1 hour** **Class : II M.Sc. Biotechnology**
Subject Name & Code : **Bioprocess technology, MDK3C**

Section A (5 x 1 = 5 marks)
(Answer any **FIVE** questions)

CO6	BL1	1.Define Trickling generator
CO4	BL1	2. Define flocculation
CO4	BL1	3. State the sedimentation
CO6	BL1	4. Defirn bioseperation
CO3	BL1	5. Define Cell disruption
CO3	BL1	6. List the method of cell lysis
CO3	BL1	7. Name the methods of extraction

Section B (2 x 5 = 10 marks)
(Answer any **TWO** questions)

CO1	BL2	8. Describe the immobilization technique
CO3	BL6	9. Write about advantages of Super Critical Fluid Extraction
CO3	BL2	10. Summarize the bead milling method of cell disruption
CO2	BL2	11. Describe the penicillin production.

Section C (1 x 10 = 10 marks)
(Answer any **ONE** question)

CO3	BL2	11. Explain the principle, conditions and workflow required in osmotic method of cell lysis
CO2	BL2	12. Describe the citric acid production.

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SRM Nagar, Kattankulathur
Chengalpattu Dist - 603 203

M.Sc. Biotechnology
Bioprocess technology
Section A

CO 6 BL 1 1. Define trickling generator
Is a type of generator that uses a trickle of fuels
Vinegar from trickling generators are less turbid than those from submerged fermentation

CO 4 BL 1 2. Define flocculation
A process by which a chemical coagulant is added to the water acts to facilitate bonding between particles, creating larger aggregates which are easier to separate
Two types of flocculation: natural flocculation and chemical flocculation

CO 4 BL 1 3. State the sedimentation
Separation of smaller particles and sediments in water
Purpose of sedimentation is to enhance the filtration process by removing particulates

CO 6 BL 1 4. Define bioseparation
Process steps used to purify the products from bioseparator
Downstream processing steps include extraction, precipitation, electrophoresis and chromatography

CO 3 BL 1 5. Define cell disruption
Process of breaking cells in order to obtain intracellular fluid
Contains molecules/particles of interest such as proteins or viruses

CO 3 BL 1 6. List the method of lysis
By repeated freezing and thawing cycles
Mechanical disruption, liquid homogenization, high frequency sound waves (sonication), freeze/thaw cycles and manual grinding

CO 3 BL 1 7. Name the methods of extraction
One or more components are separated selectively from a liquid or solid mixture, the feed by means of a liquid immiscible solvent
Solvent extraction, distillation method, pressing and sublimation

Section B

CO 1 BL 2 8. Describe the immobilization technique
A technical process in which enzymes are fixed to or within solid supports, creating a heterogenous immobilized enzyme systems
Five different types of techniques: adsorption, covalent binding, entrapment, cross-linking and encapsulation
Immobilized enzymes can be used in production of syrups
In enzyme immobilization technique, covalent binding is one of the best methods
Enzymes physically confined or localized in a certain defined region of space with retention of their catalytic activities

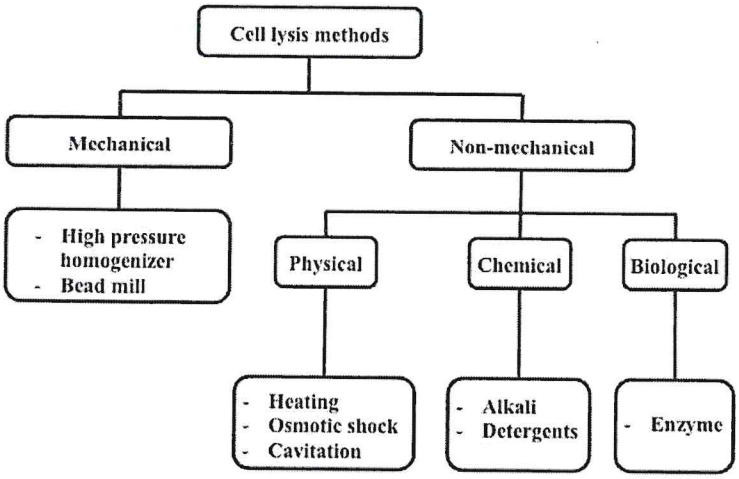
Allows re-use of enzymes for an extended period of time and enables easier separation of the catalyst from the product
Immobilization improves many properties of enzymes such as performance in organic solvents, pH tolerance, heat stability or functional stability

CO 3 BL 6 9. Write about advantages of super critical fluid extraction

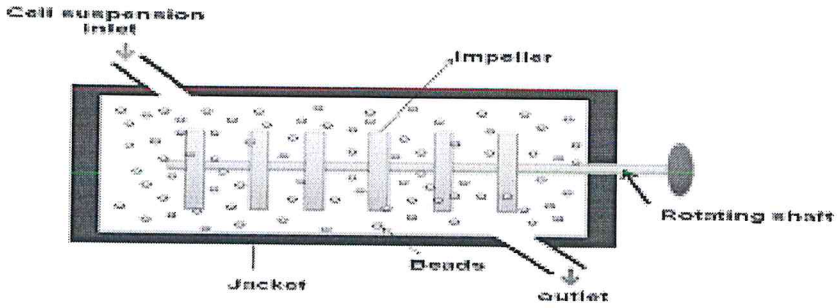
A supercritical fluid is any substance at a temperature and pressure above its critical point.
can diffuse through solids like a gas, and dissolve materials like a liquid.
suitable as a substitute for organic solvents in a range of industrial and laboratory processes
leaves no toxic residue behind
Its extraction properties can be widely and precisely manipulated with subtle changes in pressure and temperature.
There are 2 types of CO_2 extraction: (i) Low pressure cold extraction, (ii) Supercritical extraction
have highly compressed gases, which combine properties of gases and liquids in an intriguing manner.
Solubility increases with increasing density (that is with increasing pressure).
process of separating one component (the extractant) from another (the matrix) using supercritical fluids as the extracting solvent

CO 3 BL 2 10. Summarize the bead milling method of cell disruption

Cell disruption is the process of obtaining intracellular fluid via methods that open the cell wall.
The overall goal in cell disruption is to obtain the intracellular fluid without disrupting any of its components.
Factors of Cell Disruption: Sample Size, Ability to disrupt the cell and the necessary conditions, Efficiency of disruption, Stability of the component needed to be isolated



Bead milling or bead homogenization is a mechanical cell disruption process with some degree of complexity
Bead-cell collisions are also implicated in the mechanism whereby bead milling disrupts cells.
The parameters are bead diameter, bead density, bead filling, agitator speed, and feed rate.



CO 2 BL 2 11. Describe the penicillin production

Fermentation is the technique used for the commercial production of penicillin

It is a fed batch process that is carried out aseptically in stainless steel tank reactors with a capacity of 30 to 100 thousand gallons

Produced by the fungus Penicillium chrysogenum which requires lactose, other sugars and a source of nitrogen in the medium to grow well

It is common in temperature ad subtropical regions and can be found on salted food products, but is mostly found in indoor conditions

It is the source of several β-lactam antibiotics, most significantly penicillin which inhibits the biosynthesis of bacterial cell walls affecting lysis of cells

P. chrysogenum has been used industrially to produce Penicilian G and Penicilian V and Xanthocilin X and to produce the enzymes polyamine oxidase

Nutrient media source: carbon source, nitrogen source, mineral source and precursors

Section C

CO 3 BL 2 12. Explain the principle, conditions and work flow required in osmotic method of cell lysis

Non-mechanical lysis can be categorized into three main groups, namely physical, chemical and biological

each group is further classified based on the specific techniques and methods used for lysis

Physical disruption is a non-contact method which utilize external force to rupture the cell membrane.

French press consists of a cylinder with orifice at bottom.

In Microfluidizer method pressure is applied that causes production of small sized particles.

Osmotic shock is the technique of weakening cells caused by lysis, which is brought about by increased internal pressure as water rapidly enters cells when cells are subjected to high osmotic pressure followed by sudden dilution.

requires strictly defined chemical conditions

optimal conditions and ability to withstand suboptimal conditions are species specific.

Osmotic shock is not commonly used method for cell disruption because of its low efficiency

CO 2 BL 2 13. Describe the citric acid production

Most important organic acid produced in tonnage and is extensively used in food and pharmaceutical industries

Produced by submerged fermentation using Aspergillus niger or Candida sp from different sources of carbohydrates, such as molasses and starch based media

factors in citric acid production: carbohydrate source, trace metals, pH, dissolved O2, nitrogen source.

Surface processes: solid substrate fermentation using wheat bran, or pulp from sweet potato starch used as culture media.
Liquid surface fermentation: using liquid as nutrient medium, simple technology
Interference of trace metals and dissolved O2 tension are minimal
20% of citric acid in the world is produced by surface processes
Nutrient supply comes from the beet molasses
Two types of reactors are used: stirred tanks and aerated towers
Success and yield of citric acid production mainly depend on the structure of mycelium medium
Antifoam agents and mechanical antifoam devices are used to prevent foaming
Final steps in citric acid recovery are, treatment with activated charcoal, cation and anion exchangers and crystallization

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Department of Biotechnology

Date : 15-09-2022 **Duration : 1 hour** **Class :II M.Sc. Biotechnology**
Subject Name & Code: **Nanotechnology MDKAH**

Section A (5 x 1 = 5)

(Answer any **FIVE** questions)

CO	BL1	1. Define Quantum dots.
CO	BL1	2. List out uses of Biochip
CO	BL6	3. Write about Scaffold.
CO	BL1	4. Name any two nanodevices used in medicine.
CO1	BL1	5. Define Dendrimers
CO1	BL1	6. Name the two properties of nanoparticles.
CO6	BL1	7. Define CNT

Section B (2 x 5 = 10)

(Answer any **TWO** questions)

CO	BL6	8. Write Biosensors.
CO	BL6	9. Write short notes on Quantum Dots.
CO1	BL4	10. Classify nanoparticles
CO1	BL4	11. Correlate the two main approaches of nanobiotechnology

Section C (1 x 10 = 10)

(Answer any **ONE** question)

CO6	BL1	11. Enumerate Applications of Nanobiotechnology.
CO	BL4	12. Explain about the significance of nanofibres in tissue engineering.

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Answer Key

Section A

1. Quantum dots (QDs) are semiconductor particles a few nanometres in size, having optical and electronic properties that differ from those of larger particles as a result of quantum mechanics.
2. The biochip is being used in toxicological, protein, and biochemical research.
3. Scaffolds, typically made of polymeric biomaterials, provide the structural support for cell attachment and subsequent tissue development.
4. Nanorobots and Nanopores
5. Dendrimers are nano-sized, radially symmetric molecules with well-defined, homogeneous, and monodisperse structure that has a typically symmetric core, an inner shell, and an outer shell.
6. The two properties of nanoparticles are surface area and quantum effects
7. Carbon Nanotubes Technology is a tube made of carbon with diameters typically measured in nanometers.

Section B

8. A biosensor is a device incorporating a biological sensing element either intimately connected to or integrated within a transducer. Specific molecular recognition is a fundamental prerequisite, based on affinity between complementary structures such as enzyme-substrate, antibody-antigen and receptor-hormone, and this property in biosensor is used for the production of concentration–proportional signals.
    i. Biosensor's selectivity and specificity highly depend on biological recognition systems connected to a suitable transduce.
    ii. Types of Biosensors
    iii. Advantages of Biosensors in nanotechnology
9. Quantum dots (QDs) are semiconductor particles a few nanometres in size, having optical and electronic properties that differ from those of larger particles as a result of quantum mechanics.

    i) Properties of Quantum dots

ii) Uses of Quantum dots in nanotechnology examples, Televison etc.

iii) Advantages of Quantum dots

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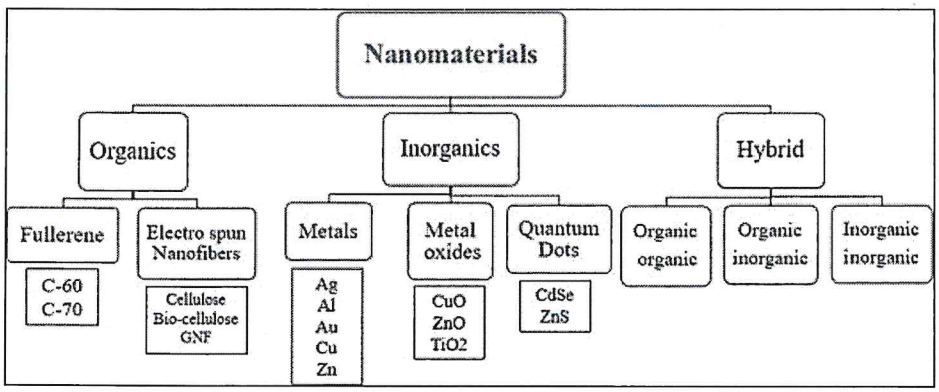

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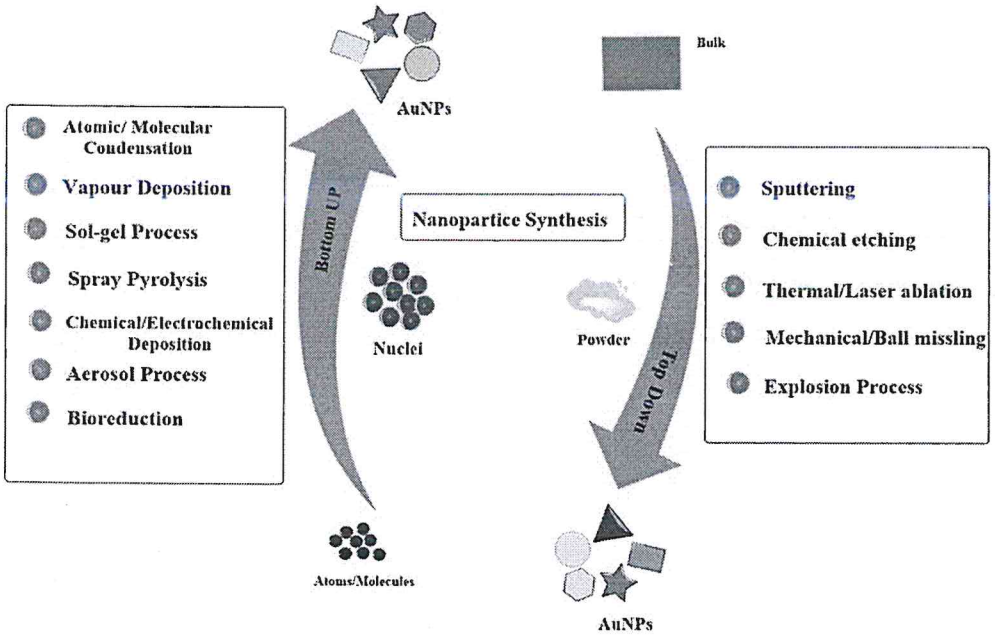
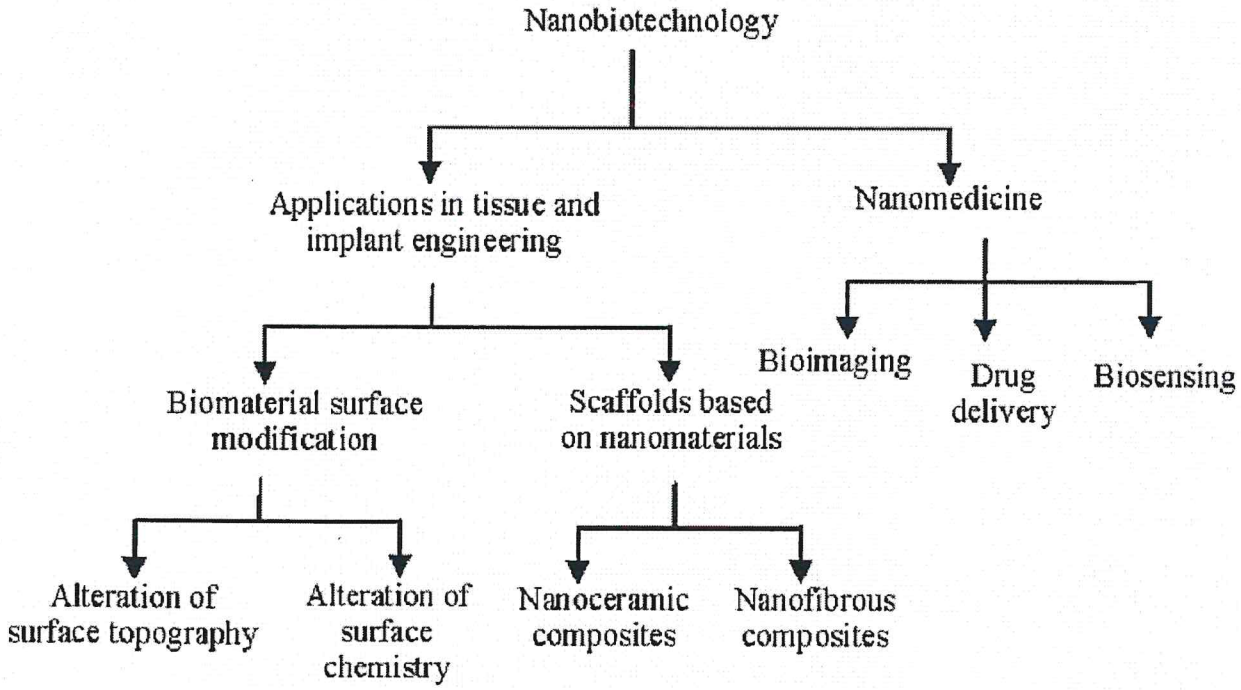


Section C

12. Applications of Nanobiotechnology



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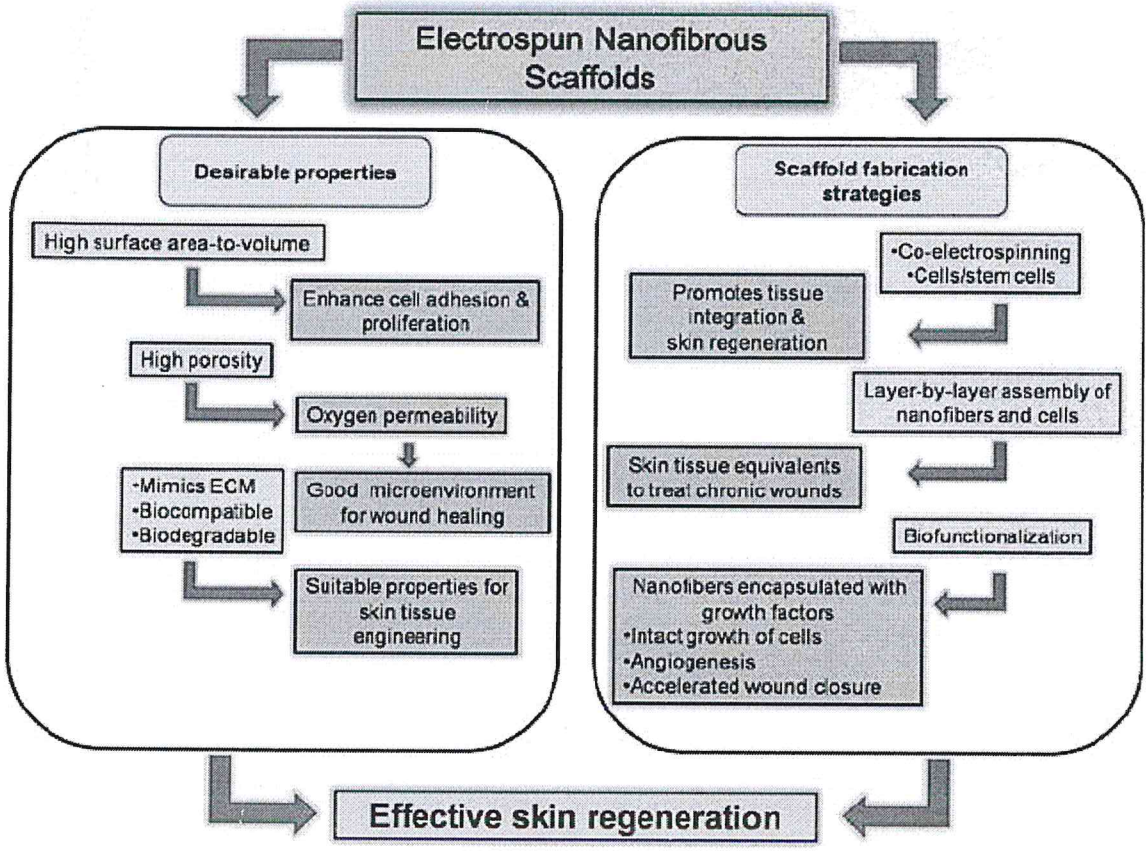

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UNIT TEST II

Date : 03-11-2022 **Duration : 1 hour** **Class :II M.Sc. Biotechnology**

Subject Name & Code: **Nanotechnology & MDKAH**

Section A (5 x 1 = 5)

(Answer any **FIVE** questions)

CO2 BL1 1. Define Nanoshells

CO2 BL1 2. List out the uses of Quantum dot

CO2 BL6 3. Write about Nubot

CO2 BL1 4. State Nanogold

CO5 BL1 5. Define carbon nanotubes

CO1 BL1 6. Name the two properties of Nanofibres

CO3 BL1 7. Define Scaffold

Section B (2 x 5 = 10)

(Answer any **TWO** questions)

CO5 BL6 8. Write Biosensors.

CO2 BL6 9. Explain in detail about dendrimers

CO1 BL4 10. Classify Nanoparticles

CO5 BL4 11. Correlate the two main approaches of nanotubes

Section C (1 x 10 = 10)

(Answer any **ONE** question)

CO2 BL1 11. Explain the usage of nanotechnology in cancer diagnosis and treatment

CO4 BL4 12. Explain about the significance of nanofibres in tissue engineering.

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UNIT TEST II

Date : 03-11-2022 **Duration : 1 hour** **Class :II M.Sc. Biotechnology**

Subject Name & Code: **Nanotechnology & MDKAH**

SECTION A

CO2 BL1 1. Define Nanoshells

A Nanoshell, is a type of spherical nanoparticle consisting of a dielectric core which is covered by a thin metallic shell (usally gold).

These nanoshells involve a quasiparticle called a plasmon which is a collective excitation or quantum plasma oscillation where the electrons simultaneously oscillate with respect to all the ions.

CO2 BL1 2. List out the uses of quantom dot

Biomedical monitoring applications have taken considerable advantage of using quantumdots for sensitive optical imaging in fixed cells and tissues, living cells and animal models.

Electronic applications of quantum dots are envisaged in future highspeed electronic and photonic devices. Quantum dots provide a promising way forward for a new generation of lasers, infrared photodetectors, photovoltaic devices, and optical data storage media.

CO2 BL6 3. Write about Nubot

Nubot is an abbreviation for "nucleic acid robot". Nubots are organic molecular machines at the nanoscale. DNA structure can provide means to assemble 2D and 3D nanomechanical devices. Our DNA has been successfully targeted by nanobots "for drug therapy or destruction".

CO2 BL1 4. State Nanogold

Gold nanoparticles, known as nanogold or colloid gold, is a suspension of subpension of sub-micrometre sized particles (10nm or more) in a fluiod, usually water. It also a semiconductor, in which it has an electrical conductivity of thst between a conductor and a insulator.

CO5 BL1 5. Define Carbon nanotubes

CNTs nanomaterials are allotropes of carbon, made of graphite, and have been constructed in cylindrical tubes with nanometer scale in diameter and several millimeters in length.

Their impressive structural, mechanical, and electronic properties are due to their small size and mass, their incrediblemechanical strength, and their high electrical and thermal conductivity.

CO1 BL1 6. Name the two properties of Nanofibres

large specific surface area, high porosity,small pore size,diameter range (50 – 1000) nm,Material,Polymer solutions or melts.

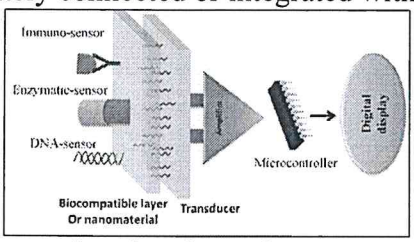
CO3 BL1 7. Define Scaffold

Bone diseases such as bone infections, bone tumors, and bone loss need for bone regeneration.
Bone tissue engineering is a complex and dynamic process that initiates with migration and recruitment of osteoprogenitor cells followed by their proliferation, differentiation, matrix formation along with remodeling of the bone.

SECTION B

CO5 BL6 8. Write Biosensors

Biosensors can be used to monitor environmental pollution in air, soil, water, etc.; toxic elements in food and quality control; biohazardous bacteria or virus, and biomolecules for clinical diagnostics, etc.; and to necessitate sensitive, fast, and selective equipments or tools.
Biosensors have immense potential due to their inherent simplicity, low cost, fast analysis, and miniaturization, as well as easy handling.
Biosensors have been predicted to have applications in military, health care, industrial process control, environmental monitoring, food control, and microbiology—bacterial and viral studies, etc.
A biosensor is an analytical electronic device that generates an electronic signal by receptor–target analyte interactions.
The main component in a biosensor is a bioreceptor or biologically derived sensing element that is either intimately connected or integrated with a physicochemical transducer.



Schematic diagram showing the main components of a typical biosensor.

The function of a biosensor is to produce a digital electronic signal that is directly proportional to the concentration of a target biomolecules.
According to the International Union of Pure and Applied Chemistry definition, "a biosensor is a self-contained integrated device that is capable of providing specific quantitative or semi-quantitative analytical information using a biological recognition element (receptor) which is in direct spatial contact with a transducer element"
In a typical biosensor, bioreceptor molecules such as enzymes, oligonucleotides, cells, antibodies, etc. can recognize the desired analytes.
In addition to bioreceptor molecules, a transducer is an essential component that converts a biochemical signal to electronic signal by interaction of the bioreceptors with target analytes.
The generated signal can be directly or inversely proportional to the concentration of a desired analyte.

The transducer elements could be electric current, electric potential, intensity and phase of electromagnetic radiations, mass, conductance, impedance, temperature, viscosity, etc.
There are three generations of biosensors. The electrode proposed by Clark in 1962 is known as first generation of biosensor, and this is oxygen dependent.
CHARACTERISTICS OF A BIOSENSOR:

- Linearity: It is defined as the maximum sensor output signal that can be detected by a sensor. It should be high for a biosensor to detect substrate concentration.
- Sensitivity: It is the magnitude of electrode response per unit substrate concentration.
- Selectivity: The electrode response in the presence of other interfering chemicals or foreign materials. It is the minimal chemical interference with the target analyte. It should be minimum for a biosensor.
- Stability: It is the maximum electrode response over a period of time.
- Limit-of-detection: The lowest quantity of a substance that can be determined from the absence of that substance (blank signal). It can be calculated from the mean of the blank and its standard deviation.

CO2 BL6 9. Explain in detail about dendrimers

Dendrimers are nano-sized, radially symmetric molecules with well-defined, homogeneous, and monodisperse structure that has a typically symmetric core, an inner shell, and an outer shell. Their three traditional macromolecular architectural classes are broadly recognized to generate rather polydisperse products of different molecular weights. A variety of dendrimers exist, and each has biological properties such as polyvalency, self-assembling, electrostatic interactions, chemical stability, low cytotoxicity, and solubility. These varied characteristics make dendrimers a good choice in the medical field, and this review covers their diverse applications.

Structure and chemistry:

The structure of dendrimer molecules begins with a central atom or group of atoms labeled as the core. From this central structure, the branches of other atoms called 'dendrons' grow through a variety of chemical reactions.

Three main parts of a dendrimer: the core, end-groups, and subunits linking the two molecules.

SYNTHESIS:

Dendrimers are just in between molecular chemistry and polymer chemistry. They relate to the molecular chemistry world by virtue of their step-by-step controlled synthesis, and they relate to the polymer world because of their repetitive structure made of monomers. The three traditional macromolecular architectural classes (i.e., linear, cross-linked, and branched) are broadly recognized to generate rather polydisperse products of different molecular weights.

Properties of dendrimer:

- Monodispersity
- Nanoscale size and shape
- Viscosity
- High aqueous solubility
- High solubility in non polar solutions
- Non crystalline and have low glass temperature
- Low compressibility

Types of dendrimers:

- PAMAM dendrimer
- PPI dendrimer
- Chiral dendrimer
- Multillingual dendrimer
- Tecto dendrimer
- Hybrid dendrimer
- Amphiphilic dendrimer
- Frechet-Type dendrimer
- Peptide dendrimer
- PAMAMOS dendrimer

APPICATIONS OF DENDRIMERS:

1.Blood substitution: The stearic bulk surrounding a hememimetic centre significantly slows degradation compared to free heme.

2.Sensors: Cadmium-sulfide/ polypropylenimine tetrahexacontamine dendrimer composites to detect fluorescence signal quenching.

3.Solubility enchancers: Dendrimers have hydrophobic core and hydrophilic outer surface. This enhances solubility of poorly soluble drugs by forming cascade and nonskid-chain like synthesis of covalent, non covalent complexes with drug molecules.

4.Gene transfection: Dendrimers are non-viral gene transfer agents, enhancing transfection by endocytosis.

CO1 BL4 10. Classify Nanoparticles

Nanomaterials possess specific properties that make them different from that of bulk materials, including large surface area, the ability totailor their functionalities for varying applications, and high surface energy.

The different types of nanoparticles, a common category of nanomaterials, are discussed.

CLASSIFICATION OF NANOPARTICLES:

1. Carbon based material: with spherical, ellipsoidal or tubular forms.
2. Metallic based material: they can be quantum dots (quantom dots or transistors of a single electron) or nanoparticles of gold, silver42 or of reactive metals like titanium dioxide.
3. Dendrimer: are highly branched macromolecules with the dimensions nanometer-scale. The surface of a dendrimer possess numerous chain which can be modified to perform specific chemical functions.
4. Composites: Nanocomposite can be described as a multiphase solid material where at least one of the phases has one, two or three dimensions in nanoscale. The most common examples of these materials are colloids, gels and copolymers.

Different shapes of nanoparticles:

Sphere,Prism,Cube and tetrapod.

Different nanoparticles according to the spatial dimensions:

- Zero dimensional(0-D): These nanomaterials have nanodimensions in all the three directions. Diameter of particles: 1-50 nm. Most of thes are sphereical. Example: clusters.
- One dimensional(1-D): One dimension of the nanostructure will be outside the nanometer range. Examples: nanotubes, fibers and rods.
- Two dimensional(2-D): In this type of nanomaterials, two dimensions are outside the nanometer range. Examples: nano films, nano sheets.
- Three dimensional(3-D): All dimensions of thes are outside the nano meter range. Examples: nanocrystals.

CO5 BL4 11. Correlate the two main approaches of nanotubes

Bottom-up and top-down are the main approaches for synthesis of nanostructures materials.

1. Bottom–up approach: In this approach, the miniaturization of material elements (atomic level) followed by self-assembly results in the creation of nanostructures. During the self-assembly process, the basic unit of a larger structure is composed of nanostructured materials. This method has been used for the formation of quantum dots during the epitaxial growth and the formation of NPs from colloidal dispersion. This approach yields lesser defects and a more homogeneous chemical composition.

2. Top–down approach: In this method, the large (macroscopic) structure can be externally controlled during processing of the desired nanostructures. Etching through the mask, ball milling, and application of severe plastic deformation are examples of this approach. A major drawback in this technique is the presence of imperfections in the surface structure. Surface defects in this approach can have an impact on physical and surface properties of NPs due to the high aspect ratio.

SECTION C

CO2 BL1 11. Explain the usage of nanotechnology in cancer diagnosis and treatment

Nanotechnology can be used for better cancer diagnosis. One of the main usage fields of optical nanoparticles is to allow better cancer detection.

Classical methods that are used in diagnosis have limitations. Classified methods such as X-rays, tomography or mammography require using mutagenic agents on cells that cause cancer.

To eliminate these concerns, optical nanoparticles in diagnosis is possible technique that can be used.

This technique works with special dyes to interact with tumor cells and optical nanoparticles can be detected.

NANOTECHNOLOGY IN THE DETECTION AND DIAGNOSIS OF CANCER

NANOPORE

Scientists believe nanopores, tiny holes that allow DNA to pass through one strand at a time, will make DNA sequencing more efficient.

As DNA passes through a nanopore, scientists can monitor the shape and electrical properties of each base, or letter, on the strand. Because these properties are unique for each of the four bases that make up the genetic code, scientists can use the passage of DNA through a nanapore to decipher the endoded information, including errors in the code known to be associated with cancer.

NANOTUBE

Another nanodevice that will help identify DNA changes associated with cancer is the nanotube.

Nanotube are carbon rods about half the diameter of a molecule of DNA that not only can detect the presence of altered genes, but they may help researchers pinpoint the exact location of those changes.

To prepare DNA for nanotube analysis, scientists must attach a bulky molecule to regions of the DNA that are associated with cancer. They can design tags that seek out specific mutations in the DNA and bind to them.

Once the mutation has been tagged, reseachers use a nanotube tip resembling the needle on a record player to trace the physical shape of DNA and pinpoint the mutated regions.

The nanotube creates a map showing the shape of the DNA molecule, including the tags identifying important mutations.

Since the location of mutations can influence the effects they have on a cell, these techniques will be important in predicting disease.

QUANTUM DOTS

Quantum dots are tiny crystals that glow when they are stimulated by ultraviolet light.

Latex beads filled with these crystals can be designed to bind to specific DNA sequences. By combining different sized quantum dots within a single bead, scientists can create probes that release distinct colors and intensities of light.

When the crystals are stimulated by UV light, each bead emits light that serves as a sort of spectral bar code, identifying a particular region of DNA.

To detect cancer, scientists can design quantum dots that bind to sequences of DNA that are associated with the disease.

When the quantum dots are stimulated with light, they emit their unique bar codes, or labels, making the critical, cancer-associated DNA sequences visible.

Another advantages of quantum dots is that they can be used in the body, eliminating the need for biopsy.

NANOTECHNOLOGY IN DRUG DELIVERY SYSTEM AND CANCER TREATMENT

Spherical, branched polymers that are silica-coated miscelles, ceramic nanoparticles, and cross-linked liposomes, can be targeted to cancer cell.

This is done by attaching monoclonal antibodies or cell-surface receptor ligands that bind specifically to molecules found on the surfacs of cancer cells.

Such as the high-affinity folate receptor and luteinizing hormone releasing hormone(LH-RH) or molecules unique to endothelial cells that become co-opted by malignant cells.

The nanoparticles are rapidly taken into cells.

DENDRIMERS

Dendrimers are highly branched, star-shaped macromolecules with nanometer-scale dimensions.

Dendrimers are defined by three components: a central core, an interior dentritic structure(the branches), and an exterior surface with functional surface groups

The varied combination of these components yields products odf different shapes and sizes with shielded interior cores.

Applications highlighted in recent literatue include drug delivery, gene transfection, catalysis, energy harvesting, photo activity, molecular weight and size determination, rheology modification, and nanoscale science and technology.

Dendrimers have been explored for the encapsulation of hydrophobic compounds and for the delivery of anticancer drugs.

There are three methods for using dendrimers in drug delivery:

First, the drug is covalently attached to the periphery of the dendrimer to form dendrimer prodrugs.

Second, the drugs is coordinated to the outer functional groups via ionic interaction.

Third, the dendrimer acts as a unimolecular miscelle by encpasulating a pharmacetical through the formation of a dendrimers- drug supramolecular assembly.

LIPOSOMES

A liposome is a spherical vesicle having at least one lipid bilayer.

A liposome can be used as a vehicle for administration of nutrients and pharmaceutical drugs.

Liposomes can be prepared by disrupting biological memebranes(such as by sonication).

Liposomes are most often composed of phopholipids, especially phosphatidylcholine, but may also include other lipids, such as egg phosphatidylethanolamine, so long as they are compatible with lipid bilayer structure.

A liposome design may employ surface ligands for attaching to unhealthy tissue.

NANOSHELLS

Nanoshells are miniscule beads coated with gold. By manipulationg the thickness of the layes making up the nanoshells.

Scientists can design thes beads to absorb specific wavelengths of light.

The most useful nanoshells are those that absorb near-infrared light, which can easily penetrate several centimeters of human tissue.

The absorption of light by the nanoshells creates an intense heat that is lethal to cells.

These gold nanoshells are shuttled into tumors by the use of phagocytosis.

Phagocytes engulf the nanoshells through the cell mambrane to form an internal phagosome, or macrophage.

Nanoparticle-based therapeutics have been successfully delivered, taken up passively into tumors without the assistance

NANOROBOT

A korean research team has successfully developed bacteriorobots that can diagnose and treat cancer.

This bacteria-based robot is expected to be utilized to develop new treatments for cancer and various microrobots for medical purposes in the future.
Bacteriobots are made up of bacteria and 3μm – sized microstructures filled with anticancer drugs.
Genetically-modified non-toxic bacteria move inside tissues or blood with flagella, and find tumors by pushing microstructures and targeting certain drugs secreted by cancer cells.
CONCLUSION
Over the past 150 years, many innovative and groundbreaking techiques have been developed in order to treat cancer. But these approaches has its own series of undesirable side effects that are both dangerous and damaging to the overall health of the patient.
There have been significant improvements largely due to breakthroughs, both in the bottom-up and in the top-down nanotechnology. We will make early detection, prevention and treatment with a high degree of accuracy and ease possible that is effective and can be made it safe.
Different types of cancer cells have unique properties that can be exploited by nanoparticles to target the cancer cells.

CO4 BL4 12. Explain about the significance of nanofibres in tissue engineering

Wound healing is a delicate physiological process, including hemostasis, inflammation, proliferation and remodelling/maturation. According to healing time, skin wounds generally include two categories: acute and chronic wounds. Acute wounds are featured by rupture or perforation of the skin layer, healing in a short time. Chronic wounds are usually hard to heal in the short term because they are mostly emerging as accompanied by diseases such as obesity and diabetes. Angiogenesis is an important part of the wound healing process. The vascular formation can not only provide adequate blood flow, nutrition, oxygen, etc., but also accelerate the healing of wounds and base formation of granulation tissue. While abnormal blood vessel formation causes chronic wound formation, which impedes timely healing. Therefore, when treating skin wounds, both skin tissue and vascular regeneration must be considered. For different skin injuries, there are also different treatment strategies for promoting the healing process of chronic wounds, such as local oxygen therapy, hyperbaric oxygen therapy, ozone therapy, negativepressure wound therapy, etc. Typically, autologous transplantation can be used for large-area skin injuries treatment. Briefly, the full-thickness skin from other suitable parts of the donor is separated, expanded and transplanted to the wound. But this approach is limited by the donor site and the area of injury. Herein, another useful route is developed by using autologous cell-based therapy. After sufficient proliferation in vitro, these fused cells are used for wound healing. However, the success rate, treatment cycle and cost are extremely affected by various conditions. In order to further improve the efficiency of proliferation and biosafety, nanomaterials are used in skin tissue engineering for wound healing. The ideal biomaterials should meet the following criteria: (1) providing a barrier layer for regenerative keratinocytes; (2) firmly attaching to the lower dermis; (3) remodeling blood vessels at the injured site; (4) offering elastic structural support for the skin. Chitosan is a non-toxic and biodegradable

polycation polysaccharide, which can be decomposed by lysozyme in vivo to release harmless amino sugars. The features like good biocompatibility and cell adhesiveness make it noticeable for skin applications. The positively charged chitosan bonds to the negatively charged bacterial membrane trigger agglutination and ultimately resulted in leakage of cell components. Moreover, chitosan can chelate metals, thereby inhibiting certain enzyme activities. For example, commercially available HemCon bandage, which is invented as a hemostatic dressing, shows effectiveness from skincare application prospects. In addition, it has been confirmed that the keratin–chitosan composite film enforced the tensile properties of keratin, enhanced antibacterial property and supported the attachment of fibroblasts.As a new type of nanomaterial, nanocellulose composed of cellulose-based nanoscale structures has attracted more and more attention. Nanocellulose has its special advantages, containing the ability to absorb wound exudate and easier remove the dressing, that traditional wound dressing materials (such as gauze) do not have, so the cellulose-based nanomaterials are also widely employed in biomedical applications for the treatment of skin diseases. Fu et al. discovered that nanocellulose produced by bacteria had greater advantages for wound care, such as faster healing, less inflammation, low-toxic product, and compared with traditional dressings, it helped faster tissue regeneration and enhanced the capillary formation in wounds. In addition, dressings made of nanocellulose also show great potential in the treatment of chronic ulcers of the lower extremities. The nanocellulose-based film is also used for severe burns treatment by providing a good clean environment, resulting from its excellent adhered ability of the injured area (due to its plasticity) and maintain water balance, thereby promoting wound healing. Besides, a previous study also showed that nanocellulose could reduce inflammation reactions in skin repair. Xi et al. developed an antibacterial, photoluminescent, and elastomeric hybrid polypeptide-based composite to suppress multidrug-resistant (MDR) bacteria and promote wound healing. The polypeptide-based nanocellulose composite showed excellent biocompatibility, biomimetic elastomeric behaviour, and robust antibacterial activity. In vivo results indicated that the nanocellulose composite system could efficiently inhibit MDR bacteria derived wound infection and prominently improve skin regeneration. Additionally, nanocomposite material-introduced nanocellulose, such as polyethylene glycol, polyvinyl alcohol, chitosan, gelatin, alginate, could also exhibit an advanced skin tissue repair effect. In order to promote revascularization in skin tissue engineering, designing suitable nanocarriers for gene transfection can effectively protect molecules from nucleases and regulate gene release during gene delivery therapy. Mayo et al. synthesized PLGA NPs loaded with anti-vascular endothelial growth factor (VEGF) interceptor plasmid pFlt23K for the treatment of neovascular disorders. They successfully modulated gene expression (and decreased the secretion of vascular endothelial growth factor from epithelial cells), showing the potential to treat traumatic diseases. In terms of skin regeneration, stem cells with high expression of vascular endothelial growth factor and transient modification have been developed to promote angiogenesis (especially afer transplantation). According to reports, biodegradable nanomaterials can deliver the epidermal growth factor gene to human MSCs and cells derived from human embryonic stem cells. Meanwhile, the treated cells are more vigorous

to produce epidermal growth factor, and better implant effects are observed in target tissues. Compared with the control cells, angiogenesis was enhanced 2–4 times when the nanostructured scaffolds were implanted with VEGF expressing stem cells. It exhibits the clinical potency of stem cells engineered with biodegradable NPs for skin tissue regeneration.

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Department of Biotechnology

Date : 16-09-2022 **Duration : 1 hour Class :II M.Sc. Biotechnology**

Subject Name & Code : **Lifestyle Diseases Subcode: MENBB**

Section A (5 x 1 = 5)

(Answer any **FIVE** questions)

CO1 BL1 1. List out lifestyle factors of obesity

CO1 BL6 2. Write about CHD.

CO2 BL4 3. Distinguish diastolic and systolic blood pressure in normal and diseased patients

CO2 BL1 4. List out four pathophysiology mechanisms in hypertension

CO2 BL5 5. Comment on the risk factors responsible for kidney stone

CO2 BL6 6. Write about pharmacological therapeutics prescribed for hypertension.

CO1 BL6 7. Write about Diabetes due to lifestyle changes.

Section B (2 x 5 = 10)

(Answer any **TWO** questions)

CO1 BL 8. Elaborate the management of Diabetes mellitus.

CO2 BL2 9. Describe the process involved DASH management for Hypertension

CO2 BL2 10. Summarize the major types of kidney stones and their pathophysiology

CO1 BL2 11.Describe the Cardiovascular diseases.

Section C (1 x 10 = 10)

(Answer any **ONE** question)

CO1 BL5 11. Summarize the causative factors for coronary heart disease.

CO2 BL4 12.Illustrate on Kidney stone. Diagnostic, treatment and dietary management.

(CO: Mark CO/CO2/CO3/CO4/CO5/CO6) (BL: Blooms Taxonomy Level 1/2/3/4/5/6)

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Answer key

Section A

1. List out lifestyle factors of obesity

Poor diet, too much television watching, improper sleeping pattern, less physical activity and stress.

2. Write about CHD.

Coronary heart disease (CAD), or coronary heart disease, develops when the coronary arteries become too narrow or cholesterol blockages develop in the walls. The coronary arteries are the blood vessels that supply oxygen and blood to the heart.

3. Distinguish diastolic and systolic blood pressure in normal and diseased patients

BLOOD PRESSURE CATEGORY	SYSTOLIC mm Hg (upper number)		DIASTOLIC mm Hg (lower number)
NORMAL	LESS THAN 120	and	LESS THAN 80
ELEVATED	120 – 129	and	LESS THAN 80
HIGH BLOOD PRESSURE (HYPERTENSION) STAGE 1	130 – 139	or	80 – 89
HIGH BLOOD PRESSURE (HYPERTENSION) STAGE 2	140 OR HIGHER	or	90 OR HIGHER
HYPERTENSIVE CRISIS (consult your doctor immediately)	HIGHER THAN 180	and/or	HIGHER THAN 120

4. List out four pathophysiology mechanisms in hypertension

- Sympathetic nervous sytem activities
- Activities of vascular endothelium
- Activities of renal system

5. Comment on the risk factors responsible for kidney stone

- Imbalance pH balance in urine, Acidic forms uric and cristine stones and alkali forms calcium stones
- Gout

6. Write about pharmacological therapeutics prescribed for hypertension.

- Diuretics eg., chlorothiazide and furosmide
- Beta blockers eg., Atenolol and propranolol
- Alpha blockers eg., prazosin
- Vasodilators eg., Nitroglycerin and sodium nitroprusside

7. Write about Diabetes due to lifestyle changes.

Junk foods, abnormal physical activity, stress, smoke, alcohol

Section B

8. Elaborate the management of Diabetes mellitus.

- Balanced food diet
- Proper Medications
- Avoiding sugar and sweetened beverages
- Proper exercise
- Stress Management
- Avoid alcohol and smoke

9. Describe the process involved DASH management for Hypertension

- Sodium Restriction
- Carbohydrate Restriction
- Balanced protein intake
- Diet suggested by DASH : Grains, Vegetables, Fruits, Dairy, Lean meat, Poultry and fish
- Nuts and legumes

10. Summarize the major types of kidney stones and their pathophysiology

- Calcium oxalate stone
- Calcium phosphate stone
- Struvite stone (Triple stone)
- Uric acid stone
- Cystic stone

11. Describe the cardiovascular diseases.

- Coronary artery disease
- Coronary heart disease
- Ischaemic heart disease
- Pulmonary heart disease
- Myocardial infarction
- Congenital heart disease

Section C

11. Summarize the causative factors for coronary heart disease.

- Behavioural risk factors such as tobacco use, unhealthy diet, obesity, physical inactivity and alcohol consumption
- Ethnicity, age, gender, family history, heredity and race,

8/9/2022

12. Illustrate on Kidney stone. Diagnostic, treatment and dietary management.

- Hard solid mass of material forms from the substances in urine
- Renal calculi/ renal calculus or nephrolith (deposits of calcium and other mineral elements)
- Kidney, urinary bladder, ureter and urethra
- Urine saturation, supersaturation, crystal nucleation, aggregation, retention and growth
- Blood, urine analysis, cystoscopy, x-ray, CT scan, MRI, Intravenous urogram (IVU) or Intravenous pyelogram, USG, KUB
- Analgesic, spasmotic eg, Buscopan, NSAIDS eg Steroid, Lithotripsy, ureterolithotomy, pyelolithotomy, nephrolithotomy, total nephrectomy
- Plenty of fluids, limitations with food with high oxalate content, dietary calcium, moderate amount of protein, avoid salt intake

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2022

SRM ARTS AND SCIENCE COLLEGE
Department of Biotechnology

Date : 04-11-2022 **Duration : 1 hour Class :II M.Sc. Biotechnology**
Subject Name & Code : **Lifestyle Diseases Subcode: MENBB**

Section A (5 x 1 = 5)

(Answer any **FIVE** questions)

CO1	BL4	1. Define Biological Aging
CO3	BL6	2. Write about Cervical cancer.
CO3	BL5	3. Comments on Ulcer causes and prevention.
CO3	BL1	4. List out cancer treatment.
CO5	BL5	5. Comment on the risk factors for gall stone
CO1	BL4	6. What are aging theories.
CO 3	BL4	7. Differentiate Primary aging and Secondary aging

Section B (2 x 5 = 10)

(Answer any **TWO** questions)

CO3	BL	8. Elaborate the causes of ulcer and prevention.
CO3	BL2	9. Describe the cervical cancer symptoms, diagnosis and treatment.
CO4	BL4	10. Explaing the five concept of aging
CO3	BL4	11.Present the factors influencing aging.

Section C (1 x 10 = 10)

(Answer any **ONE** question)

CO5	BL5	11. Summarize the factors for gall stones types, symptoms and prevention.
CO	BL4	12. Describe Dementia. Cause, types, Symptoms and Treatment.

(CO: Mark CO/CO2/CO3/CO4/CO5/CO6) (BL: Blooms Taxonomy Level 1/2/3/4/5/6)

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SRM ARTS AND SCIENCE COLLEGE
Department of Biotechnology

Date : 04-11-2022 **Duration : 1 hour Class :II M.Sc. Biotechnology**
Subject Name & Code : **Lifestyle Diseases Subcode: MENBB**

Section A (5 x 1 = 5)

(Answer any **FIVE** questions)

CO1 BL4 1. Define Biological Aging

Biological age is a concept used loosely and with little objectivity to describe a shortfall between a population cohort average life expectancy and the perceived life expectancy of an individual of the same age.

CO3 BL6 2. Write about Cervical cancer.

Cervical cancer is a type of cancer that occurs in the cells of the cervix, the lower part of the uterus that connects to the vagina. Various strains of the human papillomavirus (HPV), a sexually transmitted infection, play a role in causing most cervical cancer. When exposed to HPV, the body's immune system typically prevents the virus from doing harm. In a small percentage of people, however, the virus survives for years, contributing to the process that causes some cervical cells to become cancer cells.

CO3 BL5 3. Comments on Ulcer causes and prevention.

Ulcers are breaks or holes in the protective lining of the stomach or duodenum. Duodenal ulcers are more common than stomach ulcers. these develop on the inside lining of the stomach and the upper portion of the small intestine or esophagus. They form when digestive juices damage the lining of the stomach or intestine. These are most often caused by inflammation after being infected by H.pylori and long-term use of painkillers. There are three types of peptic ulcers:

- Gastric ulcers
- Oesophageal ulcers
- Duodenal ulcers

CO3 BL1 4. List out cancer treatment.

Depending on the type and stage of cancer, treatments to eradicate the tumor or slow its growth may include some combination of **surgery, radiation therapy, chemotherapy, hormone therapy or immunotherapy.**

CO5 BL5 5. Comment on the risk factors for gall stone

Gallstones are more common older women and in people who have other family members who have had them. People of Native American and Scandinavian ancestry are also at higher risk. Having the following health problems may raise the risk, being overweight, not being active, disease or surgery of the ileum (a part of the small intestine), diabetes, pregnancy.

CO1 BL4 6. What are aging theories.

Many theories attempt to explain why organisms age. Some of them contradict one another as science has not agreed on one theory over another.

- **Oxidative Damage Theory**
- **Damage Accumulation Theory**
- **Epigenetic Theory**
- **Group Selection Theory**

CO 3 BL4 7. Differentiate Primary aging and Secondary aging

Primary aging refers to the simple and fairly universal effects of biological aging. Examples being **wrinkles, loss of muscle mass, slowing of physical prowess** and others. The distinction between primary and secondary aging can be blurred by the presence of genetic influence and diseases associated with advancing age.

Section B (2 x 5 = 10)

(Answer any **TWO** questions)

CO3 BL 8. Elaborate the causes of ulcer and prevention.

Causes of ulcers are as follows:

- Stomach Ulcers are more likely to develop in people having a sedentary lifestyle or poor eating habits.
- Oesophageal ulcers often result from exposure to medications such as certain antibiotics or anti-inflammatories and alcohol abuse.
- Ulcers also form as a result of excessive stomach acid secretion, consuming fatty and oily foods, alcohol, caffeine and tobacco. All of these factors contribute to a

build-up of stomach acids which decay the protective lining of the stomach, esophagus and duodenum.

- According to a recent theory, bacterial infection is also one of the causes of peptic ulcers. For example, H.pylorii is present in 80% of stomach ulcers and 90% of duodenal ulcers.
- Overuse of over-the-counter painkillers such as ibuprofen, aspirin or naproxen, alcohol consumption, psychological stress and smoking exacerbate the formation of ulcers, especially in those with H.pylori.
- Stomach ulcers are more probable to occur in elderly people. With advancing age, the pylorus relaxes and allows excess bile to seep up into the stomach which erodes the stomach lining.
- People with type A blood group are more prone to get cancerous stomach ulcers.
- Duodenal ulcers develop in those who have an O blood group type. This is because people of this blood group are unable to produce certain substances on the surface of blood cells that protect the lining of the duodenum.

Lifestyle changes for prevention may include:

- **Not eating certain foods.** Avoid any foods that make your symptoms worse.
- **Quitting smoking.** Smoking can keep your ulcer from healing. It is also linked to ulcers coming back after treatment.
- **Limiting alcohol and caffeine.** They can make your symptoms worse.
- **Not using NSAIDs** . These include aspirin and ibuprofen.

CO3 BL2 9. Describe the cervical cancer symptoms, diagnosis and treatment.

Initial stages of cervical cancer show no signs or symptoms. Signs and side effects of further developed cervical cancer include:

- Vaginal bleeding after intercourse
- Abnormal Vaginal discharge with foul odor
- Pelvic pain during intercourse

Screening tests can help detect cervical cancer and precancerous cells that may one day develop into cervical cancer. Screening tests include:

- **Pap test.** During a Pap test, your doctor scrapes and brushes cells from your cervix, which are then examined in a lab for abnormalities.

A Pap test can detect abnormal cells in the cervix, including cancer cells and cells that show changes that increase the risk of cervical cancer.

- **HPV DNA test.** The HPV DNA test involves testing cells collected from the cervix for infection with any of the types of HPV that are most likely to lead to cervical cancer.

Treatment for cervical cancer depends on several factors, such as the stage of the cancer, other health problems you may have and your preferences.

Early-stage cervical cancer is typically treated with surgery. Radiation therapy uses high-powered energy beams, such as X-rays or protons, to kill cancer cells. Radiation therapy is often combined with chemotherapy as the primary treatment for locally advanced cervical cancers. It can also be used after surgery if there's an increased risk that the cancer will come back. If you haven't started menopause yet, radiation therapy might cause menopause.

For locally advanced cervical cancer, low doses of chemotherapy are often combined with radiation therapy, since chemotherapy may enhance the effects of the radiation. Higher doses of chemotherapy might be recommended to help control symptoms of very advanced cancer. Targeted drug treatments focus on specific weaknesses present within cancer cells. By blocking these weaknesses, targeted drug treatments can cause cancer cells to die. Targeted drug therapy is usually combined with chemotherapy.

Immunotherapy is a drug treatment that helps your immune system to fight cancer. Your body's disease-fighting immune system might not attack cancer because the cancer cells produce proteins that make them undetectable by the immune system cells.

CO4 BL4 10. Explaing the five concept of aging

Many theories attempt to explain why organisms age. Some of them contradict one another as science has not agreed on one theory over another.

- **Oxidative Damage Theory** - This theory is also known as the Free Radical Theory of Ageing. Oxidative stress in the body causes damage to cells which affects how other organ systems operate. If the body cannot neutralize this damage over time, the free radicals cause cell death and organ failure. Free radicals are negatively-charged molecules that contain an extra electron. They attach to healthy molecules and pollute them with their negatively charged chemicals.
- **Damage Accumulation Theory** - This theory suggests that their ability to repair damaged DNA declines as people age. It's like an assembly line in a factory run by machines where one machine goes down, and the line continues to run. Everything produced on that line

comes through incomplete or damaged. This damage builds up in the cells over time, causing them to stop functioning or cross signals and damage other cells.

- **Epigenetic Theory** - This is also known as The Information Theory. This concept theorizes that your environment greatly affects how your genes and DNA express themselves. Kidney cells will express themselves as the kidney, and your liver cells will become part of the liver. This is called the epigenome. The epigenome determines what parts of the DNA should turn on and turn off to express or suppress specific genes. Over time your environment can cause damage to this mechanism. Kidney cells may start to express themselves as liver cells, and the body goes haywire eventually.
- **Group Selection Theory** - You may also hear this theory called the Kin Selection Theory. This concept suggests that death and aging are a part of maintaining the group's well-being and longevity. The death of the elderly creates more resources and opportunities for the young, which ensures the species' survival.

CO3 BL4 11.Present the factors influencing aging.

Everyone ages differently, yet many people strive to slow down the process as much as possible. While aging is unique to everyone, the following factors may affect the aging process:

- Hormonal imbalances
- Genetics
- Chronic illness and other comorbidities
- Lifestyle factors
- Mental health problems
- Social factors
- Environmental factors

If you have begun to develop health issues due to the aging process, certain anti-aging and regenerative therapies may help you restore your energy, strength, and hormonal balance. Our facility specializes in regenerative and metabolic medicine, so we can review your health condition to see which treatments are suitable for you.

Section C (1 x 10 = 10)

(Answer any **ONE** question)

CO5 BL5 11. Summarize the factors for gall stones types, symptoms and prevention.

Gallbladder is a small organ located in your upper right abdomen, right below your liver. It's a pouch that stores bile, a green-yellow liquid that helps with digestion. Issues with your gallbladder typically occur when something is blocking its bile duct — like a gallstone.

Most gallstones are created when substances that are found in bile, like cholesterol, harden. Gallstones can lead to pain in the upper right abdomen or the center of your stomach. You

may experience gallbladder pain from time to time after you eat foods that are high in fat, such as fried foods, but the pain can occur at almost any time.

Pain caused by gallstone issues usually lasts for only a few hours, but it can feel severe.

If gallstones are left untreated or unidentified, the symptoms may increase to include:

- a high temperature
- rapid heartbeat
- yellowing of the skin and whites of the eyes (jaundice)
- itchy skin
- diarrhea
- chills
- confusion
- a loss of appetite

The actual cause of gallstones is thought to be due to a chemical imbalance of bile inside of the gallbladder. While researchers still aren't clear about what exactly causes that imbalance to happen, there are a few possible reasons:

- Having too much cholesterol in your bile can lead to yellow cholesterol stones. These hard stones may develop if your liver makes more cholesterol than your bile can dissolve.
- Bilirubin is a chemical produced during the normal breakdown of red blood cells. After it's created, it passes through the liver and is eventually excreted out of the body.

Treatments include,

1. Surgical

- **Laparoscopic cholecystectomy.** This is a common surgery that requires general anesthesia. The surgeon will usually make three or four incisions in your abdomen.

They'll then insert a small, lighted device into one of the incisions, check for stones, and carefully remove your gallbladder. You can usually go home on the day of the procedure or the day after if you have no complications.

- **Open cholecystectomy.**This surgery is typically performed when the gallbladder is inflamed, infected, or scarred. This surgery may also happen if problems occur during a laparoscopic cholecystectomy.

2. Non-surgical
    - **Oral dissolution therapy** typically includes using the medications like chenodiol (Chenix) to break up gallstones. These medications contain bile acids, which work to break up the stones. This treatment is best suited for breaking up cholesterol stones and can take many months or years to work completely.
    - **Shock wave lithotripsy** is another option. A lithotripter is a machine that generates shock waves that pass through a person.
    - **Percutaneous drainage of the gallbladder** involves placing a sterile needle into the gallbladder to aspirate (draw out) bile. A tube is then inserted to help with additional drainage. This procedure isn't typically a first line of defense and tends to be an option for individuals who may not be suited for other procedures.

While there is no foolproof way to completely prevent gallstones, cholesterol seems to play a major role in their formation. If you have a family history of gallstones, your doctor may advise you to limit foods with a high saturated fat content. Some of these foods include:

- fatty meat, like sausage and bacon
- cakes and cookies
- lard and cream
- certain cheeses

Because people living with obesity are more predisposed to gallstones, keeping your weight within a moderate range is another way to limit the possibility of their formation.

CO BL4 12. Describe Dementia. Cause, types, Symptoms and Treatment.

Dementia refers to a group of symptoms that affect memory, thinking, behavioral health, and social abilities so much which hinder daily life. It is not a result of any particular disease but numerous health conditions can cause dementia. It typically involves memory loss but is accompanied by various other symptoms. Millions of people in the world suffer from this syndrome and approximately 10 million new cases are introduced every year. Alzheimer's disease is the commonest type of dementia and nearly 60-70% of cases have been found out. Dementia affects memory, thought process, learning, understanding, decision making, and language. The outcome of dementia can affect a patient's life in all aspects. Whether it be family, society, and physical, psychological, social, and economic, all parts of a person's life are affected to a large extent.

Dementia can be of different types-

Alzheimer's disease: It is also called senile dementia, a progressive disorder in which brain cells degenerate themselves and die and consequently destroy memory and mental functions.

Parkinson's disease: It is a disorder of the central nervous system in which nerve cell damage may cause a drop in dopamine levels and hence affect movements including tremors.

Frontotemporal dementia (FTD)/frontotemporal lobar degeneration(FTLD): It is commonly known as Pick's disease. And is kind of similar to Alzheimer's disease but slightly different. It results in a change in personality and behavior. It can also interfere with judgment and perception.

Vascular dementia: It is also called multi-infarct dementia caused by brain damage caused due to multiple strokes. It affects memory in older adults, specifically those who are at high risk of stroke which is the result of obesity or diabetes.

Creutzfeldt-Jakob disease(CJD): It is also called subacute spongiform encephalopathy in which the brain degenerates. It may arise spontaneously or come in inheritance from family. Or it is possible that the patient gets transmission by coming in contact with infectious tissue such as during transplant or eating contaminated meat. This disorder evokes personality changes, anxiety, depression, and memory loss within a few months. It may lead to dementia and death in the end.

Lewy body dementia(LBD): It is a type of progressive dementia that damages brain cells due to the deposits of abnormal microscopic protein particles called Lewy bodies and interferes with motor functions. It includes changes in vision, hallucinations, inattentiveness, and misidentification of objects.

Primary progressive aphasia(PPA): Changes in the ability to speak, understand, read, write and convey thoughts have been observed in PPA. It is a language disorder that is not the same as the problems with speech and reading and writing abilities.

People suffering from dementia have problems in their daily life such as remembering things and thinking. Some other symptoms include:

- Short term memory loss
- Communication problems
- Become lost
- Depression and Mood swings
- Poor judgment and dilemma
- Hallucinations and delusions
- Problems with movement
- Asking questions repeatedly
- Completing work in longer durations
- Describing familiar words with peculiar words

There are 3 stages in which each person is affected by dementia in a distinct way depending upon the personality prior to illness and impact of disease including:

Early-stage: The beginning of dementia is gradual and it may show no impairment or very mild decline in which you can observe either no symptoms or slight changes of the behavior. The common symptoms include:

- Forgetfulness
- Fail to stay away aware of the time
- Getting lost in a familiar place

Middle stage: The signs and symptoms become transparent and constraining that may show a moderate decline in behavior include:

- Forgetful of current events and names of people
- Getting lost at home and familiar places
- Increasing difficulty with communication

Late-stage: Dormant and dependence condition in which the memory state is serious. It may show moderately severe to very severe symptoms including-

- Unaware of time and place
- Walking difficulty
- Behavioral changes that may include aggression
- Difficulty in recognizing relatives and friends
- Increased dependency

Several medical drugs are in use as medicine for the treatment of dementia. However, these drugs require a doctor's prescription to be in use. These includes:

Cholinesterase inhibitors like donepezil, rivastigmine, and galantamine block the normal breakdown of acetylcholine which is the main neurotransmitter in both the central nervous system(CNS) and peripheral nervous system(PNS) and is responsible for the contraction of smooth muscles, dilation of blood vessels, increasing secretions from the body and slow the pace of the heart.

NMDA receptor antagonists like memantine are a class of drugs that may help with memory and reduce neuronal excitation, abnormal pain occurrence, and hyperalgesia.

(CO: Mark CO/CO2/CO3/CO4/CO5/CO6) (BL: Blooms Taxonomy Level 1/2/3/4/5/6)

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SRM ARTS AND SCIENCE COLLEGE
Department of Microbiology
UNIT TEST-1
2022-2023

Date : 25.1.23 **Duration :1hr** **Class :I Bsc**

Subject Name & Code: Basic and applied immunology SN22A

Section A (5 x 2 = 10)

(Answer any **FIVE** questions)

CO1	BL1	1. Define Antigens
CO1	BL1	2. State immunology
CO2	BL2	3.Describe Antibody
CO1	BL1	4.Define Natural killer cells
CO1	BL1	5.State live attenuated vaccine
CO1	BL1	6. Define Humoral immunity
CO2	BL6	7. Write about ABO blood group

Section B (1 x 5 = 5)

(Answer any **ONE** question)

CO2	BL2	8. Describe the history of Immunology.
CO2	BL3	9. Give an account on the cell mediated immune response.

Section C (1 x 10 = 10)

(Answer any **ONE** question)

CO1	BL3	10. Give an account on primary lymphoid organs.
CO1	BL2	11. Discuss in detail about the mechanism of immune response

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SRM ARTS AND SCIENCE COLLEGE
Department of Microbiology
UNIT TEST-1
2022-2023

Date : 25.1.23 **Duration :1hr** **Class :I Bsc**
Subject Name & Code : Basic and applied immunology SN22A

ANSWER KEY

1. Antigens: a toxin or other foreign substance which induces an immune response in the body, especially the production of antibodies.
2. Immunology is **the study of the immune system** and is a very important branch of the medical and biological sciences.
3. Antibody: a blood protein produced in response to and counteracting a specific antigen
4. Natural killer cells: a lymphocyte able to bind to certain tumour cells and virus-infected cells without the stimulation of antigens, and kill them by the insertion of granules containing perforin
5. Live vaccines **use a weakened (or attenuated) form of the germ that causes a disease.** Because these vaccines are so similar to the natural infection that they help prevent, they create a strong and long-lasting immune response.
6. Humoral immunity is **the aspect of immunity that is mediated by macromolecules** - including secreted antibodies, complement proteins.
7. ABO blood group: For a blood transfusion, the ABO blood group system is **used to match the blood type of the donor and the person receiving the transfusion.** People with blood type O can donate blood to anyone and are called universal donors. People with blood type AB can accept blood from all donors and are called universal recipients.
8. History of Immunology

1883. **Klebs and Loeffler** isolated diphtheria bacillus.
1884. **Metchnikoff**, a Russian zoologist, gave the idea of cellular immunity by showing the phagocytosis of fungus spores by white blood cells in the frog.
1885. **Robert Koch's phenomena**: He showed that animals could be immunized by exposure to Tubercle bacilli and when exposed to Tuberculous bacilli, the animal showed a different reaction in the form of thickening the skin at the site of injection, which appears in 24-48 hours.
1886. **Julius Bordet** ultimately discovered complement and got the Noble Prize.
1887. **Kraus** discovered precipitation by mixing a patient's serum and filtrate of typhoid bacilli.
1888. **Landsteiner** dominated for 40 years in the field of immunology. He discovered blood group antigens and antibodies. He also introduced the concept of incomplete antigen (Hapten). He was also awarded the Nobel Prize.
1889. **Sir Almoth** found that antibodies can help in phagocytosis and settled the controversy of humoral and cellular immunity.
1890. Immunology word first time appears in Medicus Index.

1890. Immunology word first time appears in Medicus Index.
1891. **Land Steiner** published a book on the specificity of serologic reactions. He got the Nobel prize for his work on human blood groups.
1892. The first book was published on the chemistry of antigens and antibodies.
1893. **Lady Mary Wortley Montagu** was the wife of a British Ambassador in Turkey; she contracted smallpox and later advocated for smallpox vaccination.

9. Cell-mediated immunity (CMI) is an immune response that does not involve antibodies but rather involves the activation of macrophages and NK-cells, the production of antigen-specific cytotoxic T-lymphocytes, and the release of various cytokines in response to an antigen . Cellular immunity protects the body by:

1. Activating antigen-specific cytotoxic T-lymphocytes (CTLs) that are able to destroy body cells displaying epitopes of foreign antigen on their surface, such as virus-infected cells, cells with intracellular bacteria, and cancer cells displaying tumor antigens;
2. Activating macrophages and NK cells, enabling them to destroy intracellular pathogens; and
3. Stimulating cells to secrete a variety of cytokines that influence the function of other cells involved in adaptive immune responses and innate immune responses.

Cell-mediated immunity is directed primarily microbes that survive in phagocytes and microbes that infect non-phagocytic cells. It is most effective in destroying virus-infected cells, intracellular bacteria, and cancers. It also plays a major role in delayed transplant rejection

10. Primary Lymphoid Organs

The organs in which the production of the cells of the immune system occurs are known as primary lymphoid organs. They are also knwon as central lymphoid organs. They include the thymus and the bone marrow.

Thymus

The thymus is a gland-like organ that is situated at the back of the heart and above the breastbone. It is the site for the maturation of thymus cell lymphocytes, also known as T cells. The thymus gives a suitable environment for the production of T cells from hematopoietic progenitor cells.

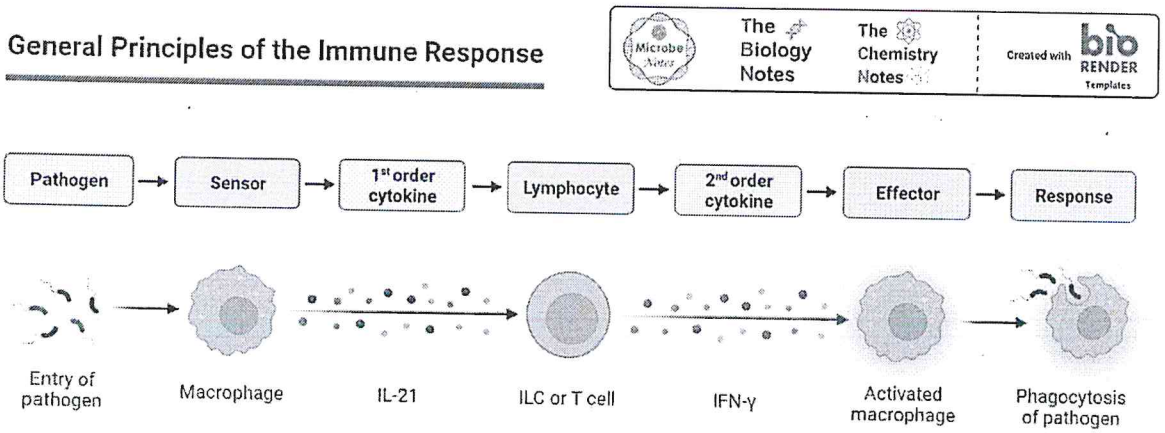
This gland reaches its full maturity during childhood. As adulthood commences, it is replaced by fatty or adipose tissue. The T cells coordinate the innate and adaptive immune systems.

Bone Marrow

Bone marrow, a primary lymphoid organ, is a spongy tissue found in the bones. It is the site for the production of precursors of T cells, and production and maturation of B cells. These cells are then transported to other organs and tissues via blood to carry out their function. The red bone marrow is found in abundance during the time of birth and it

actively produces immune system cells, but over time, the red bone marrow converts to fatty tissues. In adults only the pelvis, ribs and breastbone have red bone marrow.
The B cells that are produced and matured in the bone marrow immediately travel to the circulatory system in search of pathogens. T cells travel to the thymus for maturation and they join B cells in the circulatory system in search of pathogens. T cells are also involved in the process of apoptosis.

11. **Mechanism of immune response**



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Department of Microbiology

UNIT TEST I – 2022-2023

Date : 26.01.23 **Duration : 1 hour** **Class : I B.Sc Microbiology**

Subject Name: Bioinstrumentation **Max Marks: 25**

Section A (5x2=10)

(Answer any **FIVE** questions)

CO1	BL3	1. Uses of pH meter.
CO1	BL1	2. Define anaerobic incubator.
CO1	BL2	3. Differentiate Laminar air flow and biosafety cabinet.
CO1	BL1	4. List few applications of biosafety cabinet.
CO2	BL6	5. Write few applications of paper chromatography.
CO2	BL6	6. Write the importance of chromatographic techniques.
CO2	BL1	7. List the types of chromatography.

Section B (1x5 = 5)

(Answer any **ONE** question)

CO1	BL2	8. Explain the working principle of pH meter.
CO1	BL6	9. Write short notes on anaerobic incubator.

Section C (1x10 = 10)

(Answer any **ONE** question)

CO1	BL6	10. Write in detail about Laminar air flow.
CO2	BL2	11. Describe about the steps in paper chromatography.

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I B.Sc MICROBIOLOGY

BIOINSTRUMENTATION

INTERNAL TEST I ANSWER KEY

1. pH meters are used for soil measurements in agriculture, water quality for municipal water supplies, swimming pools, environmental remediation; brewing of wine or beer; manufacturing, healthcare and clinical applications such as blood chemistry; and many other applications.
2. Anaerobic incubators provide a non-oxygen environment to cultivate and handle anaerobic microbe. They usually form a part of the chambers or workstations that are used in laboratories specializing in anaerobic culture work.
3. A Laminar Flow Hood (LFH), is not a biological safety cabinet. These devices do not provide any protection to the worker. They are designed to provide a sterile environment to protect the product. Air potentially contaminated with infectious agents may be blown towards the worker. Biosafety Cabinets are similar to the Laminar Air Flow cabinets. They too contain HEPA filters but there is one dissimilarity that Biosafety Cabinets offers complete protection to the users against harmful pathogens, since the contaminated air is filtered before it can come in contact with the users.
4. Biosafety cabinets (BSCs) are one type of biocontainment equipment used in biological laboratories to provide personnel, environmental, and product protection.
5. Paper Chromatography Applications: To study the process of fermentation and ripening, To check the purity of pharmaceuticals, To inspect cosmetics, To detect the adulterants, To detect the contaminants in drinks and foods, To examine the reaction mixtures in biochemical laboratories.
6. Chromatography is an important biophysical technique that enables the separation, identification, and purification of the components of a mixture for qualitative and quantitative analysis.
7. Various chromatography methods have been developed to that end. Some of them include column chromatography, thin-layer chromatography (TLC), paper chromatography, gas chromatography, ion exchange chromatography, gel permeation chromatography.
8. What is a pH Meter? Before exploring pH meter principles and applications, it's time to review what a pH meter does. A pH meter measures the acidity or alkalinity of a solution. Acidic solutions have positively charged hydrogen ions, and alkaline solutions have negatively charged hydroxide ions. pH stands for the power of hydrogen, and it is calculated based on the number of hydrogen ions in a liquid. Because these hydrogen ions create a positive charge, an acidic solution with many hydrogen ions can easily conduct an electric current. pH meters measure that ability. What is the Working Principle Behind Lab pH Meters? The working principle behind pH meters is potentiometry. This is the measurement of a solution's electric potential (voltage). Remember how acidic solutions can efficiently conduct an electric current because of the positive hydrogen ions? The ability of a solution to conduct a current is called electric potential. Electric potential is key in understanding pH meter principles and applications. A pH meter measures electric potential using 2 electrodes inserted into the liquid to create an electrical circuit. One of these electrodes, called the reference electrode, will contain a substance with a known electric potential. The other electrode, known as the sensor electrode, will be inserted into the solution being tested. The electric potential is the difference that results from comparing the reference electrode to the sensor electrode. What Are the Most Common Applications of pH Meters? pH meters have a wide range of industrial applications ranging

from medical to industrial. Measuring the voltage of a solution is the pH meter principle and applications all involve liquids as a result. pH meters are used in the development of pharmaceutical drugs since acidity can affect drug metabolism. In agriculture, pH meters are important for testing soil and water quality. Water purification plants use pH meters to validate filtration methods. pH meters measure water safety in pools and aquariums. pH meters are also used to develop food, cosmetics, and detergents.

9. Anaerobic incubators provide a non-oxygen environment to cultivate and handle anaerobic microbe. They usually form a part of the chambers or workstations that are used in laboratories specializing in anaerobic culture work. The incubator is provided in the workspace chamber whose temperature is controlled by using a solid state temperature sensor probe (thermistor) attached to the incubator body and a heating element. The anaerobic atmosphere in the chamber is initially achieved through a purge of the workspace by flowing anaerobic mixed gas (AMG), which pushes normal atmosphere out of the chamber. Anaerobic incubators are used for anaerobic microbiology assays, clinical microbiology anaerobic tissue culture research, anaerobic bacteriology, industrial research, and quality control applications. They find usage in large clinical or research laboratories for cell culture applications where accurate control of oxygen, carbon dioxide, temperature, and humidity are required.

10. A laminar flow cabinet or tissue culture hood is a carefully enclosed bench designed to prevent contamination of semiconductor wafers, biological samples, or any particle sensitive materials. Air is drawn through a HEPA filter and blown in a very smooth, laminar flow towards the user. Due to the direction of air flow, the sample is protected from the user but the user is not protected from the sample. The cabinet is usually made of stainless steel with no gaps or joints where spores might collect. Such hoods exist in both horizontal and vertical configurations, and there are many different types of cabinets with a variety of airflow patterns and acceptable uses. Laminar flow cabinets may have a UV-C germicidal lamp to sterilize the interior and contents before usage to prevent contamination of the experiment. Germicidal lamps are usually kept on for fifteen minutes to sterilize the interior before the cabinet is used. The light must be switched off when the cabinet is being used, to limit exposure to skin and eyes as stray ultraviolet light emissions can cause cancer and cataracts.

11. Paper Chromatography Procedure

    Below we have explained the procedure to conduct Paper Chromatography Experiment for easy understanding of students. Selecting a suitable type of development: It is decided based on the complexity of the solvent, paper, mixture, etc. Usually ascending type or radial paper chromatography is used as they are easy to perform. Also, it is easy to handle, the chromatogram obtained is faster and the process is less time-consuming. Selecting a suitable filter paper: Selection of filter paper is done based on the size of the pores and the sample quality. Prepare the sample: Sample preparation includes the dissolution of the sample in a suitable solvent (inert with the sample under analysis) used in making the mobile phase. Spot the sample on the paper: Samples should be spotted at a proper position on the paper by using a capillary tube. Chromatogram development: Chromatogram development is spotted by immersing the paper in the mobile phase. Due to the capillary action of paper, the mobile phase moves over the sample on the paper. Paper drying and compound detection: Once the chromatogram is developed, the paper is dried using an air drier. Also, detecting solution can be sprayed on the chromatogram developed paper and dried to identify the sample chromatogram spots.

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Department of Microbiology
UNIT 1
2022-2023

Date: 25.01.23 **Duration :1hr**
Subject Name & Code: Soil and Agricultural Microbiology **Class: II BSc Microbiology**

Section A

(2×5 =10)

(Answer any five questions)

CO4 BL2 1.Name the stages of nitrogen cycle.

CO4 BL1 2. State denitrification.

CO4 BL1 3.Define biofertilizer.

CO4 BL1 4. State what is Rhizobium.

CO BL1 5. Define soil microbiology.

CO BL1 6. State soil structure

CO BL2 7. Name the types of soil.

Section B (5×1 =5)

(Answer anyone questions)

CO4 BL2 8. Describe about Nitrogen fixation.

CO BL 2 9. Explain about test for soil fertility.

Section C (10×1 =10)

(Answer anyone questions)

CO4 BL2 10. Explain in detail about Nitrogen cycle.

CO BL 2 11. Describe about the factors of soil formation.

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1. There are five stages in the nitrogen cycle, and we will now discuss each of them in turn: fixation or volatilization, mineralization, nitrification, immobilization, and denitrification.

2. Biofertilizer can be defined as biological products containing living microorganisms that, when applied to seed, plant surfaces, or soil, promote growth by several mechanisms such as increasing the supply of nutrients, increasing root biomass or root area and increasing nutrient uptake capacity of the plant.

3. Rhizobium is a genus of Gram-negative soil bacteria that fix nitrogen. Rhizobium species form an endosymbiotic nitrogen-fixing association with roots.

4. The study of organisms in soil, their functions and how they affect properties of soil or environmental microbiology.

5. Soil structure refers to the way soil particles group together to form aggregates (or peds). These aggregates vary in size and shape from small crumbs through to large block.

6. Soil is classified into four types: Sandy soil,Silt Soil,Clay Soil,Loamy Soil.

7. Nitrogen fixation, any natural or industrial process that causes free nitrogen (N_2), which is a relatively inert gas plentiful in air, to combine chemically with other elements to form more-reactive nitrogen compounds such as ammonia, nitrates, or nitrites.

Section B

8. Nitrogen fixation, any natural or industrial process that causes free nitrogen (N2), which is a relatively inert gas plentiful in air, to combine chemically with other elements to form more-reactive nitrogen compounds such as ammonia, nitrates, or nitrites. The symbiotic nitrogen-fixing bacteria invade the root hairs of host plants, where they multiply and stimulate the formation of root nodules, enlargements of plant cells and bacteria in intimate association. Within the nodules, the bacteria convert free nitrogen to ammonia, which the host plant utilizes for its development. To ensure sufficient nodule formation and optimum growth of legumes (e.g., alfalfa, beans, clovers, peas, and soybeans), seeds are usually inoculated with commercial

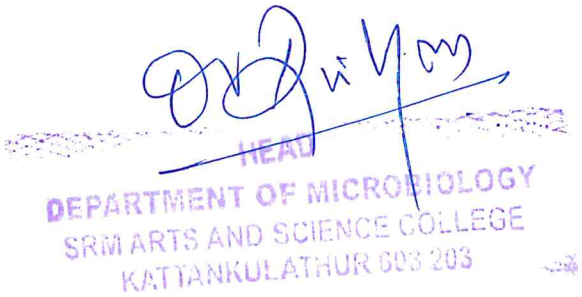
cultures of appropriate Rhizobium species, especially in soils poor or lacking in the required bacterium.

9. Soil testing is often performed by commercial labs that offer a variety of tests, targeting groups of compounds and minerals. The advantages associated with local lab is that they are familiar with the chemistry of the soil in the area where the sample was taken. This enables technicians to recommend the tests that are most likely to reveal useful information.
   Soil testing in progress
   Laboratory tests often check for plant nutrients in three categories:
   Major nutrients: nitrogen (N), phosphorus (P), and potassium (K)
   Secondary nutrients: sulfur, calcium, magnesium
   Minor nutrients: iron, manganese, copper, zinc, boron, molybdenum, chlorine

Section C

10. Nitrogen cycle, circulation of nitrogen in various forms through nature. Nitrogen, a component of proteins and nucleic acids, is essential to life on Earth. Although 78 percent by volume of the atmosphere is nitrogen gas, this abundant reservoir exists in a form unusable by most organisms. Through a series of microbial transformations, however, nitrogen is made available to plants, which in turn ultimately sustain all animal life. The steps, which are not altogether sequential, fall into the following classifications: nitrogen fixation, nitrogen assimilation, ammonification, nitrification, and denitrification.
11. Soil is deposited by streams or is derived from in-situ weathering. At this point, the soil has many properties, such as mineral composition, color, particle size, and chemical elements. The black soil, for example, derives its color from lava rock.
    2. Climate: - This is one of the key factors in soil formation because it influences the weathering rate of the parent rock.
    3. Function of precipitation:- The variability of precipitation affects the composition of the soil. For example, areas with low rainfall and high evaporation rates have led to the accumulation of salts in the soil. The soils underlying tropical rainforests appear to be nutrient-poor due to extensive leaching due to heavy rainfall.
    4. Function of temperature: - It also plays an important role because temperature variations cause shrinkage and swelling, frost action, and general soil weathering.
    5. Biota (Flora, Fauna, and Microorganisms):- Biota, in combination with climate change, modifies the parent material for the production of soil. For example, leguminous plants (such as beans, peas, and groundnuts) have nitrogen-fixing bacteria. These plants are taking nitrate ions directly from these nitrogen-fixing

bacteria. The fertility of the soil is improved by fixing atmospheric nitrogen to ammonia or ammonium.



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Department of Microbiology

Date : 27/01/2023 **Duration : 1 hr** **Class :II BSc**

Subject Name & Code : Clinical Biochemistry

Section A (5 x 2 = 10)

(Answer any **FIVE** questions)

CO1	BL1	1. Define glucose homeostasis
CO1	BL1	2. State hyperglycaemic hormone and hypoglycaemic hormone
CO 1	BL1	3. Recall what glycosuria is and name the biochemical test used to identify
CO3	BL4	4. Explain Lipid
CO3	BL1	5. Define different dietary sources of lipids
CO 3	BL1	6. Define lipid metabolism
CO 3	BL3	7. Demonstrate different phases of digestion and absorption

Section B (1 x 5 = 5)

(Answer any **ONE** question)

CO1	BL2	8.Differentiate between insulin and glucagen
CO1	BL2	9.Paraphrase the factors maintaining blood glucose

Section C (1 x 10 = 10)

(Answer any **ONE** question)

CO1	BL1	10.Describe how the blood glucose is regulated during well fed state and post prandial state
CO1	BL4	11.Explain the role of insulin

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ANSWER KEY

1. Glucose Homeostasis: the balance of insulin and glucagon to maintain blood glucose. Insulin: secreted by the pancreas in response to elevated blood glucose.
2. Hyperglycemic hormone is glucagon, which hypoglycemic hormone is insulin.
3. Glycosuria is a term that defines the presence of reducing sugars in the urine, such as glucose, galactose, lactose, fructose, etc. The glucose urine test measures the amount of sugar (glucose) in a urine sample. The presence of glucose in the urine is called glycosuria or glucosuria. Glucose level can also be measured using a blood test or a cerebrospinal fluid test.
4. Any of a class of organic compounds that are fatty acids or their derivatives and are insoluble in water but soluble in organic solvents.
5. Dietary lipids are primarily oils (liquid) and fats (solid). Commonly consumed oils are canola, corn, olive, peanut, safflower, soy, and sunflower oil. Foods rich in oils include salad dressing, olives, avocados, peanut butter.
6. Lipid metabolism involves the synthesis of the structural and functional lipids (such as phospholipids, glycolipids, sphingolipids, cholesterol, prostaglandins, etc.) that are characteristic of individual tissues and the degradation of lipids to satisfy the metabolic needs of the body (e.g., energy production).
7. The processes of digestion include six activities: ingestion, propulsion, mechanical or physical digestion, chemical digestion, absorption, and defecation. The first of these processes, ingestion, refers to the entry of food into the alimentary canal through the mouth.
8. Glucagon increases blood sugar levels, whereas insulin decreases blood sugar levels. If your pancreas doesn't make enough insulin or your body doesn't use it properly, you can have high blood sugar (hyperglycemia), which leads to diabetes.
9. Eating a healthy diet with plenty of fruit and vegetables, maintaining a healthy weight, and getting regular physical activity can all help. Other tips include: Keep track of your blood sugar levels to see what makes them go up or down. Eat at regular times, and don't skip meals.
10. In the fed state, pancreatic β cells secret insulin in response to an increase in blood glucose, amino acids, and fatty acids. Insulin stimulates glycogen synthase by activating Akt which phosphorylates and inactivates GSK-3, thus increasing glycogen synthesis.
11. The major purpose of insulin is to regulate the body's energy supply by balancing micronutrient levels during the fed state [30]. Insulin is critical for transporting intracellular glucose to insulin-dependent cells/tissues, such as liver, muscle, and adipose tissue.

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Department of Microbiology

UNIT TEST I- 2022-2023

Date: 23.01.23 **Duration :1hr**

Subject Name & Code: Environmental Microbiology **Class: III BSc Microbiology**

Section A

(2×5 =10)

(Answer any five questions)

CO4 BL2 1. Name composting.

CO1 BL1 2. State biosphere.

CO1 BL1 3.Define producers.

CO1 BL1 4.Define consumers.

CO1 BL1 5.Name the microconsumers.

CO1 BL1 6.Define Benthic community.

CO1 BL1 7.Differentiate abiotic and biotic with examples.

Section B (5×1 =5)

(Answer anyone questions)

CO1 BL2 8. Describe the components of ecosystem.

CO1 BL2 9. Discuss microorganisms as component of ecosystem both as producers and consumers.

Section C (10×1 =10)

(Answer anyone questions)

CO4 BL2 13. Explain about composting and how it is done.

CO1 BL2 14 Describe in detail about microbial communities in aquatic and terrestrial environment.

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Section A

1. Compost is a mixture of ingredients used as plant fertilizer and to improve soil's physical, chemical and biological properties.
2. The biosphere is a narrow zone on the surface of the earth where soil, water, and air combine to sustain life.
3. A producer in an ecosystem is the baseline part of a food chain. Producers include plants, bacteria, algae and phytoplankton.
4. Consumer is a category that belongs within the food chain of an ecosystem. It refers predominantly to animals. Consumers are unable to make their own energy.
5. Micro-consumers are also called osmotrophs. -Osmotrophs are micro-organisms which absorb food by the process of osmotrophy. -Bacteria and fungi use the osmotrophic method for the intake of nutrients.
6. Benthic communities are largely composed of macroinvertebrates, such as annelids, mollusks, and crustaceans. These organisms inhabit the bottom substrates of estuaries and play a vital role in maintaining sediment and water quality.
7. Abiotic factors are water, air, soil, sunlight, and minerals. Biotic factors are living or once-living organisms in the ecosystem.

Section B

8. Components of Ecosystem

Biotic components are the living things that have a direct or indirect influence on other organisms in an environment. For example plants, animals, and microorganisms and their waste materials.

Abiotic components of an ecosystem include all chemical and physical elements i.e. non-living components. Abiotic components can vary from region to region, from one ecosystem to another. They mainly take up the role of life supporter. They determine and restrict the population growth, number, and diversity of biotic factors in an ecosystem. Hence, they are called limiting factors.

A terrestrial ecosystem consists of abiotic factors like climate, type of soil or rock, altitude, temperature, nutrients, and minerals, whereas abiotic components in an

aquatic ecosystem include dissolved gases, depth of water, salinity, pH of water, light intensity etc.

9. An ecosystem can be categorized into its abiotic constituents, including minerals, climate, soil, water, sunlight, and all other nonliving elements, and its biotic constituents, consisting of all its living members. Linking these constituents together are two major forces: the flow of energy through the ecosystem and the cycling of nutrients within the ecosystem. Ecosystems vary in size: some are small enough to be contained within single water droplets while others are large enough to encompass entire landscapes and regions (see biome).

Section C

10. Composting is the natural process of recycling organic matter, such as leaves and food scraps, into a valuable fertilizer that can enrich soil and plants. Anything that grows decomposes eventually; composting simply speeds up the process by providing an ideal environment for bacteria, fungi, and other decomposing organisms (such as worms, sowbugs, and nematodes) to do their work. The resulting decomposed matter, which often ends up looking like fertile garden soil, is called compost. Fondly referred to by farmers as "black gold," compost is rich in nutrients and can be used for gardening, horticulture, and agriculture.

    Organic discards can be processed in industrial-scale composting facilities, in smaller-scale community composting systems, and in anaerobic digesters, among other options. This guide focuses primarily on home composting, which is a great way to keep your organic discards out of the waste stream and produce a valuable soil amendment for your own use.

11. Microorganisms include members of the plant kingdom, protozoa, bacteria, and fungi. These organisms differ radically, and share only their small size; most are not visible without a microscope, though colonies of some can be seen with the naked eye. Microorganisms are present in large quantities everywhere and can survive extreme physical and chemical conditions. Many microorganisms play foundational roles in aquatic ecosystems, capturing the sun's energy through photosynthesis and, through their role in decomposition, releasing nutrients stored in organic tissue.

Bacteria

Some of the smallest and most ancient organisms on earth, bacteria are present in virtually every environment and are abundant in all aquatic systems. In rivers and streams, many of the bacteria wash in from the surrounding land, and their abundance can increase dramatically after a rainfall. The abundance of bacteria is typically in the millions per millilitre (mL), and in the hundreds of millions per millilitre in especially productive or polluted waters.

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Department of Microbiology
UNIT 1
2022-2023

Date: 24.01.23 **Duration :1hr**

Subject Name & Code: FOOD AND DAIRY MICROBIOLOGY **Class: II BSc Microbiology**

Section A

(Answer any five questions)

(2×5 =10)

CO1 BL2 1.Name the types of extrinsic factor

CO1 BL1 2. State intrinsic factor

CO3 BL1 3.Define contamination

CO2 BL1 4. State principle of food preservation

CO4 BL1 5. Define intoxication

CO1 BL1 6. State oxidation and reduction potential

CO1 BL2 7. Name the types of factors involved in food as substrate for micro organism

Section B (5×1 =5)

(Answer anyone questions)

CO1 BL2 8. Describe about general characteristics of bacteria in food microbiology

CO1 BL 2 9. Explain about the micro organism important in food microbiology

Section C (10×1 =10)

(Answer anyone questions)

CO1 BL2 10. Explain in detail about general characteristics and their importance of molds and yeast in food microbiology

CO1 BL 2 11. . Describe about food as substrate for micro organism

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Answer key

SECTION A

1. The food environment is composed of intrinsic factors inher- ent to the food (i.e., pH, water activity, and nutrients) and extrinsic factors external to it (i.e., temperature, gaseous environment, and the presence of other bacteria).

2. Intrinsic factors include moisture content and water activity, pH and acidity, nutrient content, redox potential, antimicrobial chemicals, competitive microflora, and homogeneity.

3. Food contamination is generally defined as foods that are spoiled or tainted because they either contain microorganisms, such as bacteria or parasites, or toxic substances that make them unfit for consumption.

4. Food preservation is defined as the processes or techniques undertaken in order to maintain internal and external factors which may cause food spoilage. The principal objective of food preservation is to increase its shelf life retaining original nutritional values, color, texture, and flavor.

5. Intoxication: occurs from eating a food that contains a toxin produced by bacteria. An example of food intoxication is Clostridium botulinum poisoning. Intoxification: occurs when live bacterial cells are ingested which then produce toxins in the body. An example of food intoxification is Clostridium perfringens.

6. Oxidation–reduction potential (E_h) is a measure of the ability of chemical/biochemical systems to oxidize (lose electrons) or reduce (gain electrons). A positive value indicates an oxidized state, whereas a negative value indicates a reduced state. The E_h of milk is about +150 mV and that of cheese is about -250 mV.

7. The most important factors that affect microbial growth in foods can be summarized in the following categories: (i) factors related to the food itself, the "intrinsic factors," which include nutrient content, water activity, pH value, redox potential, and the presence of antimicrobial substances and mechanical barriers

SECTION B

8. Bacteria are the most important microorganisms to the food processor. Most are harmless, many are highly beneficial, some indicate the probable presence of filth, disease organisms, spoilage and a few cause disease. There are thousands of species of

bacteria, but all are single-celled and fall into three basic shapes: spherical, straight rods, and spiral rods. To see them, you need a microscope that magnifies about 1000-fold. All bacteria reproduce by dividing into two cells. The two cells then divide to become 4, 4 become 8, and so forth. Under ideal conditions, this doubling may occur as frequently as every 15 minutes, so that within 5 hours there will be more than a million cells from the original single cell. If there are 1000 original cells instead of a single one, there will be over 1 billion cells in 5 hours.

Some rod-shaped bacteria are capable of existing in two forms, dormant spores and active vegetative cells. Vegetative cells form spores under adverse conditions as a means of survival. Spore forms preserve the bacteria from starvation, drying, freezing, chemicals, and heat. When conditions become favorable, the spores germinate, with each spore again becoming a vegetative cell with the ability to reproduce. Among the bacteria, sporulation is not a means of reproduction since each cell forms a single spore which later germinates into a single cell again. Most sporulating bacteria that grow in the presence of air belong to the Genus Bacillus, and most that grow only in the absence of air belong to the Genus Clostridium

9. Microbiology is important to food safety, production, processing, preservation, and storage. Microbes such as bacteria, molds, and yeasts are employed for the foods production and food ingredients such as production of wine, beer, bakery, and dairy products. On the other hand, the growth and contamination of spoilage and pathogenic microorganisms is considered as one of the main causes to loss of foodstuff nowadays. Although technology, hygienic strategies, and traceability are important factors to prevent and delay microbial growth and contamination, food remains susceptible to spoilage and activity of pathogen microorganisms. Food loss by either spoilage or contaminated food affects food industry and consumers leading to economic losses and increased hospitalization costs. This chapter focuses on general aspects, characteristics, and importance of main microorganisms (bacteria, yeasts, molds, virus, and parasites) involved in food spoilage or contamination: known and recently discovered species; defects and alterations in foodstuff; most common food associated with each foodborne disease; resistance to thermal processing; occurrence in different countries; outbreaks; and associated symptoms.Bacteria.

SECTION C

10. Yeasts are microscopic fungi consisting of solitary cells that reproduce by budding. Molds, in contrast, occur in long filaments known as hyphae, which grow by apical extension. Hyphae can be sparsely septate to regularly septate and possess a variable number of nuclei. MOLDS ¬ Mold growth on foods with its fuzzy or cottony appearance, sometimes colored. Usually food with a moldy or "mildewed" food is considered unfit to eat. ¬ While it is true that molds are involved in the spoilage of many kinds of foods, special molds are useful in the manufacture of certain foods or ingredients of foods. ¬ Molds have been grown as food or feed and are employed to produce

products used in foods, such as amylase for bread making or citric acid used in soft drinks. Some mold do produce various toxic metabolites (mycotoxins).The term "mold" is a common one applied to certain multicellular, filamentous fungi whose growth on foods usually is readily recognized by its fuzzy or cottony appearance. The main part of the growth commonly appears white but may be colored or dark or smoky. Colored spores are typical of mature mold of some kinds and give color to part or all of the growth. The thallus, or vegetative body, is characteristic of thallophytes, which lack true roots, stems, and leaves. YEAST AND YEAST LIKE FUNGI ¬ Like mold the term "yeast" is commonly used but hard to define. As used here it refers to those fungi which are generally not filamentous but unicellular and ovoid or spheroid and which reproduce by budding or fission. Yeasts may be useful or harmful in foods. ¬ Yeast fermentations are involved in the manufacture of foods such as bread, beer, wines, vinegar, and surface-ripened cheese, and yeasts are grown for enzymes and for food. ¬ Yeasts are undesirable when they cause spoilage of fruit juices, sirups, molasses, honey, jellies, meats, wine, beer and other foods.

11. The nutritional requirements of various microorganisms may differ appreciably but all of them require carbon, nitrogen, and phosphorus sources, as well as other minerals and frequently vitamins. Sources of nitrogen (ammonia, ammonium salts, and nitrates) and of phosphorus are well known. These as well as sources for other minerals such as calcium, magnesium, potassium and trace elements are infrequently mentioned in the technical literature because of the overriding importance of the carbon source for the technical and economic feasibility of the biomass process. In some instances, vitamins such as biotin, thiamine, or others have to be supplied to the growth medium. Hydrogen ion concentration (pH) The pH, or hydrogen ion concentration, [H+], of natural environments varies from about 0.5 in the most acidic soils to about 10.5 in the most alkaline lakes. Since the pH is measured on a logarithmic scale, the [H+] of natural environments varies over a billion-fold and some microorganisms are living at the extremes, as well as every point between the extremes. The range of pH over which an organism Grows is defined by three cardinal points: The minimum pH, below which the organism cannot grow, the maximum pH, above which the organism cannot grow, and the optimum pH, at which the organism grows the best. Microorganisms which grow at an optimum pH well below neutrality (7.0) are called acidophiles. Those which grow best at neutral pH are called neutrophiles and those that grow best under alkaline conditions are called alkalophiles. In general, bacteria grow faster in the pH range of 6.0- 8.0, yeasts 4.5-6.5 and filamentous fungi 3.5-6.8, with the exception of lactobacilli and acetic acid bacteria with optima between pH 5.0 and 6.0.

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Date : 25/01/2023 Duration : 1 hr Class : III BSc
Subject Name & Code : Industrial & pharmaceutical microbiology

Section A (5 x 2 = 10)

(Answer any FIVE questions)

CO1	BL4	1. Explain Secondary metabolites
CO1	BL1	2. Describe Anti foaming agents
CO 1	BL6	3. Write about precursors? Give examples.
CO1	BL4	4. Explain batch culture?
CO1	BL1	5. Define Log Phase? Mention its significance.
CO 1	BL1	6. Define corn steep liquor and its uses
CO 1	BL3	7. Demonstrate any two cheaply available carbon sources for industrial media preparation.

Section B (1 x 5 = 5)

(Answer any ONE question)

CO1	BL6	8. Write a brief note on the development of inocula for industrial production.
CO1	BL6	9.Write the strategies to be followed while formulating the industrial media.

Section C (1 x 10 = 10)

(Answer any ONE question)

CO1	BL1	10. Describe the different phases of a bacterial growth curve with illustration.
CO1	BL4	11.Explain in detail about the large scale cultivation of Saccharomyces.

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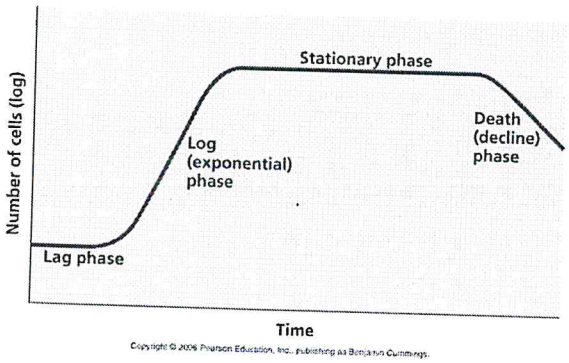
ANSWER KEY

1. Secondary metabolites are compounds that are not required for the growth or reproduction of an organism but are produced to confer a selective advantage to the organism.
2. A defoamer or an anti-foaming agent is a chemical additive that reduces and hinders the formation of foam in industrial process liquids.
3. Precursors are defined as "substances added prior to or simultaneously with the fermentation which are incorporated without any major change into the molecule of the fermentation product and which generally serve to increase the yield or improve the quality of the product.
4. Batch culture is a closed culture system that contains limited amounts of nutrients. In batch culture cells grow in a finite volume of liquid medium and are usually maintained in conical flasks on orbital shakers at a speed of 80–120 rpm.
5. Log phase, also referred to as the exponential phase or logarithmic phase, is one of the phases observed in a bacterial growth curve. The striking feature of this phase is the property of cell doubling through binary fission. The count of bacteria (new) that appear each time is proportionate to the current population.
6. Corn steep liquor is a by-product of corn wet-milling. A viscous concentrate of corn solubles which contains amino acids, vitamins and minerals, it is an important constituent of some growth media. It was used in the culturing of Penicillium.
7. Formation of products directly depends on the rate at which carbon is metabolized. Carbohydrates, oils and fats and hydrocarbons are some of the common carbon sources.
8. Development of active logarithmic microbial culture that is suitable for the final industrial production level is known as inoculum development. Inoculum we use for industrial fermentations should be • In its active, healthy and exponential growth phase. Available free of contamination in required large volumes.
9. Formulating medium at lab scale can be done by adding main ingredients like water, carbon source, nitrogen source, minerals and other supplements in pure form and in required quantities is very easy which supports the growth of the microbe whereas, the same may not support the satisfactory growth of the same organism.
10.



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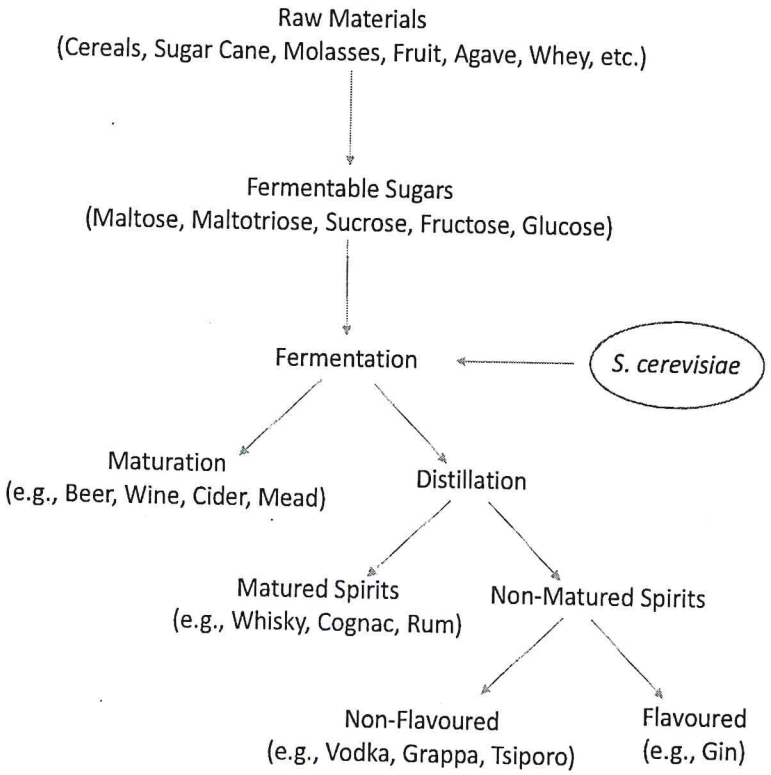

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UNIT TEST I - 2022-23

Date: 26.01.23 **Duration : 1 hour** **Class : III B.Sc Microbiology**

Subject Name: Microbial Marketable Products **Max Marks: 25**

Section A (5x2=10)

(Answer any **FIVE** questions)

CO1	BL1	1. Define photobioreactor
CO2	BL2	3. Describe the term mushroom
CO2	BL2	2. Write the binomial names for oyster and button mushroom.
CO4	BL3	4. Uses of microbial pigments.
CO4	BL1	5. Define biofertilizer.
CO4	BL2	6. Differentiate allophycocyanin, phycoerythrin and phycocyanin.
CO4	BL1	7. List few applications of cyanobacterial pigments.

Section B (1x5 = 5)

(Answer any **ONE** question)

CO1	BL2	8. Summarize the applications of *Spirullina*.
CO4	BL6	9. Write short notes on organic manure.

Section C (1x10 = 10)

(Answer any **ONE** question)

CO2	BL2	11. Describe the steps involved in mushroom cultivation.
CO4	BL6	10. Write in detail about production of Rhizobial biofertilizers.

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I B.Sc MICROBIOLOGY

MICROBIAL MARKETABLE PRODUCTS

INTERNAL TEST I ANSWER KEY

1. A photobioreactor (PBR) refers to any cultivation system designed for growing photoautotrophic organisms using artificial light sources or solar light to facilitate photosynthesis. PBRs are typically used to cultivate microalgae, cyanobacteria, macroalgae, and some mosses.
2. A mushroom or toadstool is the fleshy, spore-bearing fruiting body of a fungus, typically produced above ground, on soil, or on its food source.
3. *Agaricus bisporus* is a species with which just about everybody is familiar and is commonly referred to as the Button Mushroom. Members of the genus *Pleurotus* are commonly called Oyster Mushrooms
4. Microbes produce a variety of pigments that can be used as food colors such as carotenoids, flavins, melanins, quinines, monascins, violacein, amongst others. They can also be used as additives, antioxidants, color intensifiers, and functional food ingredients
5. Biofertilizer can be defined as biological products containing living microorganisms that, when applied to seed, plant surfaces, or soil, promote growth by several mechanisms such as increasing the supply of nutrients, increasing root biomass or root area and increasing nutrient uptake capacity of the plant
6. Phycocyanin and phycoerythrin are photosynthetic pigments, which have a blue and red color, respectively, and are found in microalgae, cyanobacteria, rhodophytes and cryptomonads.
7. Cyanobacterial Chls (Chls a, b, d, and f) are green to yellow pigments which are used as a food colorant and antioxidant supplements
8. Spirulina spp. and its processing products are employed in agriculture, food industry, pharmaceutics, perfumery and medicine.
9. Organic manures are natural products used by farmers to enhanced sustainable crop production. There are a number of organic manures like farm yard manure, green manures, compost prepared from crop residues and other farm wastes, vermicompost, oil cakes, and biological wastes - animal bones, slaughter house refuse

10. The six steps are Phase I composting, Phase II composting, spawning, casing, pinning, and cropping. These steps are described in their naturally occurring sequence, emphasizing the salient features within each step. Compost provides nutrients needed for mushrooms to grow.
11. It is a biofertilizer that contains Acetobacter bacteria which has the ability to colonize the plant roots and fixing atmospheric Nitrogen. It is especially beneficial for sugarcane plantation as it activates the soil biologically and stimulates plant growth.

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Unit test-I -2022-23

Date : 23/01/23 **Duration :1 hr** **Class : II M.Sc**

Subject Name &Code : Virology

Section- A **(5 x 1 = 5)**

I Answer any FIVE questions

CO1	BL1	1. Define Virus.
CO1	BL2	2.Explain vrions.
CO 4	BL6	3. Write about Cytopathic effects (CPE)
CO2	BL6	4.Write short notes on enveloped virus.
CO1	BL2	5. Explain the Prions.
CO 1	BL1	6. Describe about embryonated egg inoculation.
CO 3	BL2	7. Explain tissue culture.

Section-B **(2 x 5 = 10)**

II Answer any TWO questions

CO2	BL2	8. Discuss the methods of animal inoculation.
CO1	BL6	9 Write a brief note on serological diagnosis of virus.
CO2	BL2	10. Explain the virus morphology.
CO1	BL1	11. Describe briefly about the viral replication methods.

Section - C **(1 x 10 = 10)**

III Answer any **ONE** question

CO1	BL2	12. Discuss in detail about viral cultivation methods.
CO2	BL1	13. Describe in detail about the role of diagnostic procedure during viral pathogesis.

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1. An infective agent that typically consists of a nucleic acid molecule in a protein coat, is too small to be seen by light microscopy, and is able to multiply only within the living cells of a host.
2. The virion, that is the complete infectious virus particle, includes a genome comprising one or a few molecules of either DNA or RNA, surrounded by a morphologically defined protein coat, the capsid; the capsid and the enclosed nucleic acid together constitute the nucleocapsid.
3. Morphologic Effects: The changes in cell morphology caused by infecting virus are called cytopathic effects (CPE). Common examples are rounding of the infected cell, fusion with adjacent cells to form a syncytia (polykaryocytes), and the appearance of nuclear or cytoplasmic inclusion bodies.
4. A virus that has an outer wrapping or envelope. This envelope comes from the infected cell, or host, in a process called "budding off." During the budding process, newly formed virus particles become "enveloped" or wrapped in an outer coat that is made from a small piece of the cell's plasma membrane.
5. A virus that has an outer wrapping or envelope. This envelope comes from the infected cell, or host, in a process called "budding off." During the budding process, newly formed virus particles become "enveloped" or wrapped in an outer coat that is made from a small piece of the cell's plasma membrane.
6. Embryonated chicken eggs are inoculated by the allantoic route at approximately the middle of the 21-day embryonation period, at 8–10 days of embryonation; they are inoculated by the amniotic route late in the incubation period, at 14–16 days of embryonation.
7. Tissue culture, a method of biological research in which fragments of tissue from an animal or plant are transferred to an artificial environment in which they can continue to survive and function. The cultured tissue may consist of a single cell, a population of cells, or a whole or part of an organ.
8. The usual routes of commonly employed for the inoculation of the viruses into experimental animals are - intravenous, intramuscular, subcutaneous, intradermal, intraperitoneal, intracerebral and Intranasal.
9. Virus antigens are investigated by antigen detection assays. Serological diagnosis is based on either the demonstration of the presence of virus-specific IgM antibodies or a significant increase in the levels of specific IgG antibodies. Immunoassays are the most commonly used serological assays.
10. Viral morphology provides the basis for grouping viruses into families. A virus family may consist of members that replicate only in vertebrates, only in invertebrates, only in plants, or only in bacteria. Certain families contain viruses that replicate in more than one of these hosts.

11. In general terms, virus replication involves three broad stages which are present in all viruses: initiation of infection, replication and expression of the genome, and the release of mature virions from the infected cell.
12. Viral cultivation requires the presence of some form of host cell (whole organism, embryo, or cell culture). Viruses can be isolated from samples by filtration. Viral filtrate is a rich source of released virions. Bacteriophages are detected by presence of clear plaques on bacterial lawn.
13. An accurate virus diagnosis invariably requires laboratory testing of clinical specimens for the presence of virus, viral antigens, or specific antibodies. The past few decades have seen a major revolution in the operation of virus diagnostic laboratories and in their role in clinical patient management. Virus isolation has been largely replaced by sensitive nucleic acid detection assays and the measurement of specific antibodies at a very high level of sensitivity and specificity.

    - Virus diagnosis,
    - viral antigen,
    - Electron microscopy,
    - Nucleic acid hybridization,
    - Virus isolation,
    - Serum antibodies,
    - Serology

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UNIT TEST-1
2022-2023

Date : 24/1/23 **Duration :1 hr** **Class : II MSc**

Subject Name &Code :Medical Bacteriology(MDT2B)

Section A **(5 x 1 = 5)**

I Answer any **FIVE** questions

CO1 BL1 1. Define Virulence.
CO1 BL2 2.Explain Biohazard.
CO 4 BL6 3. Write about Mantoux test
CO2 BL6 4.Write short notes on Kirby Bauer technique
CO1 BL2 5. Explain the Normal microbial flora.
CO 1 BL1 6. Describe Biphasic media.
CO 3 BL2. 7.Explain Coagulase test

Section B **(2 x 5 = 10)**

II Answer any **TWO** questions

CO2 BL2 8. Discuss the methods of collection and diagnosis of sputum specimens for the diagnosis of lung infections.
CO1 BL6 9 Write a brief note on nonspecific host immune mechanism's
CO2 BL2 10. Explain the collection of CSF sample.
CO1 BL1 11. Describe briefly about the virulence factors of bacteria causing infections.

Section C **(1 x 10 = 10)**

III Answer any **ONE** question

CO1 BL2 12. Discuss in detail the nonspecific host immune mechanisms.
CO3 BL2 13. Discuss in detail about the role of hospital infection control committee and its functions

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UNIT TEST-1
2022-2023

Date : 24/1/23 **Duration :1 hr** **Class : II MSc**

Subject Name &Code : Medical Bacteriology(MDT2B)

Section A **(5 x 1 = 5)**

I Answer any **FIVE** questions

1. Virulence the severity or harmfulness of a disease or poison.
2. Biohazard: refer to **biological substances that pose a threat to the health of living organisms, primarily that of humans.**
3. Mantoux test a test for immunity to tuberculosis using intradermal injection of tuberculin.
4. The Kirby-Bauer disk diffusion susceptibility test **determines the sensitivity or resistance of pathogenic bacteria to various antimicrobial compounds** in order to assist physicians in selecting treatment options their patients
5. A diverse microbial flora is associated with the skin and mucous membranes of every human being from shortly after birth until death. The human body, which contains about 10^{13} cells, routinely harbors about **10^{14} bacteria**
6. Diphasic /biphasic medium is called so because of **containing medium both solid and liquid states in a single bottle.** It uses mainly for minimizing contamination and spread of infections. It applies to cultures of highly infectious agents like Brucella and Mycobacterium..
7. The coagulase test **identifies whether an organism produces the exoenzyme coagulase, which causes the fibrin of blood plasma to clot.**
8. Sputum should be obtained from the lower respiratory passages rather than a sample consisting mainly of saliva. Sputum specimens should be collected first thing in the morning. A sputum sample can be examined in several ways:

- The unfixed specimen may be centrifuged and then the sediment examined as a direct wet mount.
- If the sputum is too viscous, an equal volume of 3% sodium hydroxide may be added, then centrifuge, and examine the sediment.
- The specimen may be preserved in 10% formalin and a formalin-ethyl acetate concentration procedure may be completed and the sediment examined using either a wet mount or a stained preparation.
- The specimen may also be preserved in PVA if protozoa are suspected and stained with trichrome stain.

9. Nonspecific Mechanisms of Defense

Mechanical barriers. Mechanical barriers at the portal of entry represent the first line of defense for the body. These defenses are normally part of the body's anatomy and physiology.. The **skin** is a representative example.

The **mucous membranes** of the urinary, respiratory, and digestive tracts are another example. They are moist and permeable, but their fluids, such as tears, mucus, and saliva, rid the membrane of irritants. **Nasal hairs** trap particles in the respiratory tract, and the fluids exert a flushing action. **Cilia** on the cells sweep and trap particles in the respiratory tract, and coughing ejects irritants.

Chemical defenses. Among the nonspecific chemical defenses of the body are the secretions of lubricating glands. The tears and saliva contain the enzyme **lysozyme**, which breaks down the peptidoglycan of the cell wall of Gram-positive bacteria. The**lactic acid** of the vagina imparts defense, and the extremely caustic **hydrochloric acid**of the stomach is a barrier to the intestine. Semen contains the antimicrobial substance**spermine** that inhibits bacteria in the male urogenital tract.

Genetic barriers. The hereditary characteristics of an individual are a deterrent to disease as well.

10.Cerebrospinal fluid (CSF) collection is a test to look at the fluid that surrounds the brain and spinal cord.

CSF acts as a cushion, protecting the brain and spine from injury. The fluid is normally clear. It has the same consistency as water. The test is also used to measure pressure in the spinal fluid.

How the Test is Performed

There are different ways to get a sample of CSF. Lumbar puncture (spinal tap) is the most common method.To have the test

- You will lie on your side with your knees pulled up toward the chest, and chin tucked downward. Sometimes the test is done sitting up, but bent forward.
- After the back is cleaned, the health care provider will inject a local numbing medicine (anesthetic) into the lower spine.
- A spinal needle will be inserted.
- An opening pressure is sometimes taken. An abnormal pressure can suggest an infection or other problem.
- Once the needle is in position, the CSF pressure is measured and a sample of 1 to 10 milliliters (mL) of CSF is collected in 4 vials.
- The needle is removed, the area is cleaned, and a bandage is placed over the needle site. You may be asked to remain lying down for a short time after the test.

10. Virulence • Degree or intensity of pathogenicity • Virulence factors – determine the degree to which the pathogen causes damage, invasion, infectivity • Determined in part by pathogen's ability to survive outside host Animal model systems may be used to determine role of virulence factor in disease process • Determined by characteristics of the pathogen – adherence and colonization – invasion First step in disease is entrance and attachment • Portal of entry – skin, respiratory, gastrointestinal, urogenital systems, or conjunctiva of eye – vector borne, sexual contact, blood transfusion, or organ transplant • Adherence – mediated by special molecules called adhesins • Colonization – a site of microbial reproduction on or within host – does not necessarily result in tissue invasion or damage.

11. Nonspecific Mechanisms of Defense

The body possesses many mechanisms that impart nonspecific defense. The objectives of these mechanisms are to prevent microorganisms from gaining a foothold in the body and to destroy them if they penetrate to the deeper tissues.

Mechanical barriers. Mechanical barriers at the portal of entry represent the first line of defense for the body. These defenses are normally part of the body's anatomy and physiology. The **skin** is a representative example.

The **mucous membranes** of the urinary, respiratory, and digestive tracts are another example. They are moist and permeable, but their fluids, such as tears, mucus, and saliva, rid the membrane of irritants. **Nasal hairs** trap particles in the respiratory tract, and the fluids exert a flushing action. **Cilia** on the cells sweep and trap particles in the respiratory tract, and coughing ejects irritants.

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Genetic barriers. The hereditary characteristics of an individual are a deterrent to disease as well.

12. Monitoring of hospital-associated infections; u Training of staff in prevention and control of HAI; u Investigation of outbreaks; u Controlling the outbreak by rectification of technical lapses, if any; u Monitoring of staff health to prevent staff to patient and patient to staff spread of infection; u Advice on isolation procedures and infection control measures; u Infection control audit including inspection of waste disposal, laundry and kitchen, and u Monitoring and advice on the safe use of antibiotics.

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UNIT TEST I- 2022-2023

Date: 25/01/23 **Duration :1 hr** **Class : I MSc Microbiology**

Subject Name & Code: Mycology & Parasitology

Section A (5 x 1 = 5)

I Answer any **FIVE** questions.

CO1 BL1 1. Define mycology.

CO1 BL6 2. Write about conidia.

CO1 BL4 3. Distinguish hyphae and mycelium.

CO1 BL 1 4. Define a parasite

CO1 BL4 5. Explain aberant parasite

CO 1 BL1 6.Describe parantenic host

CO 1 BL4 7.Explain indirect life cycle

Section B (2 x 5 = 10)

II Answer any **TWO** questions.

CO1 BL2 8. Discuss about the morphology of fungi.

CO1 BL4 9. Explain about the introduction of medical mycology.

CO1 BL6 10.Write the difference types of host parasite relationship.

CO1 BL4 11.Explain different classes of protozoa.

Section C (1 x 10 = 10)

III Answer any **ONE** question.

CO1 BL4 12. Explain in detail about classification of fungi.

CO1 BL1 13.Describe different types of parasites with example.

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ANSWER KEY

SECTION A

1. Mycology is the branch of biology concerned with the study of fungi, including their genetic and biochemical properties, their taxonomy and their use.
2. Conidium, **a type of asexual reproductive spore of fungi** usually produced at the tip or side of hyphae or on special spore-producing structures called conidiophores. The spores detach when mature.
3. Fungal hypha is increasingly branching to form mycelium, mycelium is made up of hyphal threads, which are the vegetative component of fungi.
4. A parasite is an organism that lives on or in a host organism and gets its food from or at the expense of its host.
5. Erratic or aberrant parasite. Endoparasite found in other organs than the normal. habit in the host are aberrant parasites,
6. Paratenic hosts span a wide range of fauna and are not needed in the nematode's life cycle, but act as reservoirs in which different larval stages of the parasite can persist but not develop further.
7. An indirect life cycle is a type of a life cycle wherein a parasite is transmitted from one host to another by using a vector or by an intermediate host of another species.

SECTION B

8. Fungi vary widely in size and shape, from unicellular, microscopic organisms to multicellular forms easily seen with the naked eye. Individual cells range from 1 μ to 30 μ. Microscopic fungi exist as either molds or yeasts or both. Internally, fungal cells are fairly typical eucaryotic cells. (b) Molds. The molds form large multicellular aggregates of long branching filaments, called hyphae. There are vegetative hyphae and reproductive hyphae. Spores are borne on the reproductive hyphae. (Fungal spores should not be confused with bacterial spores that are resistant bodies formed for bacterial survival rather than reproductive purposes.) Spore size, shape and structure are used in the classification and identification of

fungi. The tube-like hyphae are responsible for the fluffy appearance of the macroscopic mold colony. The hyphae and other structures combine to form an elaborate network called a mycelium.

9. Mycology, the study of fungi, a group that includes the mushrooms and yeasts. Many fungi are useful in medicine and industry. Mycological research has led to the development of such antibiotic drugs as penicillin, streptomycin, and tetracycline, as well as other drugs, including statins (cholesterol-lowering drugs). Mycology also has important applications in the dairy, wine, and baking industries and in the production of dyes and inks. Medical mycology is the study of fungus organisms that cause disease in humans.
10. The host which harbors the adult parasites or where the parasite replicates sexually is called the definitive host. The definitive host can be a mammalian host or other living hosts. Examples include sheep for Fasciola gigantica, a dog for Echinococcus granulosus, and a female anopheles mosquito for Plasmodium sp. Intermediate hosts are mandatory for the completion of the life cycle for some parasites. Some parasites require two intermediate hosts to complete their different larval stages. These are known as the first and second intermediate hosts respectively. For e.g. Amphibian snails are the first intermediate host and aquatic plants are the second intermediate host for Fasciola hepatica.
11. The protozoa are contained within the kingdom Protista along with the unicellular algae. The classes of protozoa are categorized by a variety of factors: cell architecture, motility structure, even hosts. They do not photosynthesize, rather being chemoheterotrophic like animals. This means that they use chemicals for energy production and they get their carbon from the same compounds, e.g. sugar. However, there are some pigmented protozoa and there are even a few that seem to be crossover organisms, being claimed by the botanists because of their photosynthetic ability. for example, the flagellate Euglena will photosynthesize in light (it contains chlorophyll) or will switch over to regular aerobic respiration (chemoheterotrophism) without light. Many of the protozoa form a resistant, dormant structure called a cyst. Parasitic protozoa are identified by the active feeding stage, called a trophozoite, in addition to the cyst stage, both of which may be found in the feces.

SECTION C

12. Classification of Fungi

Kingdom Fungi are classified based on different modes. The different classification of fungi is as follows:

Based on Mode of nutrition

On the basis of nutrition, kingdom fungi can be classified into 3 groups.

Saprophytic – The fungi obtain their nutrition by feeding on dead organic substances. Examples: Rhizopus, Penicillium and Aspergillus.

Parasitic – The fungi obtain their nutrition by living on other living organisms (plants or animals) and absorb nutrients from their host. Examples: Taphrina and Puccinia.

Symbiotic – These fungi live by having an interdependent relationship with other species in which both are mutually benefited. Examples: Lichens and mycorrhiza. Lichens are the symbiotic association between algae and fungi. Here both algae and fungi are mutually benefited as fungi provide shelter for algae and in reverse algae synthesis carbohydrates for fungi. Mycorrhiza is the symbiotic association present between fungi and plants. Fungi improve nutrient uptake by plants, whereas plants provides organic molecules like sugar to the fungus.

13. Types of Parasitism

There are many types of parasitism, and parasites can belong to multiple classifications based on their size, characteristics, and relationship with the host.

Obligate Parasitism

Obligate parasites are completely dependent on the host in order to complete their life cycle. Over time, they have evolved so that they can no longer exist without the existence of the host. This means that they usually will not cause serious harm to the host, as the parasites need the host to survive so that they can survive, unless the host's death is needed for the transmission of the parasite. Obligate parasitism can be found in many different types of organisms, like plants, animals, fungi, bacteria, and viruses. Head lice are obligate parasites; if removed from the human scalp, they will soon die.

Facultative Parasitism

Facultative parasites do not rely on the host in order to complete their life cycle; they can survive without the host, and only sometimes perform parasitic activities.

Certain plants, fungi, animals, and microbes can be facultative parasites. A specific example is the nematode species Strongyloides stercoralis. This is a type of roundworm that can cause the disease strongyloidiasis when it infects humans, but it can also be found free-living.

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SRM ARTS AND SCIENCE COLLEGE
Department of Microbiology
UNIT-1
2022-2023

Date: 26.01.23
Duration: 1 hr
Class: M.sc., 2nd year
Subject Name & Code **Industrial Fermentation Technology**

Section A (5×1 =5)
(Answer any five questions)

CO1 BL1 1.Define riboflavin
CO1 BL2 2.Explain submerged fermentation
CO1 BL1 3.Define steriods
CO1 BL1 4.Define cyanocoblamin
CO1 BL1 5.Define preservation
CO1 BL1 6.Name the types fermentors
CO1 BL1 7.Define vaccines
CO1 BL2 8. Explain interferons

Section B (2×5 = 10)
(Answer any two question)

CO1 BL2 9.Describe the fed batch culture
CO1 BL2 10.Explain about proccess of batch culture
CO1 BL2 11.Explain fermentation types and their importance
CO1 BL2 12.Describe design and types of fermentor

Section C (1×10 = 10)
(Answer any one question)

CO1 BL1 13.Discuss about the media design for fermentation process
CO1 BL2 14 Describe the microbial growth kinetics

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ANSWER KEY

SECTION A

1. Riboflavin is vitamin B2. It is widely found in both plant- and animal-based foods, including milk, meat, eggs, nuts, enriched flour, and green vegetables.

2. Submerged fermentation is a method of cultivating microorganisms in liquid nutrient media. For industrial production, this implies growing the selected microorganism in closed vessels, called bioreactors, which contain nutrient broths.

3. Steroids, also called corticosteroids, are anti-inflammatory medicines used to treat a range of conditions

4. a vitamin derived from foods of animal origin such as liver, fish, and eggs, a deficiency of which can cause pernicious anaemia; vitamin B_{12}. It contains a cyanide group bonded to the central cobalt atom of a cobalamin molecule.

5. Preservation protects the environment from harmful human activities. For example, conserving a forest typically involves sustainable logging practices to minimize deforestation.

6. Continuous Stirred-Tank Fermentor · Airlift Fermentor · Packed Bed Fermentor · Fluidised Bed Fermentor · Membrane Fermentor · Bubble Column Fermentor.

7. Vaccines are complex biological products with lengthy manufacturing and control processes. The quality controls represent up to 70% of the full manufacturing duration. Successful manufacturing of high-quality vaccines requires international standardization of starting materials, production and quality control

8. Interferons are a group of signaling proteins made and released by host cells in response to the presence of several viruses. In a typical scenario, a virus-infected cell will release interferons causing nearby cells to heighten their anti-viral defenses.

SECTION B

9. Fed-batch culture is, in the broadest sense, defined as an operational technique in biotechnological processes where one or more nutrients (substrates) are fed (supplied) to the bioreactor during cultivation and in which the product(s) remain in the bioreactor until the end of the run. An alternative description of the method is that of a culture in which "a base medium supports initial cell culture and a feed medium is added to prevent nutrient depletion".It is also a type of semi-batch culture. In some cases, all the nutrients are fed into the bioreactor. The advantage of the fed-batch culture is that one can control concentration of fed-substrate in the culture liquid at arbitrarily desired levels (in many cases, at low levels).Generally speaking, fed-batch culture is superior to conventional batch culture when controlling concentrations of a nutrient (or nutrients) affects the yield or productivity of the desired metabolite.

10. A batch culture begins with sterilization, and the sterile culture is then inoculated with microbes (about 2-5 % of the total volume).The percentages of nutrients, vitamins, and microbial cells in the reaction mixture and the temperature difference during the reaction

cycle.The proper mixing keeps them at acceptable concentrations and temperatures.The process is carried out in anaerobic conditions by bubbled oxygen in or out, while acidic or alkaline solutions are added to control the pH.Antifoaming agents are added when indicated by a foam sensor.The microorganism growth is allowed to take place for days, weeks, or months. In the lag phase, little or no growth is observed at the beginning of fermentation, depending on a physiochemical equilibrium between the microorganism and the environment.Once the cells have adapted to the new conditions of growth, they enter the exponential phase.Primary metabolites are produced during the log or exponential phase with their formation decreasing when growth ceases. For example, *Saccharomyces cerevisiae* produces ethanol as a primary metabolite.When the cells enter the stationary phase, secondary metabolites are produced. Most antibiotics are metabolized as secondary metabolites. For example, *Penicillium chrysogenum* produces Penicillin as a secondary metabolite.The fermentation is terminated when one or more of the following has been reached:

a. The microbial growth has stopped due to the depletion of the nutrients or the build of toxic compounds;
b. After a fixed predetermined period;
c. The concentration of desired product has been achieved.

11. The main function of fermentation is to convert NADH back into the coenzyme NAD^+ so that it can be used again for glycolysis. During fermentation, an organic electron acceptor (such as pyruvate or acetaldehyde) reacts with NADH to form NAD^+, generating products such as carbon dioxide and ethanol (ethanol fermentation) or lactate (lactic acid fermentation) in the process.Types of FermentationThere are many types of fermentation that are distinguished by the end products formed from pyruvate or its derivatives. The two fermentations most commonly used by humans to produce commercial foods are ethanol fermentation (used in beer and bread) and lactic acid fermentation (used to flavor and preserve dairy and vegetables).Ethanol Fermentation- In ethanol fermentation, the pyruvate produced through glycolysis is converted to ethanol and carbon dioxide in two steps. First, the pyruvate releases carbon dioxide to form a two-carbon compound called acetaldehyde. Next, acetaldehyde is reduced by NADH to ethanol, thereby regenerating the NAD^+ for use in glycolysis. Overall, one molecule of glucose is converted into two molecules of carbon dioxide and two molecules of ethanol.Ethanol fermentation is typically performed by yeast, which is a unicellular fungus.Lactic Acid Fermentation.There are two main types of lactic acid fermentation: homolactic and heterolactic. In homolactic acid fermentation, NADH reduces pyruvate directly to form lactate. This process does not release gas. Overall, one molecule of glucose is converted into two molecules of lactate. In heterolactic fermentation, some lactate is further metabolized, resulting in ethanol and carbon dioxide via the phosphoketolase pathway.Lactic acid fermentation is primarily performed by certain types of bacteria and fungi. However, this type of fermentation also occurs in muscle cells to produce ATP when the oxygen supply has been depleted during strenuous exercise and aerobic respiration is not possible.

12. The heart of the fermentation or bioprocess technology is the Fermentor or Bioreactor. A bioreactor is basically a device in which the organisms are cultivated to form the desired products. it is a containment system designed to give right environment for optimal growth and metabolic activity of the organism.
A fermentor usually refers to the containment system for the cultivation of prokaryotic cells, while a bioreactor grows the eukaryotic cells (mammalian, insect cells, etc).Different Types of Fermentors
Continuous Stirred-Tank Fermentor. The continuous stirred-tank reactor (CSTR) is composed of a vessel with pipes, pumps, valves, agitator, motor, shaft, and impeller(s). ...

Airlift Fermentor. ...
Packed Bed Fermentor. ...
Fluidised Bed Fermentor. ...
Membrane Fermentor. ...
Bubble Column Fermentor.

SECTION C

13. The fermentation media can either be liquid, known as broth, or it can be a solid-state fermentation. The media should satisfy all the nutritional requirements of the microorganism and should also obtain the target molecule. A typical media requires a carbon source, a nitrogen source, salts, water and micronutrients. Let us look at them one by one.
Carbon Source
Typically sugars and carbohydrates are used as carbon sources, but alcohols may also be used in making products such as vinegar. For laboratory uses, refined and pure carbon sources such as glucose, sucrose and glycerol are used that give a uniform product. However, in the case of industrial fermentation, inexpensive sources such as whey, malt extract, molasses, corn steep liquor or sugar cane juice are used.

Nitrogen Source

The nitrogen source for microorganisms may be used in the form of organic or inorganic compounds. Inorganic sources include ammonium salts or the free form of ammonia. Inexpensive nitrogen sources are used for bulk production, such as tryptone, peptone, soy meal, corn steep liquor and yeast extract.

Growth Factors

Trace salts and growth factors are important components in the fermentation media. Yeast extract is a good source of vitamins and macronutrients. Trace elements such as copper, zinc, iron, cobalt, molybdenum, manganese are all usually found in the unrefined nitrogen sources but may need to be added when using pure sources.

Miscellaneous

The process of fermentation sometimes produces a large amount of gas that forms a layer of foam and hinders the process. To get rid of this problem, antifoaming agents are also added to the fermentation medium. To stabilise pH of the media, mineral buffering salts such as phosphates and carbonates are also added. The addition of chelating agents may also be required when high concentrations of metals are present in the media.

Optimisation of the Fermentation Medium

Optimisation is the process of developing a fermentation medium that gives the best quality and quantity of the target product..

14. The cell concentration is measured by direct and indirect methods. Microbial growth kinetics explains the relationship between the specific growth rate of a microbe and its substrate concentration. Microbial growth kinetics largely depends on the laboratory culture conditions- types of phases are lag, log, stationary or death phases.
-Studying growth of a microorganism is the basis of biotechnological exploitation of microflora for production of desired product. Optimization of growth of microorganism in a particular media is desirable due to economical and availability of particular growth constituent in a region. Despite this, some microorganisms have specific requirement and they grow in a particular growth media. Common media for growth of different microorganism, yeast and animal cells is discussed in future lecture. methods of measuring

growth, different phase in bacterial growth and growth kinectics. Modes of Bacterial Cell Division

Turbidimetric methods-This method is based on light scattering principles of particulate matter such as bacteria. A bacteria cell suspension is placed in test cuvette and corresponding media in reference cuvette. The optical density or absorbance of the bacterial suspension is used to measure the number of bacteria number. This method can not distinguish between live or dead bacteria as both form contribute to the turbidity. Nitrogen content and Dry weight- A bacterial cell mass can be measured by direct measuremenof dry weight of culture or nitrogen content. Growth cycle of bacteria- As discussed earlier, the most common method of bacteria division is binary fission and by this method, one bacteria cell gives two daughter cells. The time a bacteria takes to complete one division is called as generation time and it depends on bacteria species and media properties.

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Department of Microbiology

UNIT TEST I – 2022-2023

Date :26.01.23 **Duration :1 hr** **Class :I Msc**

Subject Name & Code : Biostatistics, Bioinformatics and Bioinstrumentation

Max Marks:25

Section A (5 x 1 = 5)

(Answer **ALL** questions)

CO3	BL1	1.Define bioinformatics.
CO3	BL1	2.List the databases available for bioinformatics.
CO3	BL1	3.List the data retrieval tools.
CO3	BL6	4. Write the applications of FASTA.
CO3	BL6	5. Write the uses of bioinformatics.
CO5	BL6	6. List the parts of TEM
CO5	BL6	7. Write the applications of SEM

Section B (2 x 5 = 10)

(Answer any **TWO** questions)

CO3	BL2	8. Explain the applications of bioinformatics
CO5	BL2	9. Explain about the UV spectroscopy.
CO3	BL6	10. Write in detail about basic bioinformatic tools.

Section C (1 x 10 = 10)

(Answer any **ONE** question)

CO5	BL2	11. Explain the working principle of TEM
CO5	BL2	12. Explain about the parts and working strategies in SEM.

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I M.Sc MICROBIOLOGY

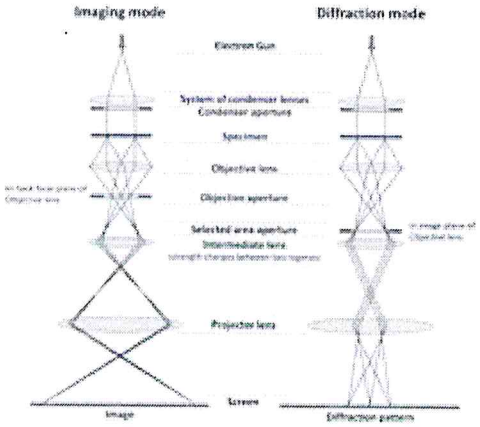
BIOINFORMATICS

INTERNAL TEST I ANSWER KEY

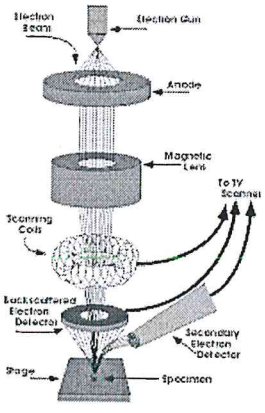
1. Bioinformatics, as related to genetics and genomics, is a scientific subdiscipline that involves using computer technology to collect, store, analyze and disseminate biological data and information, such as DNA and amino acid sequences or annotations about those sequences.
2. General Databases & Tools: ArrayTrack™, Bioinformatics: Web Databank, BRENDA: Comprehensive Enzyme Information System, Broad Institute. Cytoscape: Biology, European Molecular Biology Laboratory-European Bioinformatics Institute (EMBL-EBI), Expert Protein Analysis System (ExPASy) Genomes Online Database (GOLD)
3. The approach for the retrieval of information employs two generic techniques, one is matching the words in the query against the database, and the second is traversing the database with the aid of hypertext or hypermedia links. Still, the search is not that accurate, and to improve it, various modifications have been introduced. One of the techniques for enhancement is that the search output is sorted by the degree of relevance based on the statistical match between the keyword in the query and the document.
4. It is used for the identification of the species. Used for the establishment of the phylogeny, For DNA mapping, FASTA is also used for understanding the biochemical functions of the protein. Study the evolution of the species, from where that specific species evolved, or identify the ancestors. Calculation of the molecular weight, Identification of mutations in the sequences by comparing those sequences with the reference sequences.
5. Bioinformatics is mainly used to extract knowledge from biological data through the development of algorithms and software. Bioinformatics is widely applied in the examination of Genomics, Proteomics, 3D structure modelling of Proteins, Image analysis, Drug designing and a lot more.
6. The basic components in TEM are: electron gun, condenser system, objective lens (most important len in TEM which determines the final resolution), diffraction lens, projective lenses (all lens are inside the equipment column, between apertures), image recording system (used to be negative films, now is CCD cameras)
7. Applications of SEMs: Materials science. SEMs are used in materials science for research, quality control and failure analysis. Nanowires for gas sensing. Semiconductor inspection. Microchip assembly. Forensic investigations, Biological sciences, Soil and rock sampling, Medical science.
8. What is Bioinformatics? Bioinformatics is an emerging branch of biological science that emerged from the combination of both biology and information technology. It is an interdisciplinary field of study that uses Biology, Chemistry, Mathematics, Statistics, and Computer Science that have merged to form a single discipline. This sector is mainly involved in analyzing biological data, and developing new software using biological tools. According to the NCBI- National Center for Biotechnology Information, the branch of NLM- National Library of Medicine and NIH- National Institutes of Health, Bioinformatics is defined as the analysis, collection, classification, manipulation, recovery, storage and visualization of all biological information using computation technology. The term Bioinformatics was first coined in the year 1960 by the two Dutch biologists named Paulien Hogeweg and Ben Hesper. According to their research and discoveries, Bioinformatics was defined as the study of information processes in biotic systems. Application of Bioinformatics Bioinformatics is mainly used to extract knowledge from biological data through the development of algorithms and software. Bioinformatics is widely applied in the examination of Genomics, Proteomics, 3D structure modelling of Proteins, Image analysis, Drug designing and a lot more. A significant application of bioinformatics can be found in the fields of precision and preventive medicines, which are mainly

focused on developing measures to prevent, control and cure dreadful infectious diseases. The main aim of Bioinformatics is to increase the understanding of biological processes. Listed below are a few applications of Bioinformatics. In Gene therapy, In Evolutionary studies, In Microbial applications, In Prediction of Protein Structure, for the Storage and Retrieval of Data, In the field of medicine, used in the discovery of new drugs, In Biometrical Analysis for identification

9. The Principle of UV-Visible Spectroscopy is based on the absorption of ultraviolet light or visible light by chemical compounds, which results in the production of distinct spectra. Spectroscopy is based on the interaction between light and matter.
10. Basic bioinformatic tools: CRISPR Gene Editing, Antibodies and Immunodetection, Protein Electrophoresis and Blotting, Protein Purification, Proteins and Peptides, Molecular Biology, Cell Therapy.
11. TEM-An electron source at the top of the microscope emits electrons that travel through a vacuum in the column of the microscope. Electromagnetic lenses are used to focus the electrons into a very thin beam and this is then directed through the specimen of interest.



12. The SEM is an instrument that produces a largely magnified image by using electrons instead of light to form an image. A beam of electrons is produced at the top of the microscope by an electron gun. The electron beam follows a vertical path through the microscope, which is held within a vacuum.



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SRM ARTS AND SCIENCE COLLEGE
Department of Microbiology
Academic year: 2022-23
UNIT TEST I

Date: 23.01.2023 **Duration: 3 Hrs** **Class: II M.SC**

Subject Name & Code: Food Dairy and Environmental Microbiology- MDT4A

Section A (5 x 1 = 5)
(Answer any **FIVE** questions)

CO1	BL1	1. Define Pasteurization
CO2	BL1	2. Recall what is yoghurt
CO1	BL1	3. State two food borne viruses
CO2	BL1	4. Recall what is Sauerkraut
CO2	BL2	5. Explain Probiotics
CO2	BL2	6. Describe Swiss cheese
CO1	BL1	7. Define Canning

Section B (2 x 5 = 10)
(Answer any **TWO** questions)

CO2	BL2	8. Restate yoghurt production
CO2	BL2	9. Paraphrase the role of food control agencies
CO1	BL5	10. Criticize spoilage of canned foods
CO2	BL2	11. Explain milk borne diseases

Section C (1 x 10 = 10)
(Answer any **ONE** question)

CO1	BL2	12. Summarize the extrinsic and intrinsic factors influencing the microbial growth.
CO1	BL4	13. Elaborate the principles and methods of food preservation

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Department of Microbiology

Unit test-I -2022-23

Date : 24/01/23 **Duration :1 hr** **Class : II M.Sc**

Subject Name &Code : Research Methodology(MDTAE)

Section- A **(5 x 1 = 5)**

I Answer any FIVE questions

CO1	BL1	1. Define Research
CO1	BL1	2. Define research methodology.
CO 4	BL6	3. Write about Bioethics
CO2	BL6	4.Write short notes on null hypothesis
CO1	BL2	5. Explain the research problems.
CO 1	BL1	6. Describe about meaning of research.
CO 3	BL2	7. Explain data collection.

Section-B **(2 x 5 = 10)**

II Answer any TWO questions

CO2	BL2	8. Discuss the research problems.
CO1	BL6	9 Write a brief note on objective of research.
CO2	BL2	10. Explain the research report writing.
CO1	BL1	11. Describe briefly about the Bibliography.

Section - C **(1 x 10 = 10)**

III Answer any **ONE** question

CO1	BL2	12. Discuss in detail about research components.
CO2	BL1	13. Describe in detail about research objective and problems.

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1. The systematic investigation into and study of materials and sources in order to establish facts and reach new conclusions.
2. Research methodology is defined as a systematic way to solve a research problem by collecting data using various techniques, providing an interpretation of the collected data, and drawing conclusions about the research data. A research method is fundamentally the blueprint of the research or study.
3. Bioethics includes medical ethics, which focuses on issues in health care; research ethics, which focuses issues in the conduct of research; environmental ethics, which focuses on issues pertaining to the relationship between human activities and the environment, and public health ethics, which addresses ethical issues ...
4. The null hypothesis is **a kind of hypothesis which explains the population parameter whose purpose is to test the validity of the given experimental data**. This hypothesis is either rejected or not rejected based on the viability of the given population or sample.
5. A research problem is a statement about an area of concern, a condition to be improved, a difficulty to be eliminated, or a troubling question that exists in scholarly literature, in theory, or in practice that points to the need for meaningful understanding and deliberate investigation.
6. Research is a process of systematic inquiry that entails collection of data; documentation of critical information; and analysis and interpretation of that data/information, in accordance with suitable methodologies set by specific professional fields and academic disciplines.
7. Data collection is the process of gathering and measuring information on variables of interest, in an established systematic fashion that enables one to answer stated research questions, test hypotheses, and evaluate outcomes.
8. Descriptive research problems focus on questions like 'what is ?', with its main aim to describe the situation, state or the existence of certain specific phenomena. They seek to depict what already exists in a group or population. For such studies, surveys and opinion polls are best suitable because they require systematic observation of social issues.These problems use two different ways to collect data- cross-sectional studies and longitudinal studies. Cross-sectional studies provide a snapshot of data at a certain moment in time. On the other hand, longitudinal studies involve a fixed and stable sample that is measured repeatedly over time. However, in both cases, methods that can be used to collect data include mail, online or offline surveys, and interviews. When a researcher is dealing with a descriptive research problem, there can be no manipulation in the variables and hypotheses as they are usually nondirectional .Causal research problems focus on identifying the extent and nature of cause-and-effect relationships. Such research problems help in assessing the impact of some changes on existing norms and processes. They thus identify patterns of relationships between different elements.
9. Research objectives **describe what you intend your research project to accomplish.** They summarize the approach and purpose of the project and help to focus your research.

Your objectives should appear in the introduction of your research paper, at the end of your problem statement.

10. A research report is a document prepared by an analyst or strategist who is a part of the investment research team in a stock brokerage or investment bank. A research report may focus on a specific stock or industry sector, a currency, commodity or fixed-income instrument, or on a geographic region or country.

11. A bibliography is a list of works on a subject or by an author that were used or consulted to write a research paper, book or article. It can also be referred to as a list of works cited. It is usually found at the end of a book, article or research paper.

12. Major components of research paper are selection of title, abstract, introduction, literature review, research methodology, results, discussion, managerial implications, conclusion, limitations and future scope. Title selection is first step for writing a quality research paper.

13. A research problem is a broad issue that you would like to address through your research. It identifies a difficulty, doubt, or an area of concern, in theory or in practice, that requires thought and investigation. Research objectives are clear statements of what you aim to achieve through your research.

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DEPARTMENT OF MICROBIOLOGY
I UNIT TEST –TIMETABLE-SEP'- 2022

Time: 1hr
Marks: 25

DATE	CLASS	SUBJECT
12.09.2022	II B.Sc	Language
	III B.Sc	Bacteriology
	II M.Sc	Microbial Genetics
13.09. 2022	II B.Sc	English
	III B.Sc	Parasitology and Mycology
	II M.Sc	Genetic Engineering
14.09.2022	II B.Sc	Molecular biology
	III B.Sc	Virology
	II M.Sc	Molecular Biology
15. 09.2022	II B.Sc	Clinical laboratory technology
	III B.Sc	Biotechnology and Genetic Engineering
	II M.Sc	Soil and Agricultural Microbiology
16. 09.2022	II M.Sc	Environmental Biotechnology

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DEPARTMENT OF MICROBIOLOGY
UNIT TEST-I SEPTEMBER- 2022
DUTY LIST

Date	Room no.	Name of the staff
12/09/2022	111	Dr. A. Kalidoss
	112	Dr.B.F.Paul Beulah
	204 MBA block	Mrs.V. Aswini
13/09/2022	111	Dr.N.Prabha
	112	Dr.B.F.Paul Beulah
	204 MBA block	Dr. Vishnu priya
14/09/2022	111	Dr. A. Kalidoss
	112	Dr. Bibiana Arputhmary
	204 MBA block	Dr.N.Prabha
15/09/2022	111	Mrs. V.Aswini
	112	Dr.K. Abirami
	204 MBA block	Dr. Bibiana Arputhmary
16/09/2022	112	Dr. Sujith

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UNIT TEST- I-SEP' 2022
SEATING ARRANGEMENT

ROOM NO: 111 **FLOOR: I-PG Block** **DATE: 12.09.22 to 16.09.22**

Seat Number	Students Register Number	Seat number	Students Register Number
1	222006100	25	612101233
2	222006101	26	612101234
3	222006102	27	612101233
4	222006103	28	612101235
5	222006104	29	612101236
6	222006105	30	612101237
7	222006106	31	612101238
8	222006107	32	612101239
9	222006108	33	612101240
10	222006109	34	612101241
11	222006110	35	612101242
12	222006111	36	612101243
13	222006112	37	612101244
14	222006113	38	612101245
15	222006114	39	612101246
16	222006115	40	
17	222006116	41	
18	222006117	42	
19	222006118	43	
20	222006119	44	
21	222006120	45	
22	222006121	46	
23	222006122	47	
24	222006123	48	

S.NO	Name of the Class	Register number	Total
1	III B.Sc Microbiology	222006100-123	24
2	II M.Sc Applied Microbiology	612101233-246	15

ROOM NO: 112 **FLOOR: I-PG Block** **DATE: 12.09.22 to 16.09.22**

Seat Number	Students Register Number	Seat Number	Students Register Number
1	222006124	19	22106524
2	222006125	20	22106525
3	222006126	21	22106526
4	222006127	22	22106527
5	222006128	23	22106528
6	222006129	24	22106529
7	222006130	25	22106530
8	222006131	26	22106531
9	222006132	27	22106532
10	222006133	28	22106533
11	222006134	29	22106534
12	222006135	30	22106535
13	222006136	31	22106536
14	222006137	32	22106537
15	222006138	33	22106538
16	222006139		
17	222006140		
18	222006141		

S.No	Name of the Class	Register number	Total
1	III B.Sc Microbiology	222006124-141	18
2	II B.Sc Microbiology	22106524-538	15

ROOM NO:204 **FLOOR: 2-MBA Block** **DATE: 12.09.22 to 16.09.22**

Seat Number	Students Register Number	Seat Number	Students Register number
1	22106539	15	612101248
2	22106540	16	612101249
3	22106541	17	612101250
4	22106542	18	612101251
5	22106543	19	612101252
6	221065244	20	612101253
7	221065245	21	612101254
8	221065246	22	612101255
9	221065247	23	612101256
10	221065248	24	612101257
11	221065249	25	612101258
12	221065250	26	612101259
13	221065251	27	612101260
14	612101247	28	612101261

S.No	Name of the Class	Register number	Total
1	II B.Sc Microbiology	22106539-252	14
2	III B.Sc Microbiology	612101247-261	14

ROOM NO: 111 **FLOOR: I-PG Block** **DATE: 16.09.22**

Seat Number	Students Register Number	Seat number	Students Register Number
1	612101233	17	612101249
2	612101234	18	612101250
3	612101235	19	612101251
4	612101236	20	612101252
5	612101237	21	612101253
6	612101238	22	612101254
7	612101239	23	612101255
8	612101240	24	612101256
9	612101241	25	612101257
10	612101242	26	612101258
11	612101243	27	612101259
12	612101244	28	612101260
13	612101245	29	612101261
14	612101246		
15	612101247		
16	612101248		

S.NO	Name of the Class	Register number	Total
1	II M.Sc Applied Microbiology	612101233-261	29

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SRM ARTS AND SCIENCE COLLEGE
Department of Microbiology

Date : 14.09.22 **Duration : 1 hour** **Class : II B.Sc Microbiology**

Subject Name: Molecular Biology ***Sub Code SN23A***

Section A (5x2=10)
(Answer any 5 questions)

CO1	BL1	1. State Charagaffs rule.
CO3	BL1	2. Define replication.
CO3	BL2	3. Explain Supercoiling.
CO4	BL1	4. Define transcription.
CO4	BL1	5. Name the different types of RNA.
CO2	BL1	6. Define Okazaki fragments.
CO2	BL1	7. Define Replication fork.

Section B (1x5 = 5)
(Answer any 1 question)

CO2	BL2	8. Explain the types of DNA.
CO1	BL2	9. Describe the structure of RNA.

Section C (1x10 = 10)
(Answer any 1 question)

CO2	BL6	10. Write in detail about the structure of DNA.
CO2	BL2	11. Explain the life cycle of Bacteriophages.

SRM ARTS AND SCIENCE COLLEGE
Department of Microbiology

Date : 14.09.22 **Duration : 1 hour** **Class : II B.Sc Microbiology**

Subject Name: Molecular Biology ***Sub Code SN23A***

1. State Charagaffs rule.

Chargaff's rules state that in the DNA of any species and any organism, the amount of guanine should be equal to the amount of cytosine and the amount of adenine should be equal to the amount of thymine.

2. Define replication.

DNA replication is the biological process of producing two identical replicas of DNA from one original DNA molecule.

3. Explain Supercoiling.

DNA supercoiling refers to the amount of twist in a particular DNA strand, which determines the amount of strain on it.

4. Define transcription.

Transcription is the process of copying a segment of DNA into RNA. The segments of DNA transcribed into RNA molecules that can encode proteins are said to produce messenger RNA.

5. Name the different types of RNA.

Three main types of RNA are involved in protein synthesis. They are messenger RNA (mRNA), transfer RNA (tRNA), and ribosomal RNA (rRNA)

6. Define Okazaki fragments

Okazaki fragments are the short lengths of DNA that are produced by the discontinuous replication of the lagging strand

7. Define Replication fork

The replication fork is the region of DNA where the replication process is currently taking place.

8. Explain the types of DNA.

Particulars	A DNA	B DNA	Z DNA
Helix	Right handed	Right handed	Left handed
Base pairs per turn	~11	~10.5	~12
Helical Diameter (nm)	2.6	2.0	1.8
Helical length (nm)	2.6	3.4	3.7
Shape	Broadest	Intermediate	Narrowest
Major Grove	Wide, deep	Narrow, deep	Flat
Minor Grove	Narrow, shallow	Broad, shallow	Narrow, deep

9. Describe the structure of RNA

Ribonucleic acid (RNA) is a molecule that is present in the majority of living organisms and viruses. It is made up of nucleotides, which are ribose sugars attached to nitrogenous bases and phosphate groups. The nitrogenous bases include adenine, guanine, uracil, and cytosine. RNA mostly exists in the single-stranded form, but there are special RNA viruses that are double-stranded. The RNA molecule can have a variety of lengths and structures. An RNA virus uses RNA instead of DNA as its genetic material and can cause many human diseases. Transcription is the process of RNA formation from DNA, and translation is the process of protein synthesis from RNA.

10. Explain the structure of DNA

Watson and Crick proposed that DNA is made up of two strands that are twisted around each other to form a right-handed helix. The two DNA strands are antiparallel, such that the 3′ end of one strand faces the 5′ end of the other. The 3′ end of each strand has a free hydroxyl group, while the 5′ end of each strand has a free phosphate group. The sugar and phosphate of the polymerized nucleotides form the backbone of the structure, whereas the nitrogenous bases are stacked inside. These nitrogenous bases on the interior of the molecule interact with each other, base pairing.

11. Explain the life cycle of Bacteriophages

Bacteriophage, also called phage or bacterial virus, any of a group of viruses that infect bacteria. Bacteriophages were discovered independently by Frederick W. Twort in Great Britain (1915) and Félix d'Hérelle in France (1917). D'Hérelle coined the term bacteriophage, meaning "bacteria eater," to describe the agent's bacteriocidal ability. Bacteriophages also infect the single-celled

prokaryotic organisms known as archaea. During infection a phage attaches to a bacterium and inserts its genetic material into the cell. After that a phage usually follows one of two life cycles, lytic (virulent) or lysogenic (temperate). Lytic phages take over the machinery of the cell to make phage components. They then destroy, or lyse, the cell, releasing new phage particles. Lysogenic phages incorporate their nucleic acid into the chromosome of the host cell and replicate with it as a unit without destroying the cell. Under certain conditions lysogenic phages can be induced to follow a lytic cycle.

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SRM ARTS AND SCIENCE COLLEGE
Department of Microbiology

Date : 15.09.2022 **Duration : 1 Hr** **Class : II B.SC MB**
Subject Name & Code : Clinical Laboratory Technology **(SN33A)**

Section A (5 x 2 = 10)
(Answer any **FIVE** questions)

CO1	BL1	1. Define Molecular weight
CO1	BL2	2. Describe equivalent weight
CO1	BL2	3. Explain percent solution (%)
CO1	BL2	4. Convert 1 inch (in) to cm; 1 pound (lb) to g
CO1	BL3	5. Change 60°C to °F
CO3	BL1	6. State the normal value of haemoglobin in men and women
CO3	BL1	7. Locate the RBC counting squares with a sketch of Neubauer Counting chamber

Section B (1 x 5 = 5)
(Answer any **ONE** question)

CO1	BL5	8. Summarize the basic causes of accident in a laboratory
CO3	BL6	9. Write about determination of haemoglobin concentration

Section C (1 x 10 = 10)
(Answer any **ONE** question)

CO1	BL6	10. Organize the functional components of a clinical laboratory
CO3	BL6	11. Compile the steps involved in enumeration of RBC

****

ANSWER KEY

Section A (5 x 2 = 10)

(Answer any **FIVE** questions)

1. Define Molecular weight.

Molecular weight is calculated by totaling the constituent atoms.

Example: Molecular Weight of NaCl = 58.5

Na = 23

Cl = 35.5

Molecular Weight of NaCl is obtained by totaling 23+35.5= 58.5

2. Describe Equivalent Weight

Equivalent weight is the molecular weight divided by its valency

Eq.wt = Mol.wt/Valency

3. Percent Solution

Percent solution is a simple unit which is used to indicate the amount of solute in the basis of 100% of a solution.

4. Convert 1) 1inch (in) to cm;

2) 1 pound (lb) to g

1 inch (in) = 2.54 cm

1 pound (lb) = 454 g

5. Change 60°C to °F

°C/5 = (°F-32)/9

Implies, 60/5 = (°F-32)/9

12×9 = °F-32

108+32=° F

° F = 140°C

6. State the normal value of haemoglobin in men and in women

Normal values

Men = 14-18 g/dL

Women = 11.5-16.5 g/dL

7. Locate the RBC counting squares with a sketch of Neubauer chamber

Section B (1 x 5 = 5)

(Answer any **ONE** question)

8. Summarize the basic causes of accident in a laboratory

- Prevention is better than cure. The following are some of the basic causes of accidents which laboratory personnel must be fully aware of these.
- Failure of the person in charge to give adequate instructions.
- Failure of the person in charge to properly plan and/ or conduct the activity. This includes:
    a. Appointing inexperienced or unskilled people
    b. Failure to lead or maintain discipline
    c. Failure to enforce safety rules and regulations
    d. Failure to provide adequate manpower.
- Improper design and construction or layout.
- Failure to provide proper equipment and protective devices.
- Failure to follow instruction or rules.
- Failure to use protective devices provided by the laboratory or improper use of equipment.
- Physical condition or handicap (i.e., illness, fatigue, intoxication)
- Knowledge and/ or mental attitude (i.e., divided attention, haste, temper, fright)
- Lack of use of knowledge.

9. Write about determination of haemoglobin concentration.

The **commonly used** methods are **Sahli's/ acid hematin** method and **Cyanmethemoglobin** method.

Sahli's/acid hematin Method

Principle: Blood is mixed with N/10 HCl resulting in the conversion of Hb to acid hematin which is brown in color. The solution is diluted till it's color matches with the brown colored glass of the comparator box. The concentration of Hb is read directly.

Equipment required

Hemoglobinometer which consists of
comparator box which has brown colored glass on either side
Hb pipette which is marked upto $20mm^3$(0.02ml blood)
Tube with markings of Hb on one side
glass rod
dropper

Reagents required

N/10 HCl
Distilled water

Sample: Venous blood collected in EDTA as described earlier

Procedure

1. Add N/10 HCl into the tube upto mark 2g%.

2. Mix the EDTA sample by gentle inversion and fill the pipette with 0.02ml blood. Wipe the external surface of the pipette to remove any excess blood.
3. Add the blood into the tube containing HCl. Wash out the contents of the pipette by drawing in and blowing out the acid two to three times. Mix the blood with the acid thoroughly.
4. Allow to stand undisturbed for 10min.
5. Place the hemoglobinometer tube in the comparator and add distilled water to the solution drop by drop stirring with the glass rod till it's color matches with that of the comparator glass. While matching the color, the glass rod must be removed from the solution and held vertically in the tube.
6. Remove the stirrer and take the reading directly by noting the height of the diluted acid hematin and express in g%.

Section C

(1 x 10 = 10)

(Answer any **ONE** question)

10. Organize the functional components of a clinical laboratory

- Clinical laboratory can be attached to a hospital or it can b an independent laboratory.
- **Pathologist** is in-charge of the laboratory. He is a Medical Science Graduate with specialization in Pathology
- **Medical Laboratory technologist** is an undergraduate with a B.Sc or BS degree who receives specialized training pertaining to CL procedures for a period of 1 year
- **Medical Laboratory Technician** holds a H.Sc certificate and receives 1 to 2 years training at lower level

Organizational structure of Clinical Laboratories

Administrator
↓
Pathologist
↓
Laboratory supervisor
↓

1. Specimen collecting and processing
2. Haematology and coagulation
3. Biochemistry
4. Blood Bank
5. Microbiology
6. Clinical Pathology
7. Histology
8. Cytology
9. Pathology
10. Serology

11. Compile the steps involved in enumeration of RBC

To know whether an individual has normal blood profile, or anaemic or polycythemic, complete blood count is necessitated. RBCs is either counted manually or through machine. RBCs are manually counted with the help of specialized apparatus known as Haemocytometer.

A haemocytometer is a counting chamber invented by Louis-Charles Malassez. It includes:

A Neubauer's slide
Cover slip
RBC pipette
WBC pipette

Principle

In order to facilitate RBCs count, a specified volume of blood is diluted with a specified volume of isotonic fluid, which must have property of an anti-cougulant, antihaemolysis, anti-aggregation, anti-Rouleaux, and preserve RBC shape.

Reagents
Diluting fluid used might be 0.85% sodium chloride (NaCl) in distilled water,

Hayam's solution
Sodium sulfate – 10g
Sodium chloride – 2g
Mercuric chloride – 0.25g
DW – 100ml

Gower's solution
Sodium sulfate – 12.5g
Glacial acetic acid – 33.3ml
DW – 100ml

Sample
Whole blood using EDTA or heparin as anticoagulant, however, capillary blood may also be used.

Equipments
1. Pipettes – Thoma peipette (RBCs) or micropipette – 20 microlitre is the desired volume.
2. Improved Neubauer chamber with the cover slips.
3. Light microscope.
4. Clean gauze

Procedure
Clean the Neubauer chamber and the cover slip with 70% ethanol. With the microscope, using a 4x objective, identify the nine main squares of the chamber delimited by three lines each as shown in the following image. Now changes to 10x objective and focus one of the 9 main squares. The counting is performed in the area delimited by three lines. Cells that touch the upper and left border are counted (black colour), while cells that touch the right and lower border are not counted.

Area of square bounded by 3 lines is $0.04mm^2$.
Area of small square within the large square is $0.0025mm^2$

1. Dilute the blood (1:200 dilution) – Draw the blood up to exactly the o.5 mark and dilute to the 101 mark or pipette 4.oml of diluting fluid into a tube and mix by pipetting 20 microlitre of well mixed anticoagulated whole blood.
2. Load the cleaned haematocytometer.
3. Place the haematocytometer on the microscope stage and focus the counting chamber with 10x objective lens on the large central square, which is ruled into 25 small squares, each of which is further divided into 16 smaller squares.
4. Count RBCs in the 4 corner squares and 1 middle square out of 25 squares.
5. Switch to 40x objective lens, and start counting in the five designated squares.

Calculation:

Total RBC count = N X Dilution factor/ Area Counted × Depth

Where,

N = the total number of red blood cells counted in the counting chamber.
Dilution factor = 200 (since it is 1: 200)
Area Counted = 5×0.04
Depth =0.1mm

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SRM ARTS AND SCIENCE COLLEGE
Department of Microbiology

Date : 12/09/2022 **Duration : 1 hr** **Class :BSc**

Subject Name & Code : Medical Bacteriology

Section A (5 x 2 = 10)

(Answer any **FIVE** questions)

CO1	BL2	1. Differentiate serum and plasma
CO1	BL1	2. Describe bacteremia and septicemia
CO 1	BL6	3. Write the best sites for vein puncture with diagram
CO1	BL4	4. Explain the role of Phlebotomist
CO2	BL1	5. Define E Test
CO 2	BL1	6. Define Mac Farland Standard and its use
CO 2	BL3	7. Demonstrate spinal cord with a neat diagram and mark the lumbar pucture site

Section B (1 x 5 = 5)

(Answer any **ONE** question)

CO1	BL4	8.Explain in detail blood collection technique
CO2	BL6	9.Write in detail about kirbey Bauer method

Section C (1 x 10 = 10)

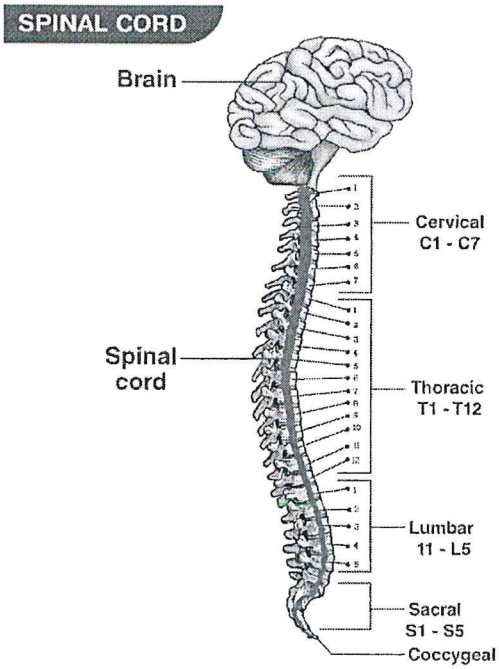
(Answer any **ONE** question)

CO1	BL1	10.Describe urine culture technique with neat diagram of excretory system
CO2	BL4	11.Explain the tube dilution method with a neat diagram

ANSWER KEY

SECTION A

1. Serum is the liquid that remains after the blood has clotted. Plasma is the liquid that remains when clotting is prevented with the addition of an anticoagulant.
2. Bacteremia is the presence of bacteria in the blood, hence a microbiological finding. Sepsis is a clinical diagnosis needing further specification regarding focus of infection and etiologic pathogen.
3. The most site for venipuncture is the antecubital fossa located in the anterior elbow at the fold. This area houses three veins: the cephalic, median cubital, and basilic veins.
4. Phlebotomists are medical professionals who work in medical labs, taking blood samples from patients and adequately labeling them with their information.
5. Etest (previously known as the Epsilometer test) is a way of determining antimicrobial sensitivity by placing a strip impregnated with antimicrobials onto an agar plate.
6. In microbiology, McFarland standards are used as a reference to adjust the turbidity of bacterial suspensions so that the number of bacteria will be within a given range to standardize microbial testing.
7.



SECTION B

8. Identify a vein and clean the area off with an alcohol wipe. Insert a small, hollow needle into the vein. You should see blood coming through the needle and into a collection tube or syringe. Remove the tourniquet and hold gentle pressure on the venipuncture site.
9. In diagnostic laboratories, the disk diffusion test is used to determine the susceptibility of clinical isolates of bacteria to different antibiotics. An effective antibiotic will produce a large zone of inhibition (disk C), while an ineffective antibiotic may not affect bacterial growth at all (disk A). Antibiotics to which a bacterial isolate is partially susceptible will produce an intermediate size zone of inhibition.

SECTION C

10. There are 5 collection methods commonly used to obtain a urine sample from an infant or small child: suprapubic aspiration, urethral catheterization, clean catch void, urine collection bag, and urine collection pad.
11. The tube dilution test is the standard method for determining levels of resistance to an antibiotic. Serial dilutions of the antibiotic are made in a liquid medium which is inoculated with a standardized number of organisms and incubated for a prescribed time.

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SRM ARTS AND SCIENCE COLLEGE
Department of Microbiology

Date :13.9.22 **Duration :1hr** **Class :III BSc**

Subject Name & Code :Medical mycology& Parasitology

Section A (5 x 2 = 10)

(Answer any **FIVE** questions)

CO1	BL1	1. Define Sporangiophore
CO1	BL1	2. Define fungal spore
CO1	BL1	3. State dimorphic fungi
CO1	BL1	4. Define chlamydospore
CO1	BL6	5. Write about Asci
CO1	BL1	6. Name two fungal media used for the isolation of fungal culture
CO2	BL6	7. Write three examples of fungi infecting the skin

Section B (1 x 5 = 5)

(Answer any **ONE** question)

CO1	BL2	8. Discuss briefly the classification of fungi
CO2	BL6	9. Write a detailed account of superficial mycoses

Section C (1 x 10 = 10)

(Answer any **ONE** question)

CO2	BL2	10. Classify medically important fungi. Describe their general characteristics. Draw diagrams of Mycelial forms and Spores.
CO2	BL2	11. Classify the dermatophytes. Explain the pathogenesis of dermatophytes

SRM ARTS AND SCIENCE COLLEGE

Department of Microbiology

Date :13.9.22 **Duration :1hr** **Class :III BSc**

Subject Name & Code :Medical mycology& Parasitology

Section A (5 x 2 = 10)

1. Define Sporangiophore

   Asexual structures characteristic ofthe Order Mucorales; they are mitotic spores produced within an enclosed sporangium, often supported by one sporangiophore

2. Define fungal spore

   A specialized propagule with enhanced survival value, such as resistance to adverse conditions or structural features that promote dispersion. Spores may result from asexual (eg, conidia, sporangiospores) or sexual reproduction.

3. State dimorphic fungi

   A small subset of fungi within the Ascomycota phylum is considered dimorphic, which refers to capacity to convert between two specific morphologic forms, yeast and hyphae. Eg. *Candida albicans*

4. Define chlamydospore

   Large, thickwalled,usually spherical conidia produced from terminalor intercalary hyphal cells.

5. Write about Asci

   The sexual spores i.e. ascospores, are produced endogenously within microscopic 'pods called asci. These asci are arranged in different types of fruiting bodies called as ascocarps.

6. Name two fungal media used for the isolation of fungal culture

   Sabrauods dextrose agar, potato dextrose agar

7. Write three examples of fungi infecting the skin

   Microsporon canis,

   Epidermophytan floccosum

   Trichophytan rubrum

Section B (1 x 5 = 5)

(Answer any **ONE** question)

8. Discuss briefly the classification of fungi

The fungi those reproduce sexually are classified under three phyla— **Glomeromycota, Ascomycota** and **Basidiomycota** depending on morphology of their fruiting bodies/structures. The function of fruiting body is to produce sexual spores for dissemination. The anamorph fungi, which lack known sexual state, have been placed in fourth separate major high-level taxon called **Deuteromycetes** or ***'Fungi Imperfecti'*** or ***'Mitosporic Fungi'***.

A. **Phylum Glomerulomycta, Order Mucorales**
B. **Phylum Ascomycota** (Ascomycetes) Sexual reproduction involves a sac or ascus in which karyogamyand meiosis occur, producing ascospores.
C. **Phylum Basidiomycota** (Basidomycetes) Sexual reproduction results in dikaryotic hyphae and four progenybasidiospores supported by a club-shaped basidium. Hyphaehave complex septa. Examples: Mushrooms, Cryptococcus.

9. Write a detailed account of superficial mycoses

Cutaneous mycoses are caused by fungi that infect only the keratinized tissue (skin, hair, and nails). The most important of these are the dermatophytes, a group of about 40 related fungi that belong to three genera: ***Microsporum, Trichophyton,*** **and** ***Epidermophyton.***

Dermatophytes are probably restricted to the nonviable skin because most are unable to grow at 37°C or in the presence of serum. Dermatophytoses are among the most prevalent infections in the world.

Being superficial, dermatophyte (ringworm) infections have been recognized since antiquity. In skin they are diagnosed by the presence of hyaline, septate, branching hyphae or chains of arthroconidia.

Section C

10. Classify medically important fungi. Describe their general characteristics. Draw diagrams of Mycelial forms and Spores.

Glomeromycota

Ascomycota is largest phylum of kingdom Fungi. It comprises of approximately 75% described fungal species and about 80% of pathogenic and opportunistic fungi. The sexual spores i.e. ascospores, are produced endoge- nously within microscopic 'pods' called asci. These asci are arranged in different types of fruiting bodies called as ascocarps.

Basidiomycota

There are about 25,000 species consisting of mushrooms, toadstools, shelf fungi, rusts and smut fungi. The hyphae in basidiomycetes usually have incomplete septa and sexual fusion of hyphae leads to formation of densely interwoven reproductive structure (mushroom) with characteristic microscopic, club-shaped organs called as basidia.

Deuteromycota (Fungi Imperfect)

The deuteromycota (Gr. for 'second fungi') is considered formal phylum of kingdom Fungi. However, this is not true phylogenetic group rather it is an artificial category in which sexual process is either absent or has not yet been observed hence fungi are temporarily placed in this phylum.

11. Classify the dermatophytes. Explain the pathogenesis of dermatophytes

Dermatophytosis

Cutaneous mycoses are caused by fungi that infect only the keratinized tissue (skin, hair, and nails). The most important of these are the dermatophytes, a group of about 40 related fungi that belong to three genera: ***Microsporum, Trichophyton,*** **and** ***Epidermophyton.***

Cosmopolitan zoophilic species (and their natural hosts) include *Microsporum canis* (dogs and cats), *Microsporumgallinae* (fowl), *Microsporum nanum* (pigs), *Trichophyton equinum*(horses), and *Trichophyton verrucosum* (cattle).

The more common dermatophytes are identified by their colonial appearance and microscopic morphology after growth for 2 weeks at 25°C on Sabouraud's dextrose agar.

Trichophyton species, which may infect hair, skin, or nails, develop cylindric,smooth-walled macroconidia and characteristic microconidia.*Microsporum* species tend to produce distinctive multicellular macroconidia with echinulate walls. Both types of conidia are borne singly in these genera. *Microsporumcanis* forms a colony with a white cottony surface and a deep yellow color on reverse; the thick-walled, 8- to 15-celled macro conidia frequently have curved or hooked tips. *Microsporum gypseum* produces a tan, powdery colony and abundant thinwalled,four- to six-celled macroconidia. *Microsporum* species infect only hair and skin.

Epidermophyton floccosum, which is the only pathogen in this genus, produces only macroconidia, which are smooth-walled, clavate, two- to four-celled, and formed in small clusters. The colonies are usually flat and velvety with a tan to olive-green tinge. *Epidermophyton floccosum* infects the skin and nails but not the hair.In addition to gross and microscopic morphology, a few nutritional or other tests, such as growth at 37°C or a test for in vitro hair perforation, are useful in differentiating certain species. Atypical isolates can usually be identified by speciesspecificpolymerase chain reaction (PCR) tests.

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SRM ARTS AND SCIENCE COLLEGE
Department of Microbiology

Class: III B.Sc MB **Marks: 50**
Subject Name: Virology **Duration: 1 Hr**

Section A (5 x 2 = 10)
(Answer any **FIVE** questions)

CO1	BL1	1. Define Virus
CO1	BL2	2. Describe CPE
CO1	BL2	3. Explain viral serology
CO1	BL1	4. Define tissue culture
CO1	BL4	5. Differentiate virus from other microbes
CO3	BL1	6. Define virion
CO3	BL2	7. Describe peplomers

Section B (1 x 5 = 5)
(Answer any **ONE** question)

CO1	BL5	8. Summarize the general characters of virus.
CO3	BL6	9. Write a short notes on embryonated egg inoculation.

Section C (1 x 10 = 10)
(Answer any **ONE** question)

CO1	BL2	10. Explain the serological methods for virus diagnosis.
CO3	BL4	11. Differentiate viral cultivation methods.

****

1) Define Virus

Virus is an intracellular obligatory parasites.

2) Describe CPE

Cytopathic effect or **cytopathogenic effect** (abbreviated CPE) refers to structural changes in host cells that are caused by viral invasion.

3) Explain viral serology

An antibody test looks for the presence of antibodies, which are specific proteins made in response to infections. Antibodies are typically detected in the blood of people who are tested after infection; they show an immune response to the infection.

4) Define tissue culture

The growth in an artificial medium of cells derived from living tissue.

5) Differentiate virus from other microbes

Virus versus Bacteria

Bacteria	Virus
1.Bacteria are totally living in nature.	1. Viruses are present in both living and nonliving form.
2. Cell wall of Bacteria is made up of lipopolysaccharide or peptidoglycan.	2. Cell wall is absent but a capsid is present in them.
3. Size of Bacteria is between 900-1000nm.	3. Size of the Virus is between 30-50nm.
4.They can survive without a host.	4.They cannot survive without a host.
5. Bacteria reproduce mainly by binary fission.	5. They reproduce by lytic fission and produce their similar copies.
6. Ribosomes are present in Bacteria.	6. Ribosome is absent in Bacteria.

6) Define virion: virion is an infectious part of virus.

10) Explain the serological methods for virus diagnosis

Virus laboratory diagnostics has an increasingly important role in modern patient care. Virological methods are needed to investigate the etiology of acute viral infection or the reactivation of a latent infection, as well as to follow virus load in antiviral treatments. Serological assays are also used for screening of blood products for the risk of certain chronic infections, evaluation of the immune status, and need for prophylatic treatments in connection with organ transplantations.

For diagnostic purposes the following approaches can be used: demonstration of presence of infectious virus or its structural components directly from a patient's specimens or investigation of specific antibody response in serum specimes. Virus isolation is used to demonstrate infectious virus in a patient's specimens, whereas nucleic acid amplification techniques, like polymerase chain reaction (PCR), are widely used to detect virus nucleic acids. Virus antigens are investigated by antigen detection assays. Serological diagnosis is based on either the demonstration of the presence of virus-specific IgM antibodies or a significant increase in the levels of specific IgG antibodies. Immunoassays are the most commonly used serological assays. Point-of-care tests (POC tests), both for antigens and antibodies, are also becoming more and more common in diagnostic use.

11) Differentiate viral cultivation methods

Viruses are obligate intracellular parasites so they depend on host for their survival. They cannot be grown in non-living culture media or on agar plates alone, they must require living cells to support their replication.

The primary purpose of virus cultivation is:

1. To isolate and identify viruses in clinical samples.
2. To do research on viral structure, replication, genetics and effects on host cell.
3. To prepare viruses for vaccine production.

Cultivation of viruses can be discussed under following headings:

1. Animal Inoculation
2. Inoculation into embryonated egg
3. Cell Culture

1. Animal Inoculation

- Viruses which are not cultivated in embryonated egg and tissue culture are cultivated in laboratory animals such as mice, guinea pig, hamster, rabbits and primates are used.
- The selected animals should be healthy and free from any communicable diseases.
- Suckling mice(less than 48 hours old) are most commonly used.

SRM ARTS AND SCIENCE COLLEGE
Department of Microbiology

Date : 15.09.22 **Duration : 1 hour** **Class : III B.Sc Microbiology**

Subject Name: Biotechnology and Genetic Engineering

Section A (5x2=10)
(Answer any **FIVE** questions)

CO1	BL3	1. Uses of optrode.
CO1	BL1	2. Define biosensor.
CO1	BL2	3. Differentiate endopeptidases and exopeptidases.
CO1	BL1	4. Define enzyme.
CO1	BL1	5. Name the substrates used in lipase production.
CO1	BL6	6. Write few points about alkaline proteases.
CO1	BL1	7. List the types of electrochemical biosensor with few points.

Section B (1x5 = 5)
(Answer any **ONE** question)

CO1	BL2	8. Explain the production of protease.
CO1	BL6	9. Write short notes on few types of biosensors.

Section C (1x10 = 10)
(Answer any **ONE** question)

CO1	BL6	10. Write in detail about methods of immobilization of enzymes.
CO1	BL2	11. Describe about the substrates used for different enzyme production.

III B.Sc MICROBIOLOGY

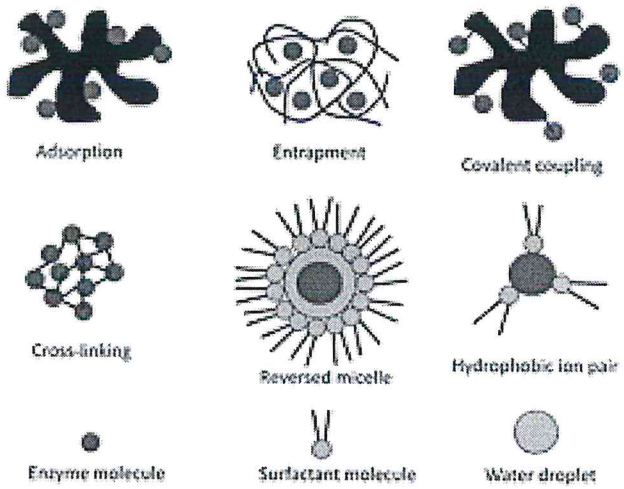
BIOTECHNOLOGY AND GENETIC ENGINEERING

INTERNAL TEST I ANSWER KEY

1. An optrode requires three components to function: a chemical that responds to an analyte, a polymer to immobilise the chemical transducer and instrumentation (optical fibre, light source, detector and other electronics). Optodes usually have the polymer matrix coated onto the tip of an optical fibre.
2. A biosensor is an analytical device, used for the detection of a chemical substance, that combines a biological component with a physicochemical detector.
3. The key difference between endopeptidase and exopeptidase is that the endopeptidase breaks peptide bonds within the protein molecules while the exopeptidase cleaves peptide bonds at the terminals of the protein molecules.
4. Enzyme are proteins that act as biological catalysts by accelerating chemical reactions. The molecules upon which enzymes may act are called substrates, and the enzyme converts the substrates into different molecules known as products.
5. Rice husk (RH), cottonseed cake (CSC), and red gram husks (RGH), Gingelly oil cake, almond oil cake, Neem oil cake etc.
6. Alkaline proteases are proteases that are active from neutral to alkaline pH range. These can be isolated from various microorganisms.
7. Electrochemical biosensors are classified into three categories, depending on what is measured as their signals. They are (1) potentiometric, (2) amperometric, and (3) conductometric biosensors, which measure voltage, current, and conductance (inverse of resistance).
8. Microbial Protease enzyme: Proteases are the second most important industrial enzymes after amylase. About 500 tons of the enzymes are produced per year. This can be produced commercially from bacteria and fungi. The proteases on the market include-alkaline, neutral and acidic proteases. i. Alkaline protease: Many bacteria and fungi excrete alkaline protease and the most important producer are Bacillus strains like Bacillus licheniformis, Bacillus mylotiquefaciens, B. megaterium, B. purilis and Streptomyces strains like Streptomyces fradiae, S. griseus, S. rectus and fungi like Aspergillus niger, A. sojae, A. oryzae, A. flavus Alkaline proteases are commonly used in detergents. Mainly proteases from bacillus licheniformis. Alkaline proteases have some features which makes its applications in industrial scales like stability at high temperature, stability in alkaline range (pH 9-11), stability in association with chelating agents. ii. Neutral protease: Neutral proteases are produced by bacteria and fungi. E.g. Bacillus subtilis, B. coreus, B. megaterium, Pseudomonas aeruginosa, Streptomyces griseus, Aspergillus oryzae, Aspergillus sojae. Neutral proteases are relatively unstable and calcium, sodium and chloride must be added for maximal stability. Its pH range for activity is narrow and sensitive to increased temperature. These are quickly inactivated by alkaline proteases. Because of these limitations, they have restricted industrial applications but can be used in leather industries and in food industries (For manufacture of breads and rolls). iii. Acidic protease: Acidic proteases are found in animal cells, yeast and molds but never in bacteria. These microbial renin-like enzymes are derived from Mucor michei, Mucor pusillus, Mucor racemaeus, Mucor bacilliformis. Pepsin like acid proteases are derived from Aspergillus species and Rhizopus spp. Renin like proteases are commonly used in cheese production in optimum pH 2-4. Applications of protease enzyme: Used in cheese production Used in medicine (similar to mammalian pepsin)

Used in digestion of soya-protein for soy-sauce production. Break down wheat gluten in baking industries.

9. Types of Biosensors - The different types of biosensors are classified based on the sensor device as well as the biological material that is discussed below. Electrochemical Biosensor Generally, the electrochemical biosensor is based on the reaction of enzymatic catalysis that consumes or generates electrons. Such types of enzymes are named Redox Enzymes. The substrate of this biosensor generally includes three electrodes such as a counter, reference, and working type. The object analyte is engaged in the response that happens on the surface of an active electrode, and this reaction may source also electron transfer across the dual-layer potential. The current can be calculated at a set potential. Electrochemical biosensors are classified into four types Amperometric Biosensors Potentiometric Biosensors Impedimetric Biosensors
   Voltammetric Biosensors. Physical Biosensor - In conditions of classification, physical biosensors are the most fundamental as well as broadly used sensors. The main ideas behind this categorization also happen from inspecting the human minds. As the general working method behind the intelligence of hearing, sight, touch is to react on the exterior physical stimuli, therefore any detecting device that offers a reaction to the physical possessions of the medium was named as a physical biosensor. The physical biosensors are classified into two types namely piezoelectric biosensors and thermometric biosensors. Piezoelectric Biosensors - These sensors are a collection of analytical devices which work on a law of "affinity interaction recording". The platform of a piezoelectric is a sensor element that works on the law of oscillations transform due to a collection jump on the surface of a piezoelectric crystal. In this analysis, biosensors having their modified surface with an antigen or antibody, a molecularly stamped polymer, and heritable information. Thermometric Biosensor - There are various types of biological reactions which are connected with the invention of heat, and this makes the base of thermometric biosensors. These sensors are usually named thermal biosensors. Optical Biosensor - The Optical biosensor is a device that uses an optical measurement principle. They use fiber optics as well as optoelectronic transducers. The term optrode represents a compression of the two terms optical & electrode. These sensors mainly involve antibodies and enzymes like the transducing elements.Enzyme Biosensor - This sensor is one kind of analytical device, used to merge an enzyme using a transducer to generate a signal that is proportional to the concentration of the target analyte. Further, this signal can be amplified, stored, processed for later analysis.
10. Traditionally, four methods are used for enzyme immobilization, namely (1) non-covalent adsorption and deposition, (2) physical entrapment, (3) covalent attachment, and (4) bio-conjugation. Support binding can be physical or chemical, involving weak or covalent bonds.



11. Agro-Food Waste Based Substrates and Solid State Fermentation of enzymes - Effect of the Carbon Source on the Fungal Growth and Protease Activity Wheat bran for human (organic wheat bran, OW) or for animal consumption (zootechnical wheat bran, ZW), and rice husk (RH), all bought at local stores, and spent espresso coffee grounds (CG) collected from bars after espresso preparation in Brescia, Italy, were the by-products used as substrates for fungal growth and enzymes production (Table 2). SSF was carried out in 340 mL micropropagation boxes equipped with a 0.45 µm filter (Micropoli, Cesano Boscone, Italy) containing 11 g of each waste. The dry substrates in boxes were autoclaved twice at 121 ◦C for 20 min. Approximate chemical composition (g/100 g dry material) retrieved from scientific literature of feed stocks used in this study. Substrate for SSF Chemical Components Wheat Bran (ZW *) Rice Husk (RH) Spent Coffee Grounds (CG) Cellulose Hemicellulose Lignin Carbohydrates Protein Lipids Ash. Effect of Water Content on the Fungal Growth and Protease Activity Different moisture contents were tested depending on the substrate composition. The optimum water content of the dried substrates was studied over a range of 1:1 (wet basis) (OWA, ZW, RH, and CGA); 1.5:1 (OWB) and 2:1 (CGB). Different moisture contents were adjusted with deionized water. Effect of Substrate Density on the Fungal Growth and Protease Activity To analyze the effect of the substrate density, the activity was tested at different porosity using rice husk. RH substrate was separated into two series.

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Department of Microbiology

Date: 12.09.22 **Duration: 1hr** **Class : II M.Sc**

Subject Name & Code: Microbial Genetics&MDT3A

Section A (5 x 1 = 5)

(Answer any **FIVE** questions)

CO1	BL1	1. Define: genetics
CO1	BL2	2.Explain genes
CO 1	BL4	3. Define Melting point of DNA
CO1	BL1	4.Define : linking number
CO1	BL1	5. Define : Transposan
CO 2	BL1	6.Define : Chromsomes
CO 1	BL6	7. Describe : Significance of Hershey and Chase experiment

Section B (2 x 5 = 10)

(Answer any **TWO** questions)

CO1	BL2	8. Discus the DNA Structure and function
CO1	BL6	9. Write a short note on RNA as a genetic material.
CO1	BL3	10. Illustrate the super helicity of DNA.
CO1	BL4	11. Write a brief notes on linking number

Section C (1 x 10 = 10)

(Answer any **ONE** question)

CO1	BL2	12. Discuss the experimental evidence of genetic material.
CO1	BL2	13. Describe the transposons and types.

II M.Sc APPLIED MICROBIOLOGY

MICROBIAL GENETICS

INTERNAL TEST I ANSWER KEY

1. Define Genetics
   Genetics is a branch of biology concerned with the study of genes, genetic variation, and heredity in organisms.
2. Explain Genes
   A gene is the basic physical and functional unit of heredity and are made up of DNA.
3. Define Melting point of DNA
   DNA melting, also called DNA denaturation, is the process by which double-stranded deoxy ribonucleic acid unwinds and separates into single-stranded strands through the breaking of hydrogen bonding between the bases.
4. Define Linking number
   The linking number of DNA defines the number of times a strand of DNA winds around the helical axis when the axis is constrained to lie in a plane.
5. Define Transposons
   Transposons are DNA segments that are mobile and they can replicate and insert copies at sites within the same or a different chromosome.
6. Define Chromosomes
   A chromosome is a thread-like structure made up of DNA and are found in the nucleus of each cell.
7. Describe the significance of Hershey and Chase experiment

The Hershey–Chase experiments were a series of experiments conducted in 1952 by Alfred Hershey and Martha Chase that helped to confirm that DNA is genetic material.

8. Discuss the DNA structure and functions
   Watson and Crick proposed that DNA is made up of two strands that are twisted around each other to form a right-handed helix. The two DNA strands are antiparallel, such that the 3′ end of one strand faces the 5′ end of the other. The 3′ end of each strand has a free hydroxyl group, while the 5′ end of each strand has a free phosphate group. The sugar and phosphate of the polymerized nucleotides form the backbone of the structure, whereas the

nitrogenous bases are stacked inside. These nitrogenous bases on the interior of the molecule interact with each other, base pairing.

9. Write short notes on RNA as a genetic material

The genome of viruses may be DNA or RNA. Most of the plant viruses have RNA as their hereditary material. Fraenkel-Conrat (1957) conducted experiments on tobacco mosaic virus (TMV) to demonstrate that in some viruses RNA acts as genetic material. TMV is a small virus composed of a single molecule of spring-like RNA encapsulated in a cylindrical protein coat. Different strains of TMV can be identified on the basis of differences in the chemical composition of their protein coats and difference in symptoms on the tobacco leaves. By using the appropriate chemical treatments, proteins and RNA of TMV can be separated. Fraenkel-Conrat experimentally proved that in the absence of DNA, RNA acts as the genetic material. In one experiment protein and RNA components of the TMV were separated and both were used to infect the tobacco leaf separately. It was observed that in case of protein subunits, there was no symptoms on the leaf and no progeny viruses were obtained. RNA part caused the infection and symptoms appeared on the tobacco leaf. Fresh progeny of TMV was also obtained.

10. Illustrate the Superhelicity of DNA

DNA supercoiling is a special property of circular, double-stranded DNA that is topological in origin. It confers new structural and energetic properties. When the ends of a linear DNA molecule are ligated to produce a covalently closed circle, the two strands become intertwined like the links of a chain, and will remain so unless one of the strands is broken. The number of times one strand is linked with the other is described by a fundamental property of DNA supercoiling, the linking number (Lk). This is related to two geometrical properties of the molecule, the twist (Tw, rotation of the strands about the helical axis) and the writhe (Wr, which measures the path of the helix axis in space).

11. Write a brief notes on linking number

The linking number is a topological property of DNA. A linking number is a sum of twists and writhes. The number of times one strand of DNA turned around another strand is called a twist while inter-coiling of the double helix is termed as writhe. In short, writhe is a number of a time DNA double helix is crossed, coiled over each other or the number of times one strand wraps around

another strand. As per the Watson and Cricks model, eukaryotic DNA is right-handed and negatively supercoiled. It is very difficult to understand DNA topology in two-dimensional space because topology is a science that cannot be understood without three-dimensional property.

12.Discuss the experimental evidence of genetic material

DNA, deoxyribonucleic acid, is the genetic material in your cells. It was passed on to you from your parents and determines your characteristics. The discovery that DNA is the genetic material was another important milestone in molecular biology.

Many scientists contributed to the identification of DNA as the genetic material. In the 1920s, Frederick Griffith made an important discovery. He was studying two different strains of a bacterium, called R (rough) strain and S (smooth) strain. He injected the two strains into mice. The S strain killed (virulent) the mice, but the R strain did not (non-virulent) (see Figure below). Griffith also injected mice with S-strain bacteria that had been killed by heat. As expected, the killed bacteria did not harm the mice. However, when the dead S-strain bacteria were mixed with live R-strain bacteria and injected, the mice died.

Griffith's Experimental Results. Griffith showed that a substance could be transferred to harmless bacteria and make them deadly. Based on his observations, Griffith deduced that something in the killed S strain was transferred to the previously harmless R strain, making the R strain deadly. He called this process transformation, as something was "transforming" the bacteria from one strain into another strain.

13.Describe the Transposons and its types

Transposon, class of genetic elements that can "jump" to different locations within a genome. Although these elements are frequently called "jumping genes," they are always maintained in an integrated site in the genome. In addition, most transposons eventually become inactive and no longer move.Transposons were first discovered in corn (maize) during the 1940s and '50s by American scientist Barbara McClintock, whose work won her the Nobel Prize for Physiology or Medicine in 1983. Since McClintock's discovery, three basic types of transposons have been identified. These include class II transposons, miniature inverted-repeat transposable elements (MITEs, or class III transposons), and retrotransposons (class I transposons).

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Department of Microbiology

Date : 13/9/22 **Duration :1 hr** **Class : II MSc**

Subject Name & Code :Genetic engineering(MDT3B)

Section A (5 x 1 = 5)

(Answer any **FIVE** questions)

CO1	BL1	1. Define replication fork
CO1	BL4	2.Explain the role of topoisomerase
CO 1	BL1	3.Define reverse transcriptase
CO1	BL6	4. Write the role of helicase activity
CO1	BL4	5. Explain the function of endonuclease and exonuclease
CO 1	BL1	6.Describe the application of recombinant DNA technology
CO 1	BL4	7.Explain the role of methylases

Section B (2 x 5 = 10)

(Answer any **TWO** questions)

CO1	BL6	8.Write in detail the process of R DNA technology
CO1	BL1	9. Describe the restriction modification system with diagram
CO1	BL6	10.Write the difference between DNA polymerase and RNA polymerase
CO1	BL4	11.Explain with neat diagram the enzymes used in replication

Section C (1 x 10 = 10)

(Answer any **ONE** question)

CO1	BL4	12.Explain in detail different types of polymerase
CO1	BL1	13.Describe about the steps involved in R DNA technology

ANSWER KEY

SECTION A

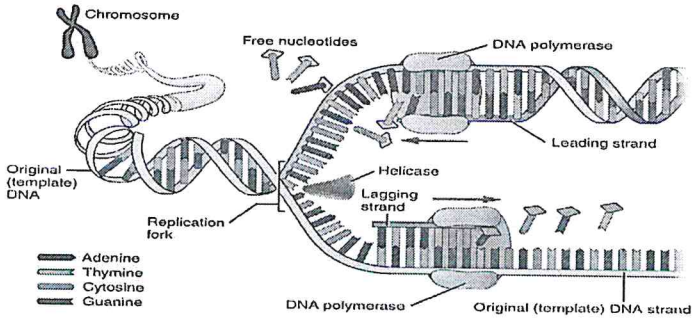
1. The replication fork is the region of DNA where the replication process is currently taking place.
2. DNA topoisomerases are highly conserved enzymes that resolve the topological problems that these structures create.
3. A reverse transcriptase (RT) is an enzyme used to generate complementary DNA (cDNA) from an RNA template, a process termed reverse transcription
4. Helicases are defined as a class of enzymes that catalyze the separation of duplex nucleic acids into single strands.
5. Exonucleases are enzymes that cleave the polynucleotide sequence either from the 5' end or the 3' end, one at a time. Endonucleases play a role in DNA repair. AP endonuclease, specifically, catalyzes the incision of DNA exclusively at AP sites.
6. Recombinant DNA technology has also proven important to the production of vaccines and protein therapies such as human insulin, interferon and human growth hormone.
7. A methylase is the enzyme that recognizes a specific sequence and methylates one of the bases in or near that sequence.

SECTION B

8. The six steps involved in rDNA technology. These are – isolating genetic material, restriction enzyme digestion, using PCR for amplification, ligation of DNA molecules, Inserting the recombinant DNA into a host, and isolation of recombinant cells.

9. Restriction-modification (R-M) systems are rudimentary bacterial immune systems. The main components include restriction enzyme (R), which cuts specific unmethylated DNA sequences, and the methyltransferase (M), which protects the same DNA sequences.
10. DNA polymerase is the enzyme that synthesizes new DNA molecules from the DNA nucleotides in a process called DNA replication. RNA polymerase is the enzyme responsible for the synthesis of RNA molecules from DNA in a process called transcription. It adds RNA nucleotides in the 5' to 3' direction to produce the single-stranded RNA molecule.

11



12. There are five DNA polymerases identified in *E.coli*. All the DNA polymerases differ in structure, functions and rate of polymerization and processivity.

DNA Polymerase I is coded by polA gene. It is a single polypeptide and has a role in recombination and repair. It has both 5'→3' and 3'→5' exonuclease activity. DNA polymerase removes the RNA primer from lagging strand by 5'→3' exonuclease activity and also fills the gap.

DNA Polymerase II is coded by polB gene. It is made up of 7 subunits. Its main role is in repair and also a backup of DNA polymerase III. It has 3'→5' exonuclease activity.

DNA Polymerase III is the main enzyme for replication in *E.coli*. It is coded by polC gene. The polymerization and processivity rate is maximum in DNA polymerase III. It also has proofreading 3'→5' exonuclease activity.

DNA polymerase III of *E.coli* is made up of a total of 13 subunits, which comprises 9 different types of subunits.It consists of two core domains made up of α, ϵ, and θ subunits. It is attached to the γ complex or clamp-loading complex, which is made up of five subunits, $\tau_2\gamma\delta\delta'$. Additional

subunits χ and ψ are attached to the clamp-loading complex. β subunits make two clamps with a dimer each. They increase the processivity of the DNA polymerase III.

DNA Polymerase IV is coded by dinB gene. Its main role is in DNA repair during SOS response, when DNA replication is stalled at the replication fork. DNA polymerase II, IV and V are translesion polymerases.

DNA Polymerase V is also involved in translesion synthesis during SOS response and DNA repair. It is made up of UmuC monomer and UmuD dimer.

13. Recombinant DNA is the DNA that is composed of sequences that are derived from different sources. The process of recombination DNA technology consists of the following steps:

Isolation of genetic material (DNA).DNA is enclosed within the membrane. So, to extract it out, the cell wall is broken down to release the genetic material. This can be done by using cell wall digesting enzymes such as Lysozymes for bacterial cells, cellulose for plant cells and chitinase for fungi cells. 2. Cutting of DNA at specific locations.This is done by using restriction enzymes that cut DNA at specific recognition sequences and give the desired DNA fragments. 3. Joining of DNA fragment-The DNA fragments generated with a cloning vector can be done by sticky ends ligation, blunt-end ligation and homopolymer tailing. 4. Insertion of DNA into the host cell.-The recombinant DNA can be inserted into the host cell by transformation, transduction, and vectorless gene transfer.5. Selection and screening of transformed cells.The selection and screening of transformed cells can be by any of the following methods- immunological method, nucleic acid hybridization and blue-white screening or insertional inactivation.

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Department of Microbiology

Date : 14.09.22 **Duration :1hr** **Class :II M.Sc**

Subject Name & Code: Molecular Biology &MDT3C

Section A (5 x 1 = 5)

(Answer any **FIVE** questions)

CO1	BL1	1. Define: Central dogma
CO1	BL2	2.Explain about Chargaff's rule
CO 1	BL4	3. Differentiate B form DNA from Z form.
CO1	BL1	4.Define : Biomolecules
CO1	BL1	5. Define : hn RNA
CO 1	BL1	6.Define : Nucleotide
CO 1	BL6	7. Describe secondary structure of protein

Section B (2 x 5 = 10)

(Answer any **TWO** questions)

CO1	BL2	8. Discus the carbohydrate structure and function.
CO1	BL6	9. Write a short note on lipid structure and function.
CO1	BL3	10. Illustrate the DNA double helix's structure and how it works.
CO	BL4	11. Differentiate DNA and RNA

Section C (1 x 10 = 10)

(Answer any **ONE** question)

CO1	BL2	12. Discuss in detailed about Confirmation and function of protein.
CO1	BL2	13. Describe the structure and function of Biomolecules.

1) Central dogma

The central dogma of molecular biology is a theory stating that genetic information flows only in one direction, from DNA, to RNA, to protein, or RNA directly to protein.

2) Explain about Chargaff's rule

Chargaff's rules state that in the DNA of any species and any organism, the amount of guanine should be equal to the amount of cytosine and the amount of adenine should be equal to the amount of thymine. Further a 1:1 stoichiometric ratio of purine and pyrimidine bases (i.e., A+G=T+C) should exist.

3) Differentiate B form DNA from Z form

Feature	B-DNA	A-DNA	Z-DNA
Type of helix	Right-handed	Right-handed	Left-handed
Helical diameter (nm)	2.37	2.55	1.84
Rise per base pair (nm)	0.34	0.29	0.37
Distance per complete turn (pitch) (nm)	3.4	3.2	4.5
Number of base pairs per complete turn	10	11	12
Topology of major groove	Wide, deep	Narrow, deep	Flat
Topology of minor groove	Narrow, shallow	Broad, shallow	Narrow, deep

4) Define: Biomolecules

Biomolecules, also called *biological molecule*, any of numerous substances that are produced by cells and living organisms. Biomolecules have a wide range of sizes and structures and perform a vast array of functions. The four major types of biomolecules are carbohydrates, lipids, nucleic acids, and proteins.

5) Define: hn RNA

Definition. hnRNA stands for **heterogeneous nuclear RNA**. It refers to the large pre-mRNAs of various nucleotide sequences that are made by RNA Polymerase II, and processed in the nucleus to become cytoplasmic mRNAs. RNA Capping RNA Polymerase II Transcription.

Chemical Properties of Carbohydrates

- **Osazone formation**: Osazone are carbohydrate derivatives when sugars are reacted with an excess of phenylhydrazine. eg. Glucosazone
- **Benedict's test:** Reducing sugars when heated in the presence of an alkali gets converted to powerful reducing species known as enediols. When Benedict's reagent solution and reducing sugars are heated together, the solution changes its color to orange-red/ brick red.
- **Oxidation:** Monosaccharides are reducing sugars if their carbonyl groups oxidize to give carboxylic acids. In Benedict's test, D-glucose is oxidized to D-gluconic acid thus, glucose is considered a reducing sugar.
- **Reduction to alcohols:** The C=O groups in open-chain forms of carbohydrates can be reduced to alcohols by sodium borohydride, $NaBH_4$, or catalytic hydrogenation (H2, Ni, EtOH/H2O). The products are known as "alditols".

Properties of Monosaccharides

- Most monosaccharides have a sweet taste (fructose is sweetest; 73% sweeter than sucrose).
- They are solids at room temperature.
- They are extremely soluble in water: – Despite their high molecular weights, the presence of large numbers of OH groups makes the monosaccharides much more water-soluble than most molecules of similar MW.
- Glucose can dissolve in minute amounts of water to make a syrup (1 g / 1 ml H2O).

Classification of Carbohydrates (Types of Carbohydrates)

The simple carbohydrates include single sugars (monosaccharides) and polymers, oligosaccharides, and polysaccharides.

Monosaccharides

- The simplest group of carbohydrates and often called simple sugars since they cannot be further hydrolyzed.
- Colorless, crystalline solids that are soluble in water and insoluble in a non-polar solvent.
- These are compound that possesses a free aldehyde or ketone group.
- The general formula is $C_n(H2O)_n$or $C_nH_{2n}O_n$.
- They are classified according to the number of carbon atoms they contain and also on the basis of the functional group present.
- The monosaccharides thus with 3, 4, 5, 6, 7 … carbons are called trioses, tetroses, pentoses, hexoses, heptoses, etc., and also as aldoses or ketoses depending upon whether they contain aldehyde or ketone group.
- Examples: **Glucose, Fructose, Erythrulose, Ribulose.**

Oligosaccharides

- Oligosaccharides are compound sugars that yield 2 to 10 molecules of the same or different monosaccharides on hydrolysis.
- The monosaccharide units are joined by glycosidic linkage.
- Based on the number of monosaccharide units, it is further classified as a disaccharide, trisaccharide, tetrasaccharide, etc.
- Oligosaccharides yielding 2 molecules of monosaccharides on hydrolysis is known as a disaccharide, and the ones yielding 3 or 4 monosaccharides are known as trisaccharides and tetrasaccharides respectively, and so on.
- The general formula of disaccharides is $C_n(H2O)_{n-1}$and that of trisaccharides is $C_n(H2O)_{n-2}$ and so on.
- Examples: **Disaccharides include sucrose, lactose, maltose, etc.**
- Trisaccharides are Raffinose, Rabinose.

10) Illustrate the DNA double helix's structure and how it works

Today, the DNA double helix is probably the most iconic of all biological molecules. It's inspired staircases, decorations, pedestrian bridges (like the one in Singapore, shown below), and more.

I have to agree with the architects and designers: the double helix is a beautiful structure, one whose form fits its function in a remarkable way. But the double helix was not always part of our cultural lexicon. In fact, until the 1950s, the structure of DNA remained a mystery.

From the work of biochemist Phoebus Levene and others, scientists in Watson and Crick's time knew that DNA was composed of subunits called **nucleotides**^1 1start superscript, 1, end superscript. A nucleotide is made up of a sugar (deoxyribose), a phosphate group, and one of four nitrogenous bases: adenine (A), thymine (T), guanine (G) or cytosine (C).

C and T bases, which have just one ring, are called **pyrimidines**, while A and G bases, which have two rings, are called **purines**.

DNA nucleotides assemble in chains linked by covalent bonds, which form between the deoxyribose sugar of one nucleotide and the phosphate group of the next. This arrangement makes an alternating chain of deoxyribose sugar and phosphate groups in the DNA polymer, a structure known as the **sugar-phosphate backbone**

Chargaff's rules

One other key piece of information related to the structure of DNA came from Austrian biochemist Erwin Chargaff. Chargaff analyzed the DNA of different species, determining its composition of A, T, C, and G bases. He made several key observations:

- A, T, C, and G were not found in equal quantities (as some models at the time would have predicted)
- The amounts of the bases varied among species, but not between individuals of the same species

11) Differentiate DNA and RNA

S. No.	DNA	RNA
1	Sugar moiety is Deoxy ribose	Sugar moiety is Ribose
2	The bases present are Adenine, Thymine, Guanine and Cytosine. Uracil is not present.	The bases present are Adenine, Uracil, Guanine and Cytosine. Thymine is rarely present.
3	Double stranded molecules	Single stranded molecules
4	Obeys Chargaff's rule	Does not obey Chargaff's rule
5	Bases are not modified	Bases are modified
6	It is stable and not hydrolysed easily by alkalis	It is unstable and hydrolysed easily by alkalis
7	DNA content is constant in all the cells except during cell division	Varies from cell to cell
8	The life time of DNA is comparatively high.	RNA is short lived.
9	No natural DNA is catalytic	RNA can be catalytic
10	Present in the nucleus, mitochondria and chloroplast	Present in the nucleus, mitochondria, nucleolus, ribosomes and cytosol.

12) Discuss in detailed about Confirmation and function of protein.

A functional protein consists of one or more polypeptides that have been coiled and folded into a unique shape. Even a slight change in primary structure can affect a protein's conformation and thus it's ability to function.

Forexample:

1) antibodies bind to particular foreign substances, that fit their binding sites.
2) enzymes recognises and bind to specific substrates, facilitating a chemical reaction.
3) neurotransmitters pass signals from one cell to another by binding to receptor sites on proteins in the membrane of the receiving cell.

Protein conformation is of paramount importance in understanding biomolecules interactions. If the 3-D structure is lost the protein may not function or may result in harmful diseases. For example in individuals with sickle cell anaemia, abnormal hemoglobin develops because of a single amino-acid substitution.

quarts) of water per day. Water is lost from the body principally through the urine, although sweat and the skin and respiratory tract are also major routes of water loss. Under normal conditions, the average intake and output of water is about equal; under extreme physical stresses, however, such as prolonged exercise, daily water loss may be increased up to three-fold.

The fluids of the body may be classified into two main divisions: the fluid within cells (intracellular fluid) and the fluid outside the cell (extracellular fluid). The extracellular fluid can be further divided into interstitial fluid, plasma, lymph, cerebrospinal fluid, and milk (in mammals).

Extracellular fluids bathe the cells and conduct nutrients, cells, and waste products throughout the tissues of the body. Mature red blood cells, white blood cells, and platelets lie in a nearly colourless, protein-rich liquid called plasma. This substance is diffused through the capillary walls to the tissues of the body, carrying with it nutrients, oxygen, and regulatory molecules and drugs; some plasma diffuses back into the blood capillaries, bringing with it wastes, carbon dioxide, and metabolites. Interstitial fluid (so called because it is found in the interstices between cells) is almost identical to plasma but is very low in protein concentration. Interstitial fluid that enters the lymphatic system through lymph capillaries in the interstitial spaces is called lymph. This substance is filtered through lymph nodes rich in white blood cells and then returned to the blood circulatory system through large lymph ducts. Lymph maintains the fluid level in the body, fights infection, and, by filtering through the gastrointestinal tract, absorbs and transports fats.

Cerebrospinal fluid, as its name suggests, surrounds and bathes the cavities of the brain and spinal cord. It also maintains intracranial pressures and acts as a lubricant and a mechanical barrier against shock. This fluid flows slowly from the ventricles of the brain, the principal site of its formation, down through the canals of the brain stem, and ultimately out into the tissue spaces surrounding the central nervous system. A clear, colourless liquid, cerebrospinal fluid is slightly alkaline, having a pH of 7.3–7.4. It is about 99 percent water and contains a small number of leukocytes and no red blood cells. In addition to the functions mentioned above, it circulates drugs and removes pathogens, chemicals, and waste products from the tissues of the brain and spinal cord and carries them into the bloodstream.

Milk is secreted by the milk-producing glands located in the breasts of female mammals. The large fat droplets secreted by these glands into the fluid of the breast produces the familiar white emulsion.

The principal cations (sodium, potassium, calcium, and magnesium), anions (chloride, bicarbonate, organic acids, phosphate, and proteins), and solutes (*e.g.*, proteins and glucose) of the body are not dispersed evenly throughout bodily fluids. Intracellular fluid contains relatively large quantities of potassium, phosphate, and proteins, and extracellular fluid contains relatively large quantities of sodium and chloride ions and smaller concentrations of proteins than found in intracellular fluids. These solute and ion gradients contribute to maintaining the equilibrium of the fluid and the electrical potential of the membranes. The system that regulates the intake and output of fluid and the individual's perception of fluid regulation involves the heart, kidneys, vagus nerve, hypothalamus, and pituitary gland. The hormones associated with this system are vasopressin or antidiuretic

hormone (ADH), adrenocorticotropic hormone, and aldosterone, which act in the kidneys to effect the increased retention of salt and water.

Various conditions can cause an excess or depletion of water or salts or an unhealthy hydrogen ion concentration in the body. Sodium depletion can instigate low blood pressure, reduced urine volume, and inhibition of the excretory system leading to kidney failure. Mild cases may be treated by having the affected person drink salt water. In severe cases salt water is injected into a vein.

Acute or chronic diarrhea, vomiting, intestinal fistulae, or various urinary abnormalities bring about potassium deficiencies. Symptoms are apathy, confusion, and weakness; severe cases may produce paralysis, changes in heartbeat, and even death. Potassium must be given either orally or intravenously.

Potassium intoxication, which may follow upon kidney failure, causes reduction in the volume of urine excreted, producing symptoms much like those of potassium depletion. Treatment is by elimination of potassium-rich foods (especially fruits) and protein from the diet.

Edema is the abnormal retention of body fluids in body tissues. Low blood volume initiates a flow of fluid out of the blood vessels into the surrounding tissue, and the system that regulates the volume of water in the body responds by a series of hormonal changes that swell the volume of water in the tissues even more. Alkalosis is a condition of excess alkalinity of the blood resulting from a loss of hydrogen ions. Acidosis is a condition of excess acidity of the blood, resulting from an overabundance of hydrogen ions.
chemokine

08/08/2012

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SRM ARTS AND SCIENCE COLLEGE
Department of Microbiology

Date :15.9.22 **Duration :1hr** **Class :II Msc**

Subject Name & Code :Soil & Agricultural Microbiology

Section A (5 x 1 = 5)

(Answer any **FIVE** questions)

CO1	BL1	1.Define predation
CO1	BL1	2.List the microbes present in the phyllosphere
CO3	BL1	3.Define Biopesticides. Give examples
CO3	BL6	4.Write the significance of Mycorrhizae
CO2	BL1	5.Enumerate the microbes responsible for Nitrogen fixation
CO3	BL6	6.Write the importance of Azolla
CO2	BL1	7.Define biological control?

Section B (2 x 5 = 10)

(Answer any **TWO** questions)

CO1	BL2	8. Discuss about the microorganisms of rhizosphere.
CO1	BL2	9. Discuss about the characters of soil
CO1	BL2	10. Explain synergism citing examples
CO3	BL2	11. Explain biofertilizers citing examples.

Section C (1 x 10 = 10)

(Answer any **ONE** question)

CO2	BL2	12. Explain the mechanism of symbiotic nitrogen fixation in detail.
CO1	BL6	13. Write a detailed note on the interaction between microorganisms.

SRM ARTS AND SCIENCE COLLEGE

Department of Microbiology

Date :15.9.22 **Duration :1hr** **Class :II Msc**

Subject Name & Code :Soil & Agricultural Microbiology

Section A

1.Define predation

A predation is a form of a symbiotic relationship between two organisms of unlike species in which one of them acts as a predator that captures and feeds on the other organism that serves as the prey.

2.List the microbes present in the phyllosphere

The phyllosphere contains four major species of bacteria such as Proteobacteria, Firmicutes, Bacteroides, and Actinobacteria

3.Define Biopesticides. Give examples

Biopesticides are certain types of pesticides derived from such natural materials as animals, plants, bacteria, and certain minerals. For example, canola oil and baking soda have pesticidal applications and are considered biopesticides.

4.Write the significance of Mycorrhizae

Mycorrhiza or mycorrhizas is a symbiotic association between a fungus and a plant. The plant makes organic molecules such as sugars by photosynthesis and supplies them to the fungus, and the fungus supplies to the plant water and mineral nutrients, such as phosphorus, taken from the soil.

5.Enumerate the microbes responsible for Nitrogen fixation

Examples of this type of nitrogen-fixing bacteria include species of Azotobacter, Bacillus, Clostridium, and Klebsiella.

6.Write the importance of Azolla

Azolla pinnata is especially grown in wet soil in rice fields during rice cultivation to generate a good amount of nitrogen rich fertilizer.

7.Define biological control?

Biological control, the use of living organisms to control pests. A natural enemy such as a parasite, predator, or disease organism is introduced into the environment of a pest or, if already present, is encouraged to multiply and become more effective in reducing the number of pest organisms.

Section B (2 x 5 = 10)

8. Discuss about the microorganisms of rhizosphere.

(a) The microorganisms catalyse the reactions in the rhizosphere and produce CO_2 and form organic acids that in turn solubilize the inorganic nutrients of plants.

(b) Aerobic bacteria utilize O_2, and produce CO_2, therefore, lower O_2 and increase CO_2 tension that reduces root elongation, and nutrient and water uptake.

(c) Some of the rhizosphere microorganisms produce growth-stimulating substances and release elements in organic forms through the process of mineralization.

D) Plant growth regulators such as indole acetic acid, gibberellins, cytokinins, etc. are known to be produced by the rhizosphere microflora.

(e) They influence phosphorus availability to plant through the process of mineralization and immobilization. However, when plant suffers from nutrient scarcity during summer in tropical areas the microorganism release the immobilized nutrients. Therefore, they act as sink between soil and plant roots in nutrient poor systems.

(f) Microorganisms in the rhizosphere zone change the availability or toxicity of sulphur to plants.

9. Discuss about the characters of soil

The soil is made up of the following components

Mineral Components:

The mineral constituents of the soil are derived from the parental rocks or regolith. They may be found in the form of particles of different sizes; from clay (.0002 mm or less in diam) to large pebbles and gravels.

Humus plays many important roles in the soil, such as:

(a) It makes the soil fertile.

(b) It provides nutrients to the plants and microorganisms.

c) On complete decomposition, it forms several organic acids which serve as solvents for soil materials. Thus humus increases the availability of minerals in dissolved state to plants.

Soil Atmosphere:

Gases found in soil profiles are said to form the soil atmosphere which is one of the most important components of the soil. The spaces between soil particles and soil organisms are called pore spaces.

Soil Water:

Soil water plays very important role in the plant growth. Plants absorb a small quantity of ram water and dew directly from their surfaces but most of water absorbed by them comes from the soil.

10. Explain synergism citing examples

synergistic effects are the effects when chemical substances or biological structures interact resulting in an overall effect that is greater than the sum of individual effects of any of them. Synergistic effects are the combined effects of at least two substances making an impact that is more significant than both of them could have shown by themselves. *Etymology:* from Greek *"synergos"*, meaning "working together".

The antibiotics' are secondary metabolites or biochemical secreted by microorganisms which, 'in low concentration, inhibit the growth or kill other microorganisms, i.e., the antibiotics are 'antimicrobial agents of microbial origin'. Although some 6,000 antibiotics are known to exist, only about 100 are marketed. About 200 new antibiotics are discovered every year.

11. Explain biofertilizers citing examples

(i) Free Living Nitrogen Fixing Bacteria:

They live freely in the soil and perform nitrogen fixation. Some of them are saprotrophic, living on organic remains, e.g., Azoto- bacter, Bacillus polymyxa, Clostridium, Beijerinckia. They are further distinguished into aerobic and anaerobic forms.

(ii) Free Living Nitrogen Fixing Cyanobacteria:

A number of free living cyanobacteria or blue-green algae have the property of nitrogen fixation, e.g., Anabaena, Nostoc, Aulosira, Totypothrix, Cylindrospermum, Stigonema. Cyanobacteria are photosynthetic. Therefore, they add organic matter as well as extra nitrogen to the soil.

(iii) Loose Association of Nitrogen Fixing Bacteria:

Certain nitrogen fixing bacteria like Azospirillum live around the roots of higher plants without developing any intimate relationship. It is often called rhizosphere association. The bacteria obtain some plant exudate and use the same as part of their food requirement.

(iv) Symbiotic Nitrogen Fixing Bacteria:

They form a mutually beneficial association with the plants. The bacteria obtain food and shelter from plants. In return, they give a part of their fixed nitrogen to the plants. The most important of the symbiotic nitrogen fixing bacteria is Rhizobium (pi Rhizobia.These bacteria, also called rhizobia, live freely in the soil but cannot fix nitrogen except for a strain of Cowpea Rhizobium (Me Comb et al, 1975).

(v) Symbiotic Nitrogen Fixing Cyanobacteria:

Nitrogen fixing cyanobacteria (blue- green algae) form symbiotic association with several plants, e.g., cycad roots, lichens, liverworts, Azolla (fern). Out of these, Azolla-Anabaena association is of great importance to agriculture.

(vii) Mycorrhiza (pl-Mycorrhizae Frank,. 1885):It is a mutually beneficial or symbiotic association of a fungus with the root of a higher plant. The most common fungal partners of mycorrhiza are Glomus species. Mycorrhizal roots show a sparse or dense wooly growth of fungal hyphae on their surface. Root cap and root hairs are absent.

Section C (1 x 10 = 10)

(Answer any ONE question)

12. Explain the mechanism of symbiotic nitrogen fixation in detail.

The general chemical reaction for the fixation of nitrogen is identical for both the chemical and the biological processes. N2+3H2+Energy = 2NH3 • The triple bond of N must be broken and three atoms of hydrogen must be added to each of the nitrogen atoms.

Non-Biological Nitrogen Fixation Biological Nitrogen Fixation Non-Symbiotic Non-Symbiotic Non-Symbiotic Symbiotic Nitrogen Fixation: Processes Processes In-vivo In-vitro Atmospheric Fixation Biological Fixation Industrial Fixation Within a living organism In an artificial environment outside a living organism

The movement of nitrogen between the atmosphere, biosphere, and geosphere in different forms is called the nitrogen cycle and is one of the major biogeochemical cycles.

- It may also be considered as the movement of nitrogen through the food chain from simple inorganic compounds, mainly ammonia, to complex organic compounds.
- This complex cycle involves bacteria, plants, and animals.
- All organisms can convert ammonia (NH_3) to organic nitrogen compounds that are compounds containing C–N bonds. However, only a few microorganisms can synthesize ammonia from nitrogen gas (N_2).

The first stage in the nitrogen cycle is the reduction of N_2 gas to ammonia, a process called nitrogen fixation.

- The process of converting atmospheric N_2 gas into ammonia is carried out by only a few microorganisms, termed diazotrophs which have an enzyme called "nitrogenase" that combines nitrogen atoms with hydrogen atoms.
- These are some free-living soil bacteria such as *Klebsiella* and *Azotobacter*, cyanobacteria (blue-green algae), and the symbiotic bacteria (mainly *Rhizobium*).
- First, the soil bacteria *Nitrosomonas*and *Nitrococcus* convert NH_3 to NO_2^-, and then another soil bacterium, *Nitrobacter*, oxidizes NO_2^- to NO_3^-.
- These bacteria are "chemotrophs" who obtain their energy from volatile chemicals. They gain energy through these conversions, both of which require oxygen to occur.

Optimum conditions for nitrification:

- Adequate aeration
- The next step in the nitrogen cycle is the assimilation of inorganic nitrogen, into organic nitrogen-containing compounds.
- It is the process by which plants and animals incorporate the NO_3^- and ammonia formed through nitrogen fixation and nitrification.
- Assimilation produces large quantities of organic nitrogen, including proteins, amino acids, and nucleic acids.
- Ammonification is the conversion of organic nitrogen into ammonia.
- Denitrification refers to the change (via denitrifying bacteria) of nitrate to gaseous forms of nitrogen such as nitrogen gas (N_2) or nitrous oxide (N_2O).

- The process is rapid and large amounts of N_2 are lost from the soil system and end up in the atmosphere.This process only occurs where there is little to no oxygen, such as deep in the soil near the water table.

12. Interactions between soil microbes

Mutualism describes the ecological interaction between two or more species where each species has a benefit. It is a symbiotic relationship in which two different species interact with and, totally rely on one another for survival.

Organisms live in mutualistic relationships for a number of important reasons, including a need for shelter, protection, and nutrition, as well as for reproductive purposes.

Symbiosis:An association of two or more different species.Two types of symbiosis are Ectosymbisis -One organism can be located on the surface of another, as an ectosymbiont. In this case, the ectosymbiont usually is a smaller organism located on the surface of a larger organism. E.g Thiothrix species, a sulfur-using bacterium, which is atached to the surface of a mayfly larva and which itself contains a parasitic bacterium.

Protocooperation:It is a relationship in which an organism in an association is mutually benefited with each other. This interaction is similar to mutualism but the relationships between the organisms in protocooperation are not obligatory as in mutualism.

Amensalism : A relationship in which the product of one organism has negative effect on other organism. Example:The production of antibiotics that can inhibit or kill a susceptible microorganism

Bacteriocins (Proteinaceous toxins produced by bacteria with antimicrobial toxicity. Most bacteriocins target other strains of the same species as the producing organism, but some are more broad-spectrum)

Commensalism :

It is a relationship in which one symbiont, the commensal, benefits while the other is neither harmed nor helped (neutral). Commensalistic relationships between microorganisms include situations in which the waste product of one microorganism is the substrate for another species.

Predation: When one organism, the predator, engulfs and digests another organism as its prey. The prey can be larger or smaller than the predator, and this normally results in the death of the prey. Examples *Bdellovibrio*, a periplasmic predator that penetrates the cell wall and grows outside the plasma membrane

Parasitism:The population that benefits, the parasite, drives its nutritional requirements from host, which is harmed. It can involve physical maintenance in or on the host.

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SRM ARTS AND SCIENCE COLLEGE
Department of Microbiology

Date: 16.09.22 **Duration : 1hr** **Class :** M.sc., 2nd year

Subject Name & Code : ENVIRONMENTAL BIOTECHNOLOGY

Section A (5×1 =5)

(Answer any 5 questions)

CO2	BL 1	1.Name the types of bioreactor
CO2	BL2	2.Differentiate between COD and BOD
CO2	BL1	3.Define Trickling filters
CO1	BL1	4.Define niche
CO1	BL1	5.Define quorum sensing
CO2	BL1	6. Define Stirred tank reactor
CO2	BL1	7. Define Continuos flow reactor

Section B (2×5 = 10)

(Answer any 2 question)

CO2	BL2	8.Describe the application of bioreactor
CO1	BL2	9.Explain about bioflim formation
CO2	BL2	10. Explain about effluent recycle
CO2	BL2	11. Describe about anaerobic treatment of waste water

Section C (1×10 = 10)

(Answer any 1 question)

CO3	BL2	10.Discuss about the waste water treatment.
CO3	BL6	11.Write in detail about denitrification

SRM ARTS AND SCIENCE COLLEGE
Department of Microbiology

Date : 16.9.22 **Duration : 1 hour** **Class : II M.Sc Microbiology**

Subject Name: Environmental Microbiology ***Sub Code MBTBB***

1. 1.Name the types of bioreactor

(1) Continuous Stirred Tank Bioreactors. (2) Bubble Column Bioreactors. (3) Airlift Bioreactors. (4) Fluidized Bed Bioreactors

2. Differentiate between COD and BOD

BOD measures the amount of oxygen required by the aerobic organisms to decompose organic matter and COD measures the oxygen required to decompose organic and inorganic constituents present in the wastewater by chemical reaction.

3.Define Trickling filters

Trickling filters (TFs) are used to remove organic matter from wastewater. The TF is an aerobic treatment system that utilizes microorganisms attached to a medium to remove organic matter from wastewater.

4.Define niche

In ecology, the term "niche" describes the role an organism plays in a community.

5.Define quorum sensing

Quorum sensing is a process of cell–cell communication that allows bacteria to share information about cell density and adjust gene expression accordingly.

7.Define stirred tank reactor

Stirred tank bioreactors are the reactors most widely employed for culturing of biological agents such as cells, enzymes, or antibodies.

8. Define continuos flow reactor

The continuous stirred-tank reactor, also known as vat- or backmix reactor, mixed flow reactor, or a continuous-flow stirred-tank reactor, is a common model for a chemical reactor in chemical engineering and environmental engineering.

6.Describe the application of bioreactor

- . A bioreactor could be a reference to the device or system that is designed to produce tissues or cells within an environment of cell cultivation.

- They are currently being developed to be used in tissue engineering.
- Bioreactors are modular and performs all process of fermentation in one enclosed environment.
- Bioreactors play a crucial part in bioprocess.
- Bioreactors with stirred tanks are often employed in the process of fermentation.
- Because of the simplicity of technology and better yield, solid state bioreactors are extensively used in the industry.
- Ethanol is produced by Saccharomyces cerevisiae, a fungus that lives.
- Organic acids e.g. butyric acid and acetic acid are produced in bioreactors by Eubacterium limosum.
- Thienamycine an antibiotic that is also made in a bioreactor.
- The production of glucomylase occurs in Auerobasidium pullulans, a bioreactor.

7.Explain about bioflim formation

Biofilm formation is a highly complex process, in which microorganism cells transform from planktonic to sessile mode of growth. It has also been suggested that biofilm formation is dependent on the expression of specific genes that guide the establishment of biofilm. The process of biofilm formation occurs through a series of events leading to adaptation under diverse nutritional and environmental conditions. This is a multi-step process in which the microorganisms undergo certain changes after adhering to a surface. Microorganisms which form biofilms are shown to elicit specific mechanisms. Biofilm formation has following important steps (a) attachment initially to a surface (b) formation of micro-colony (c) three dimensional structure formation (d) biofilm formation, maturation and detachment.

8. Explain about effluent recycle.

Effluent is sewage that has been treated in a septic tank or sewage treatment plant. It is also referred to as "trade effluent" or "wastewater."

Effluent is waste other than waste from kitchens or toilets, surface water or domestic sewage.It can be produced and discharged by any industrial or commercial premises. Effluent usually flows from the premises directly into the main sewer network and it cannot enter a river, reservoir, stream or lake unless it is cleaned and treated first.

Effluent usually contains one or more contaminants including:

- Fats, oils and greases (FOGs);
- Chemicals;
- Detergents;
- Heavy metal rinses;
- Solids; and
- Food waste.

Wastewater Treatment

The goal of waste water treatment is to remove as much of the suspended solids as possible before the effluent is discharged back to the environment. Primary treatment removes about 60% of suspended solids from wastewater, according to USGS, and secondary treatment removes more than 90% of suspended solids.

Effluent Guidelines are national regulatory standards for wastewater discharged to surface waters and municipal sewage treatment plants, according to the U.S. EPA. The EPA issues these regulations for industrial categories, based on the performance of treatment and control technologies.

Industrial Effluent

Industrial effluent discharged from process and manufacturing plants must meet stringent regulatory standards. These standards are designed to protect surface and groundwater resources.

9. Describe about Anaerobic treatment of waste water.The anaerobic digestion process has a number of significant advantages over the aerobic digestion process:

•Since less sludge is kept after the anaerobic process, the cost of sludge treatment is lowered.
•High organic load rates can be achieved.
•COD reduction that is effective.
•Toxic waste is transformed into non-harmful by-products.
•A method that is more energy efficient in comparison.
•Anaerobic digestion process by-products are a wonderful source of energy and biogas production.

Process of anaerobic digestion

The **anaerobic digestion** process is made up of four biochemical steps:

Hydrolysis, acidogenesis, acetogenesis, and methanogenesis, with CH4 and CO2 being the final products.

As a result, all of these steps have an impact on the quality and quantity of biogas produced. The quality of the microbial activity, in turn, affects the biochemical process. On the waste, many types of hydrolysing, acidogenic, and related bacteria act. It's critical to recognise that bacteria are naturally present in wastewater and are designed to act on it. Until recently, the best performance from microbes required merely the correct non-oxygen habitat set-up and other parameters.

The overall process can be characterised by a chemical reaction in which anaerobic microbes biochemically degrade organic material such as glucose to produce carbon dioxide (CO2) and methane (CH4).

$C_6H_{12}O_6 \rightarrow 3CO_2 + 3CH_4$

Hydrolysis: Large organic polymers make up the majority of biomass. These chains must first be broken down into their smaller component parts in order for the bacteria in anaerobic digesters to access the material's energy potential. Other bacteria can quickly access these constituent parts, or monomers, such as sugars. Hydrolysis is the method of splitting these chains and dispersing the smaller molecules into solution. As a result, the initial step in anaerobic digestion is to hydrolyse these high-molecular-weight polymeric components. Complex organic compounds are broken down into glucose, amino acids, and fatty acids through hydrolysis.

Methanogens can utilise the acetate and hydrogen produced in the initial steps directly. Other molecules, including volatile fatty acids (VFAs) with chains longer than acetate, must first be catabolized into chemicals that methanogens may utilise directly.

Acidogenesis: Acidogenesis is a biological process that causes acidogenic (fermentative) bacteria to break down the remaining components. VFAs, as well as carbon dioxide, ammonia and hydrogen sulphide, are produced here, as well as other by products. Acidogenesis works in the same way that milk degrades.

Acetogenesis: The third stage of anaerobic digestion is acetogenesis. Acetogens digest the simple molecules formed during the acidogenesis phase, ending in acetic acid, carbon dioxide, and hydrogen.

Methanogenesis: The biological mechanism of methanogenesis is the final stage of anaerobic digestion. Methanogens utilise the intermediate products from the previous stages to produce methane, carbon dioxide, and water. The majority of the biogas produced by the system is made up of these components.

Methanogenesis happens between pH 6.5 and pH 8, and is sensitive to both high and low pH. The digestate is made up of any indigestible material that the microorganisms can't utilise and any dead bacterial remnants

10.Discuss about the waste water treatment.

wastewater treatment, also called sewage treatment, the removal of impurities from wastewater, or sewage, before it reaches aquifers or natural bodies of water such as rivers, lakes, estuaries, and oceans. Since pure water is not found in nature (i.e., outside chemical laboratories), any distinction between clean water and polluted water depends on the type and concentration of impurities found in the water as well as on its intended use. In broad terms, water is said to be polluted when it contains enough impurities to make it unfit for a particular use, such as drinking, swimming, or fishing. Although water quality is affected by natural conditions, the word pollution usually implies human activity as the source of contamination. Water pollution, therefore, is caused primarily by the drainage of contaminated wastewater into surface water or groundwater, and wastewater treatment is a major element of water pollution control.

11. Write a detail about denitrification.

Denitrification is a microbially facilitated process where nitrate (NO_3^-) is reduced and ultimately produces molecular nitrogen (N_2) through a series of intermediate gaseous nitrogen oxide products. Facultative anaerobic bacteria perform denitrification as a type of respiration that reduces oxidized forms of nitrogen in response to the oxidation of an electron donor such as organic matter. The preferred nitrogen electron acceptors in order of most to least thermodynamically favorable include nitrate (NO_3^-), nitrite (NO_2^-), nitric oxide (NO), nitrous oxide (N_2O) finally resulting in the production of dinitrogen (N_2) completing the nitrogen cycle. Denitrifying microbes require a very low oxygen concentration of less than 10%, as well as organic C for energy. Since denitrification can remove NO_3^-, reducing its leaching to groundwater, it can be strategically used to treat sewage or animal residues of high nitrogen content. Denitrification can leak N_2O, which is an ozone-depleting substance and a greenhouse gas that can have a considerable influence on global warming.

The process is performed primarily by heterotrophic bacteria (such as *Paracoccus denitrificans* and various pseudomonads), although autotrophic denitrifiers have also been identified (e.g., *Thiobacillus denitrificans*). Denitrifiers are represented in all main phylogenetic groups. Generally several species of bacteria are involved in the complete reduction of nitrate to N2, and more than one enzymatic pathway has been identified in the reduction process. The denitrification process does not only provide energy to the organism performing nitrate reduction to dinitrogen gas, but also some anaerobic ciliates can use denitrifying endosymbionts to gain energy similar to the use of mitochondria in oxygen respiring organisms.

Direct reduction from nitrate to ammonium, a process known as **dissimilatory nitrate reduction to ammonium** or **DNRA**, is also possible for organisms that have the nrf-gene. This is less common than denitrification in most ecosystems as a means of nitrate reduction. Other genes known in microorganisms which denitrify include *nir* (nitrite reductase) and *nos* (nitrous oxide reductase) among others;organisms identified as having these genes include *Alcaligenes faecalis*, *Alcaligenes xylosoxidans*, many in the genus *Pseudomonas*, *Bradyrhizobium japonicum*, and *Blastobacter denitrificans*.

08/09/2022

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KATTANKULATHUR

Department of Microbiology

Date :01.11.22 **Duration :1 hr** **Class :I Msc**

Subject Name & Code : General Microbiology and Laboratory Animal Science

Section A (5 x 1 = 5)

(Answer **ALL** questions)

CO1	BL1	1.Define pasteurization
CO1	BL1	2.List out the contributions of Louis Pasteur
CO1	BL1	3.List the part of confocal microscope.
CO1	BL6	4. Write the applications of dark field microscope.
CO1	BL6	5. Write the parts of fluorescent microscope.
CO1	BL6	6. Write about the applications of confocal microscope
CO1	BL2	7. Differentiate the working principle of bright and dark field microscope

Section B (2 x 5 = 10)

(Answer any **TWO** questions)

CO1	BL2	8. Explain the concepts of bright field microscope.
CO1	BL2	9. Explain about the phase contrast microscope.
CO1	BL6	10. Write in detail about dark field microscope.

Section C (1 x 10 = 10)

(Answer any **ONE** question)

CO1	BL2	11. Explain the working principle of confocal microscopy
CO1	BL2	12. Explain about the parts and working strategies in fluorescent microscopy.

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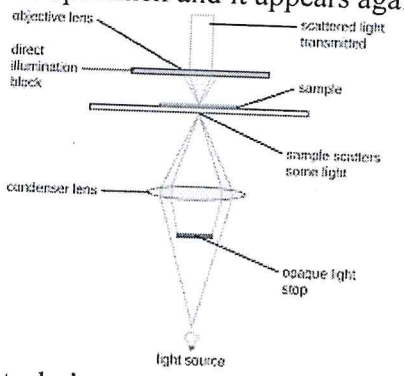
I M.Sc MICROBIOLOGY

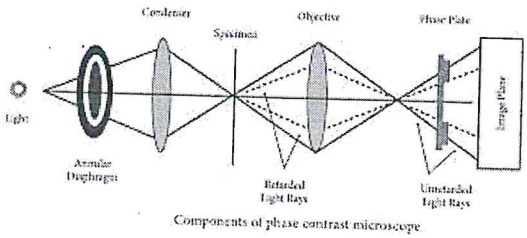
GENERAL MICROBIOLOGY AND LABORATORY ANIMAL SCIENCE

INTERNAL TEST I ANSWER KEY

1. Pasteurization is now defined as the process of heating every particle of milk or milk product in properly designed and operated equipment to any of the one specified pasteurization time–temperature combinations
2. He pioneered the study of molecular asymmetry; discovered that microorganisms cause fermentation and disease; originated the process of pasteurization; saved the beer, wine, and silk industries in France; and developed vaccines against anthrax and rabies
3. Dark-field microscopy is ideally used to illuminate unstained samples causing them to appear brightly lit against a dark background. This type of microscope contains a special condenser that scatters light and causes it to reflect off the specimen at an angle
4. Light source, Excitation filter, Dichroic mirror, Objective, Sample stage, Emission filter, Eyepieces and detector.
5. The basic components of a modern confocal microscope are the pinholes, the objective lenses, and low-noise detectors in common with the original design but also typically include fast scanning mirrors, filters for wavelength selection, and laser illumination.
6. Confocal microscopy is widely used for fluorescence imaging in the life sciences. The last decade has seen advances in illumination sources, detectors, fluorescent probes, optics, and sample preparation techniques, which provide improvements in different combinations of speed, depth, and resolution.
7. Specimens which are transparent are often stained and observed under a bright field microscope. Specimens which absorb little or no light are kept unstained and observed under a dark field microscope.
8. Bright Field Microscopy. With a conventional bright field microscope, light from an incandescent source is aimed toward a lens beneath the stage called the condenser, through the specimen, through an objective lens, and to the eye through a second magnifying lens, the ocular or eyepiece. In a standard bright field microscope, light travels from the source of illumination through the condenser, through the specimen, through the objective lens, and through the eyepiece to the eye of the observer. Light thus gets transmitted through the specimen and it appears against an illuminated background.

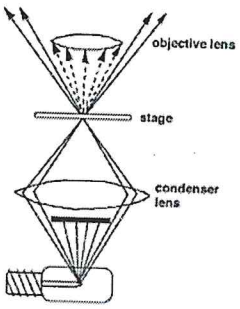


9. Phase contrast is a light microscopy technique used to enhance the contrast of images of transparent and colourless specimens. It enables visualisation of cells and cell components that would be difficult to see using an ordinary light microscope. When light passes through cells, small phase shifts occur, which are invisible to the human eye. In a phase contrast microscope, these phase shifts are converted into changes in amplitude, which can be observed as differences in image contrast.

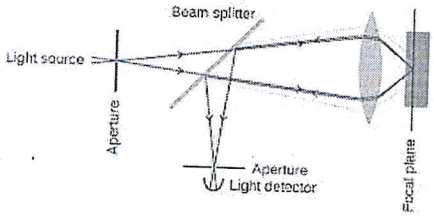


Components of phase contrast microscope

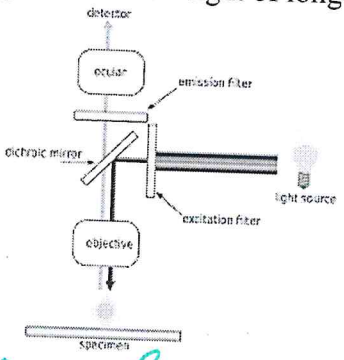
10. In optical microscopy, dark-field describes an illumination technique used to enhance the contrast in unstained samples. It works by illuminating the sample with light that will not be collected by the objective lens and thus will not form part of the image. In dark field microscopy, no direct light from the condenser enters the objective lens. Only light that is reflected, refracted or diffracted by the specimen enters the objective. The dark field condenser produces a circle of light. The light is at an extremely oblique angle to the surface of the slide.



11. The primary functions of a confocal microscope are to produce a point source of light and reject out-of-focus light, which provides the ability to image deep into tissues with high resolution, and optical sectioning for 3D reconstructions of imaged samples. Coupling of aperture-limited point scanning to a pinhole spatial filter at the conjugate image plane is an essential feature of the confocal microscope. Confocal microscopy is a specialized form of standard fluorescence microscopy (also called widefield fluorescence microscopy) that uses particular optical components to generate high-resolution images of material stained with fluorescent probes



12. Fluorescent microscopy is often used to image specific features of small specimens such as microbes. It is also used to visually enhance 3-D features at small scales. This can be accomplished by attaching fluorescent tags to anti-bodies that in turn attach to targeted features, or by staining in a less specific manner. The specimen is illuminated with light of a specific wavelength (or wavelengths) which is absorbed by the fluorophores, causing them to emit light of longer wavelengths



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Department of Microbiology

Date: 3.11.22 **Duration: 1hr**

Subject Name & Code: Metabolic Pathway MDTAA **Class: I M. Sc Microbiology**

Section A (5 x 1 = 5)

(Answer any **FIVE** questions)

CO1 BL1 1. Define Enzyme.

CO1 BL5 2. Compare Transketolase and Transaldolase.

CO2 BL1 3. List the other name for PPP Pathway.

CO2 BL1 4. Define Mitochondria.

CO1 BL6 5. Write about EC number.

CO1 BL6 6. Write the expansion for IUBMB.

CO1 BL1 7. Define Oxidation.

Section B (2 x 5 = 10)

(Answer any **TWO** questions)

CO2 BL2 8. Describe ED Pathway.

CO2 BL6 9. Write about Glucose metabolism.

CO2 BL4 10. Explain the process of Krebs Cycle.

CO2 BL4 11. Write a brief note on PPP Pathway.

Section C (1 x 10 = 10)

(Answer any **ONE** question)

CO1 BL2 11. Classify the enzyme based on nomenclature and write in detail about Mechanism of Enzyme action.

CO1 BL4 12. Explain in detail about Factors influencing Enzyme activity.

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Section A

1. Define Enzyme.

   Enzymes are proteins that help speed up metabolism, or the chemical reactions in our bodies. They build some substances and break others down. All living things have enzymes.

2. Compare Transketolase and Transaldolase.

   Transaldolase catalyzes the conversion of sedoheptulose 7-phosphate and glyceraldehydes 3-phosphate into erythrose 4-phosphate and fructose 6-phosphate, while transketolase catalyzes the conversion of xylulose 5-phosphate and ribose 5-phosphate into glyceraldehyde 3-phosphate and sedoheptulose 7-phosphate

3. 3. List the other name for PPP Pathway.

   The pentose phosphate pathway (also called the phosphogluconate pathway and the hexose monophosphate shunt and the HMP Shunt)

4. Define Mitochondria.

   Mitochondria are membrane-bound organelles present in the cytoplasm of all eukaryotic cells, that produce adenosine triphosphate (ATP), the main energy molecule used by the cell.

5. Write about EC number.

   The Enzyme Commission number (EC number) is a numerical classification scheme for enzymes, based on the chemical reactions they catalyze

6. Write the expansion for IUBMB.

   The International Union of Biochemistry and Molecular Biology (IUBMB)

7. Define Oxidation.

   oxidation is defined as the process in which an atom or ion loses one or more electrons.

Section B

8. Describe ED Pathway.

   Entner–Doudoroff pathway is an alternative metabolic pathway of glycolysis where glucose is converted into Pyruvate with the help of a series of reactions and enzymes. This pathway is found in Gram-negative bacteria, certain Gram-positive bacteria, and

archaea. Entner–Doudoroff pathway is an alternative metabolic pathway of glycolysis where glucose is converted into Pyruvate with the help of a series of reactions and enzymes.

Those bacteria are unable to perform glycolysis due to the absence of glycolytic enzymes they perform ED pathway to break down the glucose molecule into pyruvate.

This pathway was first reported by Entner and Doudoroff (1952) and MacGee and Doudoroff (1954) in the bacterium Pseudomonas saccharophila.

Recent evidence showed that this pathway also found in cyanobacteria, ferns, algae, mosses, and plants.

9. Write about Glucose metabolism

Glycolysis is the process in which glucose is broken down to produce energy. It produces two molecules of pyruvate, ATP, NADH and water. The process takes place in the cytoplasm of a cell and does not require oxygen. It occurs in both aerobic and anaerobic organisms.

Glycolysis is the primary step of cellular respiration, which occurs in all organisms. Glycolysis is followed by the Krebs cycle during aerobic respiration. In the absence of oxygen, the cells make small amounts of ATP as glycolysis is followed by fermentation.

This metabolic pathway was discovered by three German biochemists- Gustav Embden, Otto Meyerhof, and Jakub Karol Parnas in the early 19th century and is known as the EMP pathway (Embden–Meyerhof–Parnas).

10. Explain the process of Krebs Cycle.

The Krebs cycle or TCA cycle (tricarboxylic acid cycle) or Citric acid cycle is a series of enzyme catalysed reactions occurring in the mitochondrial matrix, where acetyl-CoA is oxidised to form carbon dioxide and coenzymes are reduced, which generate ATP in the electron transport chain. Krebs cycle was named after Hans Krebs, who postulated the detailed cycle. He was awarded the Nobel prize in 1953 for his contribution.

It is a series of eight-step processes, where the acetyl group of acetyl-CoA is oxidised to form two molecules of CO_2 and in the process, one ATP is produced. Reduced high energy compounds, NADH and $FADH_2$ are also produced.

Two molecules of acetyl-CoA are produced from each glucose molecule so two turns of the Krebs cycle are required which yields four CO_2, six NADH, two $FADH_2$ and two ATPs.

11. Write a brief note on PPP Pathway.

The pentose phosphate pathway is a metabolic pathway parallel to **glycolysis** which generates NADPH and pentoses (5-carbon sugars) as well as ribose 5-phosphate. The pentose phosphate pathway is also called as the phosphogluconate pathway or hexose monophosphate shunt. While it involves oxidation of glucose, its primary role is anabolic rather than catabolic. It is an important pathway that generates precursors for nucleotide synthesis andis especially important in red blood cells (erythrocytes).

Section C

12. Classify the enzyme based on nomenclature and write in detail about Mechanism of Enzyme action.

According to the International Union of Biochemists (I U B), enzymes are divided into six functional classes and are classified based on the type of reaction in which they are used to catalyze. The six kinds of enzymes are hydrolases, oxidoreductases, lyases, transferases, ligases and isomerases. Oxidoreductases

These catalyze oxidation and reduction reactions, e.g. pyruvate dehydrogenase, catalysing the oxidation of pyruvate to acetyl coenzyme A.

Transferases

These catalyze transferring of the chemical group from one to another compound. An example is a transaminase, which transfers an amino group from one molecule to another.

Hydrolases

They catalyze the hydrolysis of a bond. For example, the enzyme pepsin hydrolyzes peptide bonds in proteins.

Lyases

These catalyze the breakage of bonds without catalysis, e.g. aldolase (an enzyme in glycolysis) catalyzes the splitting of fructose-1, 6-bisphosphate to glyceraldehyde-3-phosphate and dihydroxyacetone phosphate.

13. Explain in detail about Factors influencing Enzyme activity

There are several factors that affect the speed of an enzyme's action, such as the concentration of the enzyme, the concentration of the substrate, temperature, hydrogen ion concentration (pH), and the presence of inhibitors.

Concentration of Enzyme

As the concentration of the enzyme is increased, the velocity of the reaction proportionately increases. This property is used for determining the activities of serum enzymes during the diagnosis of diseases.

Concentration of Substrate

In the presence of a given amount of enzyme, the rate of enzymatic reaction increases as the substrate concentration increases until a limiting rate is reached, after which further increase in the substrate concentration produces no significant change in the reaction rate. At this point, so much substrate is present that essentially all of the enzyme active sites have substrate bound to them.

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Department of Microbiology

Date: 31.10.22 **Duration: 1hr**

Subject Name & Code: Microbial Genetics&MDT3A **Class: II M. Sc Microbiology**

Section A (5 x 1 = 5)

(Answer any **FIVE** questions)

CO2	BL1	1. Define: Chromatids.
CO2	BL5	2. Compare Euchromatin and Heterochromatin.
CO2	BL1	3. List the types of histones and their properties.
CO2	BL1	4. Define Nucleosome.
CO2	BL6	5. Write about Acrocentric chromosomes.
CO3	BL1	6. State Curing.
CO3	BL1	7. Define Pilin.

Section B (2 x 5 = 10)

(Answer any **TWO** questions)

CO3	BL2	8. Discus the Properties of Plasmid
CO2	BL6	9. Write a short note on Chromatin.
CO3	BL4	10. Explain the process of Plasmid curing.
CO2	BL4	11. Write a brief note on Chromosome.

Section C (1 x 10 = 10)

(Answer any **ONE** question)

CO3	BL2	11. Discuss in detail about the Structure and replication of F plasmid.
CO3	BL3	12. Illustrate in detail about PCR amplification.

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Section A

1. Define: Chromatids.

   A chromatid is one of the two identical halves of a chromosome that has been replicated in preparation for cell division.

2. Compare Euchromatin and Heterochromatin.

   Heterochromatin is defined as the area of the chromosome which is darkly stained with a DNA-specific stain and is in comparatively condensed form. Euchromatin is defined as the area of the chromosome which is rich in genes that actively participate in the transcription process.

3. List the types of histones and their properties.

   There are four types of histones, named: H2A, H2B, H3, and H4. Octomers of two of each type of histone form nucleosomes. These nucleosomes are wrapped together in a spiral structure called a solenoid.

4. Define Nucleosome.

   A nucleosome is the basic repeating subunit of chromatin packaged inside the cell's nucleus

5. Write about Acrocentric chromosomes.

   crocentric chromosomes – The centromere is present near the end of chromosomes. It forms a very short p arm and a very long q arm

6. State Curing.

   Elimination of plasmids or plasmid curing from bacteria enables the study of plasmid functionality in drug resistance but more importantly can re-sensitize the bacteria against particular antimicrobials

7. Define Pilin.

   Pilin refers to a class of fibrous proteins that are found in pilus structures in bacteria. These structures can be used for the exchange of genetic material, or as a cell adhesion mechanism.

Section B

8. Discus the Properties of Plasmid

   Plasmid is small in size, circular in shape and it is a piece of DNA that is not the same as chromosomal DNA. Its ability to replicate is independent of chromosomal DNA. They are usually found in bacteria, but they are also present in multicellular organisms. Learn more about importance and different types of Plasmid.

The Characteristics of a Plasmid are as follows:

1. Plasmids almost always carry at least one gene
2. Plasmids can also provide bacteria with the ability to fix nitrogen.
3. Plasmids may be present in an individual cell in varying number, ranging from one to several hundreds.
4. Larger plasmids tend to have lower copy numbers.
5. There are some plasmids in which no effect is observed on the host phenotype. Such types are called cryptic plasmids

9. Write a short note on Chromatin.

Chromatin is a genetic material or a macromolecule comprising DNA, RNA, and associated proteins, which constitute chromosomes in the nucleus of a eukaryotic cell.

This chromatin is located within the cell nucleus. The main functions of this genetic material include:

- Preventing DNA damage.
- Tightly packing the DNA to fit into the cell.
- Control the DNA replication and gene expression.
- Support the DNA molecule to permit the process of the cell cycle – meiosis and mitosis.

9. Explain the process of Plasmid curing.

   Plasmid curing is the process of obviating the plasmid encoded functions such as antibiotic resistance, virulence, degradation of aromatic compounds, etc. in bacteria. Several plasmid curing agents have been reported in literature, however, no plasmid curing agent can eliminate all plasmids from different hosts

10. Write a brief note on Chromosome.

    The nucleus of each cell, the DNA molecule is packaged into thread-like structures called chromosomes. Each chromosome is made up of DNA tightly coiled many times around proteins called histones that support its structure. Chromosomes are not visible in the cell's nucleus—not even under a microscope—when the cell is not dividing. However, the DNA that makes up chromosomes becomes more tightly packed during cell division and is then visible under a microscope. Most of what researchers know about chromosomes was learned by observing chromosomes during cell division.

Section C

11. Discuss in detail about the Structure and replication of F plasmid.

    The F plasmid is a double-stranded circular DNA molecule of about 100 kpb (105 nucleotide pairs). It is about 30 pm long which is about 1/40 of the length of the bacterial (E. coli) chromosome. The origin point of replication in F factor for transfer of DNA into the recipient cell is called "ori T" (Fig. 18.2), while the origin point at which replication of the F factor begins as an autonomous unit (during cell division of the F1" cells) is designated as "ori V" (Origin of vegetative replication).

12. Illustrate in detail about PCR amplification.

    PCR or Polymerase Chain Reaction is a technique used in molecular biology to create several copies of a certain DNA segment. This technique was developed in 1983 by Kary Mullis, an American biochemist. PCR has made it possible to generate millions of copies of a small segment of DNA. This tool is commonly used in the molecular biology and biotechnology labs.

Principle of PCR

The PCR technique is based on the enzymatic replication of DNA. In PCR, a short segment of DNA is amplified using primer mediated enzymes. DNA Polymerase synthesises new strands of DNA complementary to the template DNA. The DNA polymerase can add a nucleotide to the pre-existing 3'-OH group only. Therefore, a primer is required. Thus, more nucleotides are added to the 3' prime end of the DNA polymerase.

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Department of Microbiology

Date : 1/11/22 **Duration :1 hr** **Class : II MSc**

Subject Name & Code :Genetic engineering(MDT3B)

Section A **(5 x 1 = 5)**

I Answer any **FIVE** questions

CO2	BL1	1. Define Ti plasmid
CO2	BL4	2.Explain EcoRI
CO 2	BL1	3. Write about Baculovirus expression vector system
CO2	BL6	4. Write short notes on Cosmids.
CO2	BL4	5. Explain the function phagmids
CO 2	BL1	6.Describe pBR322
CO 2	BL4	7.Explain the properties of good vector

Section B **(2 x 5 = 10)**

II Answer any **TWO** questions

CO2	BL6	8.Write in detail about M 13 based vectors
CO2	BL1	9. Describe pUC vector
CO2	BL6	10.Write the difference between DNA polymerase and RNA polymerase
CO2	BL4	11. Explain M13 infection and replication

Section C **(1 x 10 = 10)**

III Answer any **ONE** question

CO2	BL4	12.Explain in detail phage lambda vector
CO2	BL1	13.Describe about the steps involved Ti plasmid

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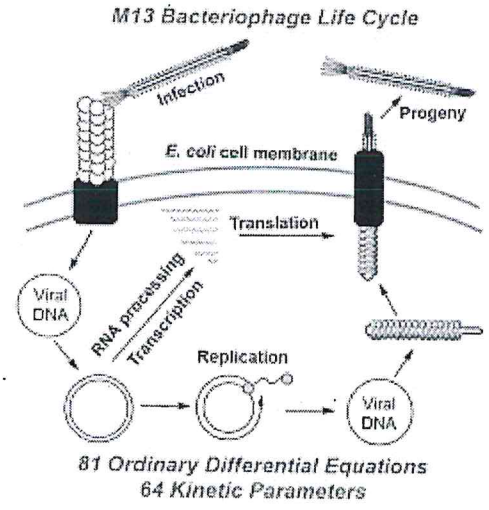
ANSWER KEY

1. The plasmid present in Agrobacterium tumefaciens cell is known as the Ti (tumor-inducing) plasmid.
2. EcoRI is a restriction enzyme or restriction endonuclease. It cuts the DNA double helix at a specific site.
3. The baculovirus expression vector system (BEVS) which enables fast, flexible and scalable protein production and is increasingly being used for the production of viral vaccines and gene therapy vectors.
4. A cosmid is a type of hybrid plasmid that contains a Lambda phage cos sequence. They are often used as a cloning vector in genetic engineering.
5. A phagemid or phasmid is a DNA-based cloning vector, which has both bacteriophage and plasmid properties.
6. The letter p stands for plasmid. BR denotes the name of two researchers, Bolivar and Rodriguez. The number 322 denotes the order of synthesis that distinguishes it from other plasmids synthesized in the same laboratory.
7. A good vector should have the ability of independent replication so that as the vector replicates (through ori gene) and a large number of copies of the DNA insert will be formed. The vector should be able to easily introduce into host cells. A vector should have marker genes for antibiotic resistance.
8. M13 cloning vectors have been developed for the selection of DNA sequences capable of directing initiation of DNA synthesis on single-stranded templates. These vectors are derived from viable M13 mutants containing large deletions in the region of the complementary strand origin.
9. It is an artificial cloning vector created by Joachim Messing and his co-workers. It is a circular double-stranded DNA similar to the pBR322. But, pUC19 is widely used in molecular techniques due to its high copy number.

10.

	DNA Replication	Gene Transcription
Function	Make DNA copy for a "daughter cell"	Make RNA copy of individual gene
	Synthesize an identical DNA copy	Synthesize RNA using DNA as a template
Enzymes	DNA helicase, DNA polymerase, DNA ligase	DNA helicase, RNA polymerase
Nucleotides	dTMP, dCMP, dAMP, and dGMP	UMP, CMP, AMP, and GMP
Occurrence (happens in)	Cell cycle **S phase**	Cell cycle **G1** and **G2 phases**
	Along **both** *(leading& lagging)*DNA strands	Along **one** *(template)* DNA strand
	Preparation for **cell division**	Preparation for **gene expression**
Bonding	Copied DNA bonded to template DNA	Copied RNA separates from DNA template
Need Primer?	RNA primer required	No primer required
Products	Deoxyribonucleic Acid (DNA) molecules	Ribonucleic Acid (RNA) molecules
	"Daughter strands" bonded to original strands	mRNA and non-coding RNA
	Stay within nucleus/nucleolus	mRNA "exported" to the cytoplasm
	Not degraded	Degraded after doing their work
Copying	Entire **genome** (all **chromosomes**)	Individual **genes** only
Unwinds	Entire DNA molecule	Only DNA with gene to be transcribed
"Post-copying" Processing	**DNA ligase** joins **Okazaki Fragments**	RNA "editing" (**introns** deleted, **exons** spliced)

11.

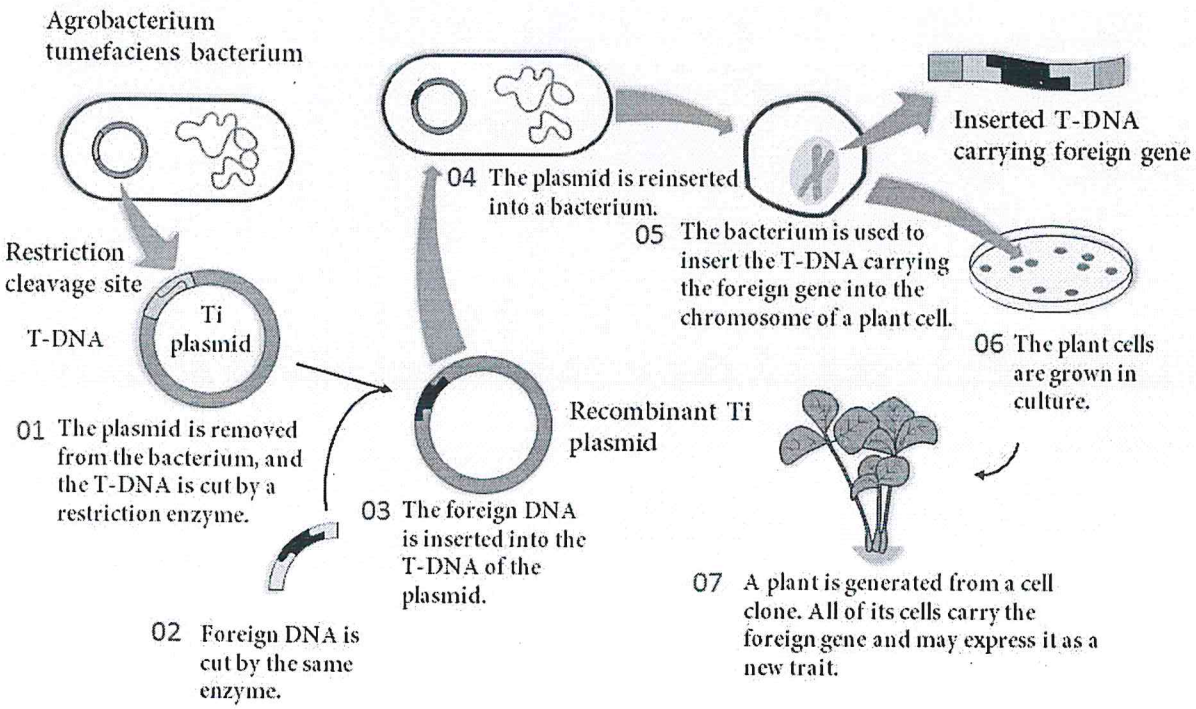


12. Lambda phage consists of a virus particle including a head (also known as a capsid), tail and tail fibers. The head contains the phage's double-stranded circular DNA genome. The phage particle recognizes and binds to its host, E. coli, causing DNA in the head of the phage to be ejected through the tail into the cytoplasm of the bacterial cell. Usually, a "lytic cycle" ensues, where the lambda DNA is replicated many times and the genes for head, tail and lysis proteins are expressed. This leads to assembly of multiple new phage particles within the cell and subsequent cell lysis, releasing the cell

contents, including virions that have been assembled, into the environment. However, under certain conditions, the phage DNA may integrate itself into the host cell chromosome in the lysogenic pathway. In this state, the λ DNA is called a prophage and stays resident within the host's genome without apparent harm to the host. The host can be termed a lysogen when a prophage is present.

13.

The Ti Plasmid



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SRM ARTS AND SCIENCE COLLEGE
Department of Microbiology

Date : **Duration :1hr** **Class :II Msc**

Subject Name & Code :Soil & Agricultural Microbiology

Section A (5 x 1 = 5)

(Answer any **FIVE** questions)

CO2	BL1	1.Define Rhizosphere effect
CO3	BL1	2.List out the enzymes of microbial origin
CO4	BL1	3.Define Damping off. Give examples
CO4	BL6	4. Write the names of the diseases associated with potato and their causative agents
CO4	BL6	5. Write the symptoms of late blight in potato
CO4	BL6	6.Write Angular leaf spot of cotton
CO3	BL6	7.Write about Lipooxygenase?

Section B (2 x 5 = 10)

(Answer any **TWO** questions)

CO4	BL6	8. Write the symptoms, transmission and management of any three diseases in paddy
CO4	BL6	9. Write notes on the defense mechanism existing in plants.
CO4	BL2	10. Explain the management of the bacterial blight disease of paddy
CO4	BL2	11.Explain the epidemiology of tobacco mosaic disease.

Section C (1 x 10 = 10)

(Answer any **ONE** question)

CO4 BL6 12. Enumerate the fungal diseases of plants. Elaborate on the symptoms and management of mildews.

CO4 BL2 13. Explain about the enzymes of microbial origin.

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SRM ARTS AND SCIENCE COLLEGE
Department of Microbiology

Date : **Duration :1hr** **Class :II Msc**
Subject Name & Code :Soil & Agricultural Microbiology

1. Rhizosphere effects (REs) are defined as biological, chemical, and physical changes in soils that occur because of root exudates and rhizodeposition. Biological processes are related to the parasitism of host plant microorganisms that promote nutrient and water uptake from soils.
2. Protease, Keratinase, Amylase, Xylanase, Laccase/Ligninase.
3. Damping-off refers to the rotting of stem and root tissues at and below the soil line. In most cases, infected plants will germinate and come up fine, but within a few days, they become water-soaked, mushy, collapse at the base and die.
4. Bacterial wilt is caused by a soil-borne bacterium named Ralstonia solanacearum (formerly known as Pseudomonas solanacearum). Potato wilt bacterium mainly inhabits the roots, and enters the root system at points of injury caused by farm tools or equipment and soil pests.
5. Initial symptoms of late blight are small, light to dark green, circular to irregular-shaped water-soaked spots. The first symptoms of late blight in the field are small, light to dark green, circular to irregular-shaped water-soaked spots (Figure 1). These lesions usually appear first on the lower leaves.
6. Bacterial Blight, also called Angular Leaf Spot, is a disease caused by the bacterium, Xanthomonas citri pv. malvacearum ("Xcm" will be used throughout this bulletin).
7. Lipoxygenases are a family of (non-heme) iron-containing enzymes most of which catalyze the dioxygenation of polyunsaturated fatty acids in lipids containing a cis,cis-1,4-pentadiene into cell signaling agents that serve diverse roles as autocrine signals that regulate the function of their parent cells, paracrine signals that regulate the function of nearby cells, and endocrine signals that regulate the function of distant cells.

Section B

8. Rice Yellow Mottle Virus (RYMV)

RYMV is known only in Africa and one of the most damaging diseases of rice in Africa.
Symptoms:

- Stunting of rice plants if infected at early stage.
- Reduced tiller number.
- Yellowing and mottling of leaves.
- Infected plants are easily attacked by other diseases such as brown spot.

Transmission of RYMV .
RYMV is transmitted by a vector and also mechanically.
. Five chrysomelids are known as vector insects.
. RYMV is not transmitted by the rice seed.
Symptoms:

- The symptoms are brown spots on the leaf and grain. • Seedling blight may occur in seedling grown from infected seeds.

Disease cycle: The disease is transmitted by the infected seeds. Damage of brown spot: It lowers grain quality and weight. Brown spot may kill up to 50 % of seedlings. Control:

- The most effective way of controlling brown spot is to grow plants in good soil and provide adequate fertilizer. • Planting a resistant variety is the most practical way of controlling.
- Treating the seeds with fungicide or hot water help control the disease.

9. **Plant defence mechanisms against phytopathogens**

Plants employ a combination of mechanisms for defence against pathogens in different host pathogen-systems. These defence mechanisms may be grouped into innate and artificial defence mechanisms. The innate defence mechanism refers to the machineries which plants are naturally able to elicit against invading pathogens owing to their inherent characteristics, while the defence mechanism which plants use in response to pathogen attack after being manipulated or assisted by man is referred to as artificial defence mechanism (**Agrios, 2005**). This review therefore focuses on the innate defence mechanisms.

Innate defence mechanism

There are two categories of innate defence mechanism, which may act during any stage of infection in plants and can occur simultaneously if the conditions are favourable, namely: the pre-existing and induced defence mechanisms.

Pre-existing defence mechanisms

This is the defence mechanism which forms the inherent basal first-line defence present within the plant even before pathogen colonization. It is grouped into the pre-existing structural defence mechanism, the pre-existing biochemical defence mechanism and defence through lack of essential factors.

A. Pre-existing structural defence mechanisms: This defence mechanism is made up of superficial structures often found on the plant surface, which generally present physical barriers to pathogen entry

Waxes and cuticles
Epidermal cell walls
Stomata and lenticels
hick-walled tissues: T

10. **Preventive method**

- Seed treatment with bleaching powder (100g/l) and zinc sulfate (2%) reduce bacterial blight.
- Seed treatment - seed soaking for 8 hours in Agrimycin (0.025%) and wettable ceresan (0.05%) followed by hot water treatment for 30 min at 52-54oC;
- seed soaking for 8 hours in ceresan (0.1%) and treat with Streptocyclin (3g in 1 litre);
- Spray neem oil 3% or NSKE 5%
- Spray fresh cowdung extract for the control of bacterial blight. Dissolve 20 g cowdung in one litre of water; allow to settle and sieve. Use supernatant liquid. (starting from initial appearance of the disease and another at fortnightly interval)

Cultural methods

- Grow Tolerant varieties (IR 20 IR 72,PONMANI , TKM 6).
- Secure disease free seed
- Grow nurseries preferably in isolated upland conditions
- Avoid clipping of seedlings during transplanting.
- Balanced fertilization, avoid excess N - application
- Skip N - application at booting (if disease is moderate)
- Drain the field (except at flowering stage of the crop)
- Destruction of weeds and collateral hosts
- Avoid flow of water from affected fields
- Maintain proper plant spacing

Chemical methods

- Seed treatment with bleaching powder (100g/l) and zinc sulfate (2%) reduce bacterial blight.
- Seed treatment - seed soaking for 8 hours in Agrimycin (0.025%) and wettable ceresan (0.05%) followed by hot water treatment for 30 min at 52-54oC;
- seed soaking for 8 hours in ceresan (0.1%) and treat with Streptocyclin (3g in 1 litre);
- Spray Streptomycin sulphate + Tetracycline combination 300 g + Copper oxychloride 1.25kg/ha. If necessary repeat 15 days later.
- Application of bleaching powder @ 5 kg/ha in the irrigation water is recommended in the kresek stage.
- Foliar spray with copper fungicides alternatively with Strepto-cyclin (250 ppm) to check secondary spread.

11. Life Cycle

The virus gets inside the plant host cells via vectors such as aphids, flies and other insects. After entering the host cell the virus starts to multiply and spreads to the nearby cells via plasmodesmata.

The virus can be transmitted to other healthy plants by coming in direct contact with the infected plants. For replication and multiplication inside the host cell, the viral particle releases its genomic material. The ssRNA then translates multiple mRNAs that can replicate the viral genome and the capsid proteins. All these proteins assemble to form a newly synthesised cell of tobacco mosaic virus that is ready to infect another cell.

Applications

Tobacco mosaic viruses are being widely used as viral vectors to deliver the gene of interest into plant cells and to produce plants with better quality and quantity. It also finds some use in biomaterial and nanotechnology devices.

Section C

12. powdery mildew,

Plant disease of worldwide occurrence that causes a powdery growth on the surface of leaves, buds, young shoots, fruits, and flowers. Powdery mildew is caused by many specialized races of fungal species in the genera *Erysiphe*, *Microsphaera*, *Phyllactinia*, *Podosphaera*, *Sphaerotheca*, and *Uncinula*. Hundreds of species of trees, shrubs, vines, flowers, vegetables, fruits, grasses, field crops, and weeds can be affected by powdery mildew.

The white powdery appearance is due to large numbers of microscopic spores (conidia) borne in chains. These wind-borne spores uniquely do not require free water for germination and infection. New conidia can be produced every 3 to 14 days. If the disease is severe, the mildewed plant parts may be stunted and distorted. Leaves commonly turn yellow and wither, flowers are distorted or fewer in number, and fruit yield and quality are reduced. Mildew is most severe in crowded, shady, poorly aerated locations when nights are cool and days are warm. At maturity or in the fall, round black specks, which are sexual fruiting bodies known as cleistothecia, may form in the mildew. In the spring the cleistothecia crack open to release one or more spore sacs (asei) containing ascospores that blow to nearby plant parts and initiate infection. Overwintering also occurs as mycelial mats on crops or weeds.

Sulfur dust is effective against many powdery mildews but should not be applied in hot weather. A number of other organic treatments, including copper-based fungicides, baking soda solutions, and neem oil, have also proven effective. Planting resistant varieties, staking plants to improve air circulation,

removing diseased plant parts, and sterilizing contaminated gardening shears can prevent or reduce the spread of the disease.

13.Enzymes of Microbial origin

There are 2 types of enzymes:

1. Constitutive

   Always present in nearly constant amounts in a cell (not affected by addition of any particular substrate…genes always expressed.) (pyro-phosphatase).
2. Inducible

   Present only in trace amounts or not at all, but quickly increases in concentration when its substrate is present. (Amidase).

Both enzymes are present in the soil.

Enzyme Classification

1. Oxidoreductases – Oxidation reduction reaction (Dehydrogenase, Catalase, Peroxidase)
2. Transferases – The transfer of group of atoms from donor to an acceptor molecule. (Aminotransferases, Rhodonese)
3. Hydrolases – Hydrolytic cleavage of bonds. (Phosphatase, Cellulose, Urease)
4. Lysates – Cleavage of bonds other than hydrolysis or oxidation.
5. Isomerases – Isomerisation reaction.
6. Ligases – Formation of bonds by the cleavage of ATP. (Acetyl-CoA carboxylase)

Importance of <u>Soil Enzymes</u>

Enzymes respond to soil management changes long before other soil quality indicator changes are detectable. Soil enzymes play an important role in organic matter decomposition and nutrient cycling. Some enzymes only facilitate the breakdown of organic matter (e.g. hydrolase, glucosidase), while others are involved in nutrient mineralisation (e.g. amidase, urease, phosphatase, sulphates). With the exception of phosphatase activity, there is no strong evidence that directly relates enzyme activity to nutrient availability or crop production. The relationship may be indirect considering nutrient mineralization to plant available forms is accomplished with the contribution of enzyme activity.

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SRM ARTS AND SCIENCE COLLEGE
Department of Microbiology

Date:04-11-22

Duration: 1 hr **Class:** M.sc., 2nd year

Subject Name & Code ENVIRONMENTAL BIOTECHNOLOGY - [illegible]

Section A (5×1 =5)
(Answer any five questions)

CO2	BL1	1.Define effluent recycle
CO3	BL2	2.Explain the methanogenesis
CO3	BL1	3.Define denitrification
CO4	BL1	4.Define detoxification
CO4	BL1	5.Define nitro aromatics
CO4	BL1	6.Name the types of inorganic metals
CO5	BL1	7.Define pesticide
CO5	BL2	8. Explain the biomass

Section B (2×5 = 10)
(Answer any two question)

CO4	BL2	9.Describe the synthetic organic chemical
CO4	BL2	10.Explain about detoxification of hazardous
CO3	BL2	11.Explain the special factors for the design of anaerobic digester
CO4	BL2	12.Describe the application of biodegradation

Section C (1×10 = 10)
(Answer any one question)

CO3 BL1 13.Discuss about the strategies pollution monitoring and control of bioremediation
CO1 BL2 14 Describe the factor causing molecular recalcitrance.

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SRM ARTS AND SCIENCE COLLEGE
Department of Microbiology

Duration: 1 hr **Class:** M.sc., 2nd year

Subject Name & Code ENVIRONMENTAL BIOTECHNOLOGY - EBTBB

Section A

(Answer any five questions)

CO2 BL1 1.Define effluent recycle

Recycling of wastewater is doneto treat the wastewater to a level suitable for various purposes. Water recycling is reusing treated waste water for beneficial purposes such as agricultural and landscape irrigation, industrial processes, toilet flushing and replenishing a ground water basin

CO3 BL2 2.Explain the methanogenesis

Methanogenesis is an anaerobic respiration that generates methane as the final product of metabolism. In aerobic respiration, organic matter such as glucose is oxidized to CO2, and O2 is reduced to H2O. In contrast, during hydrogenotrophic methanogenesis, H2 is oxidized to H+, and CO2 is reduced to CH4

CO3 BL1 3.Define denitrification

Denitrification is the process that converts nitrate to nitrogen gas, thus removing bioavailable nitrogen and returning it to the atmosphere. Dinitrogen gas (N2) is the ultimate end product of denitrification, but other intermediate gaseous forms of nitrogen exist

CO4 BL1 4.Define detoxification

Detoxification is a set of interventions aimed at managing acute intoxication and withdrawal. It denotes a clearing of toxins from the body of the patient who is acutely intoxicated and/or dependent on substances of abuse. Detoxification seeks to minimize the physical harm caused by the abuse of substances.

CO4 BL1 5.Define nitro aromatics

These compounds are organic molecules that consist of at least one nitro group (-NO2) attached to an aromatic ring.

CO4 BL1 6.Name the types of inorganic metals

These include iron, aluminium, titanium, which form the base of the construction and manufacturing industry, metals that are valued for their beauty i.e. gold, silver, and platinum and metals such as palladium, ruthenium and osmium which have catalytic properties.

CO5 BL1 7.Define pesticide

Pesticides are substances that are meant to control pests.This includes herbicide, insecticide, nematicide, molluscicide, piscicide, avicide, rodenticide.

CO5 BL2 8. Explain the biomass

Biomass is plant-based material used as a fuel for heat or electricity production. It can be in the form of wood, wood residues, energy crops.

Section B

(Answer any two question)

CO4 BL2 9.Describe the synthetic organic chemical

Synthetic Organic Chemicals are included in EPA's Chemical Contaminant Phase II/V Rule for drinking water. SOCs are man-made, organic (carbon-based) chemicals. They are used as pesticides, defoliants, fuel additives and as ingredients for other organic compounds. Some of the more well-known SOCs are Atrazine, 2,4-D, Dioxin and Polychlorinated Biphenyls (PCBs)

CO4 BL2 10.Explain about detoxification of hazardous

Hazardous waste can be treated by chemical, thermal, biological, and physical methods. Chemical methods include ion exchange, precipitation, oxidation and reduction, and neutralization. Among thermal methods is high-temperature incineration, which not only can detoxify certain organic wastes but also can destroy them.

CO3 BL2 11.Explain the special factors for the design of anaerobic digester

Hazardous waste can be treated by chemical, thermal, biological, and physical methods. Chemical methods include ion exchange, precipitation, oxidation and reduction, and neutralization. Among thermal methods is high-temperature incineration, which not only can detoxify certain organic wastes but also can destroy them.

CO4 BL2 12.Describe the application of biodegradation

The use of biodegradation for solving environmental contamination has primarily focused on clean-up of sites contaminated with industrial bulk chemicals like oil products and (chlorinated) solvents and on treatment of high-strength industrial wastewaters

Section C

(Answer any one question)

CO3 BL1 13.Discuss about the strategies pollution monitoring and control of bioremediation

Environmental pollution has been rising in the past few decades due to increased anthropogenic activities. Bioremediation is an attractive and successful cleaning technique to remove toxic waste from polluted environment. Bioremediation is highly involved in degradation, eradication, immobilization, or detoxification diverse chemical wastes and physical hazardous materials from the surrounding through the all-inclusive and action of microorganisms. The main principle is degrading and converting pollutants to less toxic forms. Bioremediation can be carried out ex-situ and in-situ, depending on several factors, which include but not limited to cost, site characteristics, type, and concentration of pollutants. Hence, appropriate bioremediation technique is selected. Additionally, the major methodologies to develop bioremediation are biostimulation, bioaugmentation, bioventing, biopiles, and bioattenuation provided the environmental factors that decide the completion of bioremediation. Bioremediation is the most effective, economical, eco-friendly management tool to manage the polluted environment. All bioremediation techniques have its own advantage and disadvantage because it has its own specific applications.

CO1 BL2 14 Describe the factor causing molecular recalcitrance.

Recalcitrance (resistance to biodegradation) may be due to biological, environmental orreasons. There arechemicalthis recalcitrance using various measures short of a full biodegradability investigation.Biological and Environmental Factors.There are innumerable

interactions between the biology, chemistry of the compounds and the environment that can cause recalcitrance of given molecules. Rather than repeat them, we will examine below the situation where a particular compound, although biodegradable in testing, is not biodegraded:

- Required nutrients are missing
- Environmental conditions are unsuitable
- Toxic substance concentration is too high
- Compound may be at too low a concentration
- Compound may not be bioavailable
- Microbial population does not produce correct enzymesRequired nutrients are missing

One or more nutrients required for growth are missing. The "limiting" nutrient is the one that is exhausted first in the growth cycle. This assumes that growth is required for biodegradation; this may not be true if sufficent biomass is already present, or if the compound is degraded by enzymes already present.Environmental conditions are unsuitableThere are many environmental conditions that can inhibit growth or metabolism; high or low pH levels, high or low Eh (redox potentials), high or low temperatures, etc. A good example is in some peat bogs where organic materials may be over 20,000 years old. Toxic substance concentration is too highome conditions (high hydrogen sulfide levels, high acid concentrations, etc. may inhibit growth or metabolism.Compound may be at too low a concentrationIf a compound is degraded through the growth of microorganisms on that compound, there will be a minimum concentration below which growth will not occur. There will be an even lower concentration that will not even provide maintenance energy levels sufficient for the organism to survive in an active state (some may sporulate).

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Department of Microbiology

II UNIT TEST- NOV 22

Date : 11.2022 **Duration : 1 Hour** **Class : I M.Sc**
Subject Name & Code : **Microbial Diversity and Taxonomy**

Section A (5 x 1 = 5)
(Answer any **FIVE** questions)

CO1	BL1	1. Define microbial biodiversity.
CO1	BL1	2. Name the father of biodiversity
CO1	BL2	3. Explain niche
CO1	BL2	4. Explain the term photoautotrophs
CO1	BL1	5. Define Chemolithotroph
CO1	BL2	6. Describe the term biodiversity conservation
CO1	BL1	7. Name the two basic strategies in biodiversity conservation

Section B (2 x 5 = 10)
(Answer any **TWO** questions)

CO1	BL6	8. Compile the morphological, physiological and metabolic features used in classification and identification of bacteria.
CO1	BL6	9. Write about conservation of biodiversity
CO2	BL4	10. Classify the microbes based on optimum growth temperature
CO4	BL4	11. Summarize Whittaker's five kingdom concept with a diagram

Section C (1 x 10 = 10)
(Answer any **ONE** question)

CO1	BL2	12. Explain the diversity of microorganisms with a classification chart.
CO1	BL4	13. Compare the characteristic features of bacteria, archaea and eucarya.

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ANSWER KEY

Section A

1. Define microbial biodiversity.

Microbial diversity can be defined as the range of different kinds of unicellular organisms, bacteria, archaea, protists, and fungi. Various microbes thrive throughout the biosphere, defining the limits of life and creating conditions conducive for the survival and evolution of other living beings.

2. Name the father of biodiversity

Edward O Wilson

3. Explain niche

Ecological niche is a term for the position of a species within an ecosystem, describing both the range of conditions necessary for persistence of the species, and its ecological role in the ecosystem.

4. Explain the term photoautotrophs

Photoautotrophs are organisms that can make their own energy using light and carbon dioxide via the process of photosynthesis. The word photoautotroph is a combination of autotroph, the word for an organism that makes its own food, and the prefix photo-, which means "light". Green plants and photosynthetic bacteria are examples of photoautotrophs.

5. Define Chemolithotroph

An organism deriving energy from chemical reactions and synthesizing all necessary organic compounds from carbon dioxide.

Examples are certain bacteria and archaea, which are further grouped into methanogens, halophiles, sulfur reducers, nitrifiers, anammoxbacteria and thermoacidophiles.

Chemo = chemical, auto = self, troph = nourishment

6. Describe the term biodiversity conservation

Conservation of biodiversity is protection, upliftment and scientific management of biodiversity so as to maintain it at its threshold level.

7. Name the two basic strategies in biodiversity conservation

- In-situ conservation
- Ex-situ conservation

Section B

8. Compile the morphological, physiological and metabolic features used in classification and identification of bacteria.

Morphological features	*Physiological features*	*Metabolic features*
Cell shape Cell size Colonial morphology Ultrastructural characteristics Staining behaviour Cilia and flagella Mechanism of motility Endospore shape and location Spore morphology and location Cellular inclusions Colour Motility	Carbon and nitrogen sources Cell wall constituents General nutritional type Growth temperature optimum and range Osmotic tolerance pH optimum and growth range Salt requirements and tolerance	Energy sources Fermentation products Luminescence Mechanisms of energy conversion Oxygen relationships Photosynthetic pigments Secondary metabolites formed Sensitivity to metabolic inhibitors and antibiotics Storage inclusions

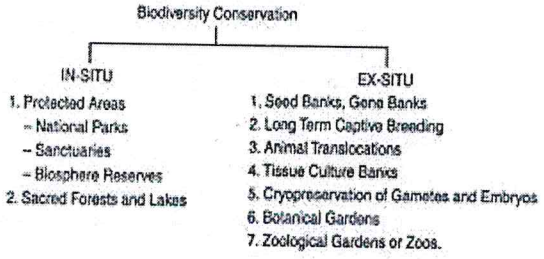
9. Write about conservation of biodiversity

Conservation is defined as management of human use of biosphere so that it may yield sustainable benefit to the present generation while maintaining its potential to meet the needs and aspirations of posterity.

There are two basic strategies of biodiversity conservation

In-situ (on site) and

Ex-situ (off site).

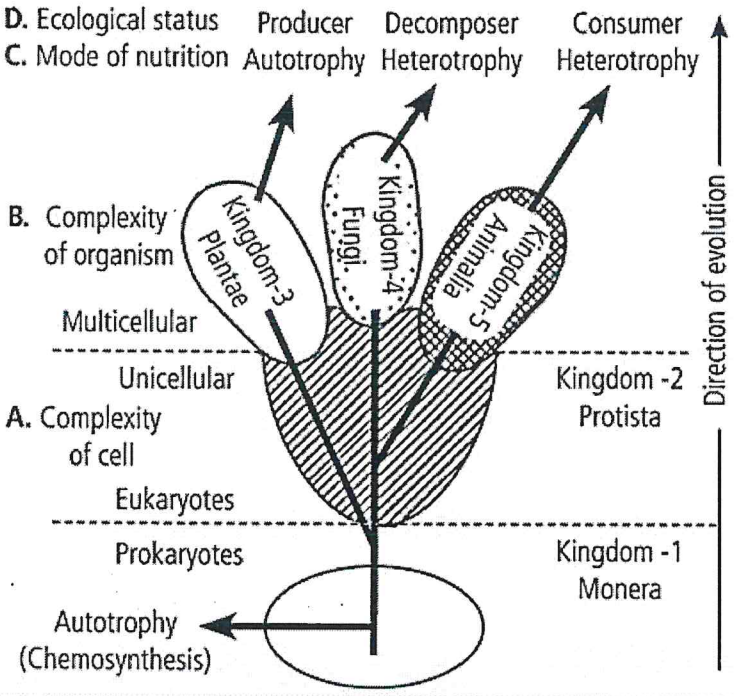


10. Classify the microbes based on optimum growth temperature

Bacteria can be classified by their optimal growth temperature. The following are the five classifications:

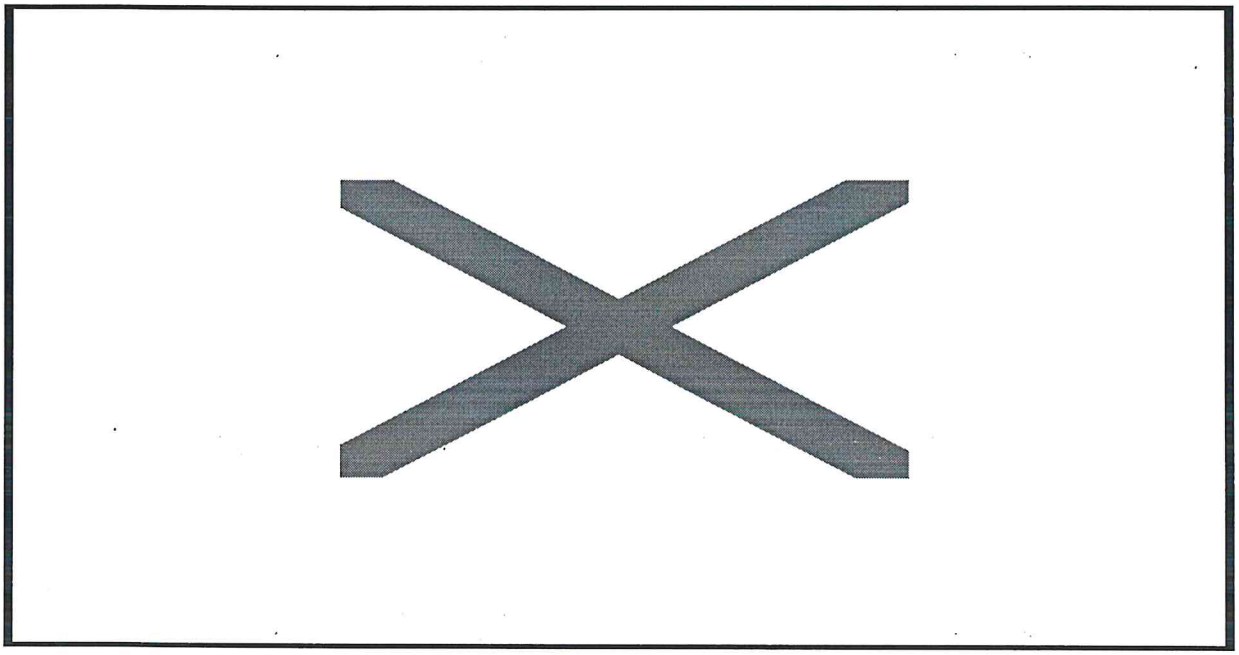
Hyperthermophile (60 degrees C and upwards)
Thermophile (optimal growth between 45 and 122 degrees)
Mesophile (20 and 45 degrees C)
Psychrotrophs (will survive at 0 degrees C, but prefer mesophilic temperature
Psychrophiles (-15 and 10 degrees C or lower).

11. Summarize Whittaker's five kingdom concept with a diagram



Section C

12. Explain the diversity of microorganisms with a classification chart.



13. Compare the characteristic features of bacteria, archaea and eucarya.

Property	*Bacteria*	*Archaea*	*Eucarya*
Nucleus with nucleolus	Absent	Absent	Present
Membranous cell organelles	Absent	Absent	Present
Cell wall	Peptidoglycan containing muramic acid	Various types without muramic acid	No muramic acid
Membrane lipids	Esterlinked straight chain fatty acids	Esterlinked branched chain fatty acids	Esterlinked straight chain fatty acids
Gas vesicles	Present	Present	Absent
t – RNA	With thymine and initiation with N-formylmethionine	No thymine and initiation with methionine	Thymine and initiation with methionine
Polysystronic m-RNA	Present	Present	Absent
m-RNA introns	Absent	Absent	Present
Ribosomes	70S	70S	80S
DNA dependent RNA polymerase structure	4 subunits	8-12 subunits	12-14 subunits
ATPase similarity	No	Yes	Yes
Methanogenesis	Absent	Present	Absent
Nitrogen fixation	Present	Present	Absent
Photosynthesis	Present	Absent	Present
Chemolithotrophy	Present	Present	Absent

Source: Prescott *et al.* (2005).

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Department of Microbiology

II UNIT TEST- NOV 22

Date : 11.2022 **Duration : 1 Hour** **Class : I M.Sc**

Subject Name & Code : **Immunology**

Section A (5 x 1 = 5)

(Answer any **FIVE** questions)

CO1	BL1	1. List out the functions of lymphoid system.
CO1	BL6	2. Write the full forms for MALT and BALT.
CO1	BL3	3. Sketch the protocol of antibody production.
CO1	BL1	4. Define epitope.
CO2	BL2	5. Explain the term antigen.
CO2	BL6	6. Write the full form for HGPRT.
CO2	BL2	7. Describe polyclonal antibodies.

Section B (2 x 5 = 10)

(Answer any **TWO** questions)

CO1	BL4	8. Differentiate between primary and secondary lymphoid organs.
CO1	BL4	9. Categorize the organs of immune system.
CO1	BL4	10. Explain HMI.
CO2	BL6	11. Criticize the methodology of production of monoclonal antibodies.

Section C (1 x 10 = 10)

(Answer any **ONE** question)

CO1	BL6	12. Compile the role APCs in CMI.
CO2	BL4	13. Classify the types of Immunoglobulins and explain their properties.

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SRM ARTS AND SCIENCE COLLEGE
KATTANKULATHUR 603 203

PRINCIPAL
SRM ARTS AND SCIENCE COLLEGE
SRM Nagar, Kattankulathur
Chengalpattu Dist - 603 203

SRM ARTS AND SCIENCE COLLEGE
Department of Microbiology

II UNIT TEST- NOV 22
Immunology- Answer Key

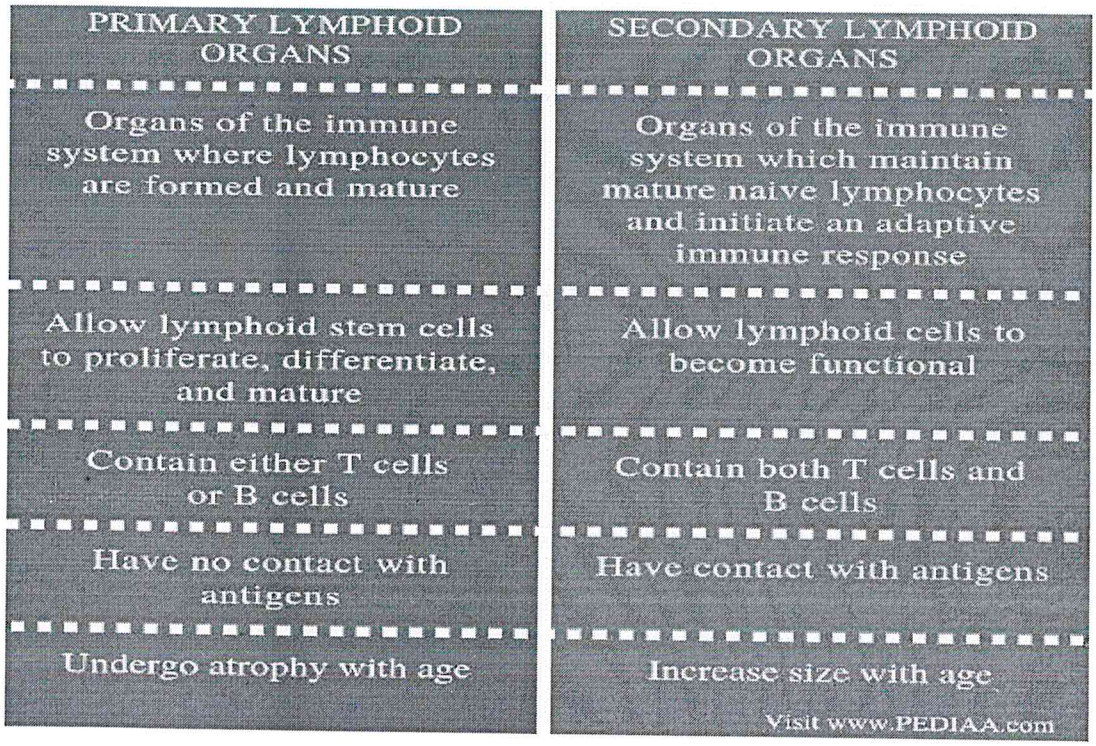
Section A (5 x 1 = 5)
(Answer any **FIVE** questions)

1. Explain the functions of lymphoid system.
   - To mature and educate naïve lymphocytes
   - To provide a seat for mature lymphocytes
   - To provide site for interaction of antigen with components of adaptive immunity
2. Write the full forms for MALT and BALT
   - MALT- Mucosa Associated Lymphoid Tissue
   - BALT- Bronchus Associated Lymphoid Tissue
3. Sketch the protocol of antibody production.
   B cells ⟶ plasma cells ⟶ antibodies
4. Define epitope.
   Antigenic determinants
5. Explain the term antigen.
   - Foreign substances
   - Anti- antibodies; Gen- generators
6. Write the full form for HGPRT.
   - HGPRT- Hypoxanthine-Guanine-Phosphoribosyl Transferase
7. Describe polyclonal antibodies.
   Polyclonal antibodies (PAbs) are **a mixture of antibodies that are secreted by different B cell lineages.** These antibodies are actually a collection of immunoglobulin molecules that react against a specific antigen, each identifying a different epitope on an antigen.

Section B (2 x 5 = 10)
(Answer any **TWO** questions)

8. Differentiate between primary and secondary lymphoid organs.

Primary Lymphoid Organ	Secondary Lymphoid Organ
Ectodermal or Ecto-endodermal junction in origin	Mesodermal in origin
Develops early in embryonic life	Develops late in fetal life
Removal in early age results in loss of functional lymphocytes and immune response	Minimal or no effects
Examples – Thymus, Bone marrow, Bursa of Fabricus, Illeal Peyer's Patches (only in Group-I mammals)	Examples – Spleen, Lymph nodes, Bone marrow, SALT, MALT



9. Categorize the organs of immune system.

Primary lymphoid organs:

- Also called "central lymphoid organs"
- It is where immature lymphocytes develop.
- Organs where differentiation, proliferation and maturation of stem cells into immuno competent cells take place.
- Includes:
  i. Thymus
  ii. Bone Marrow

Secondary lymphoid organs:

- It is where antigen is localized so that it can be effectively exposed to mature
- lymphocytes.
- initiate adaptive immune response.
- Includes:
  i. Spleen
  ii. Lymph Nodes
  iii. Tonsils
  iv. Appendix
  v. Peyer's patches

10. Explain HMI.

Humoral immunity is immunity attributable to specific immunoglobulin antibody and present in the blood plasma, lymph, other body fluids, or tissues. The antibody may also adhere to cells in the form of cytophilic antibody. Antibody or immunoglobulin- mediated immunity acts in conjunction with complement proteins to produce either beneficial (protective) or pathogenic (hypersensitivity tissue-injuring) reactions. Antibodies that are the messengers of humoral immunity are derived from B cells. For purposes of discussion, it is separated from so-called cellular or T cell-mediated immunity, though the two cannot be clearly distinguished since antibodies and T cells often participate in immune reactions together.

11. Criticize the methodology of production of monoclonal antibodies.

• Monoclonal antibodies are identical immunoglobulins, generated from a single B-cell clone. These antibodies recognize unique epitopes, or binding sites, on a single antigen. Derivation from a single B-cell clones and subsequent targeting of a single epitope is what differentiates monoclonal antibodies from polyclonal antibodies.

• Polyclonal antibodies are antibodies that are derived from different cell lines.They differ in amino acid sequences.

Preparation of Monoclonal Antibodies

• Monoclonal Antibody production or mAb is produced by cell lines or clones obtained from the immunized animals with the substances to be studied. Cell lines are produced by fusing B cells from the immunized animal with myeloma cells.

• To produce the desired mAB, the cells must be grown in either of two ways: by injection into the peritoneal cavity of a suitably prepared mouse (in vivo method) or by in vitro tissue culture.

• The vitro tissue culture is the method used when the cells are placed in culture outside the mouse the mouse's body in flask.

Practical steps for production

1. Immunize animal
2. Isolate spleen cells (containing antibody-producing B cell)
3. Fuse spleen cells with myeloma cell (using PEG)
4. Allow unfused B cell to die
5. Add aminopterin to culture and kill unfused myeloma cells
6. Clone remaining cells (place 1 cell/well and allow each cell to grow into a clones of cell)
7. Screen supernatant of each clone for presence of desired antibody
8. Grow chosen clone of cells in tissue culture indefinitely
9. Harvest antibody from the culture. 10. $ 1000-2000 per mg

Section C (1 x 10 = 10)

(Answer any ONE question)

12. Compile the role APCs in CMI.

Cells that display peptides associated with class I MHC molecules to $CD8^+$ T-cytotoxic cells are referred to as **target cells.** And cells that display peptides associated with class II MHC molecules to $CD4^+$ T-helper cells are called **antigen-presenting cells.**

Antigen presenting cells (APCs)

The APCs present the processed antigenic peptides, in association with the class II MHC antigen, on its cell membrane to T cells. The antigen presenting cells are classified into professional APCs and non-professional APCs. The professional APCs include dendritic cells, macrophages and B lymphocytes. The non professional APCs include fibroblasts in skin, glial cells in brain, pancreatic beta cells, vascular endothelial cells, thymic epithelial cells and thyroid epithelial cells. These cells function in antigen presentation only for short periods of time during a sustained inflammatory response.

Dendritic cells

They are so named because they possess long membranous extensions resembling dendrites of nerve cells. There are four types of dendritic cells : Langerhans cell, interstitial dendritic cell, myeloid and lymphoid dendritic cells. All arise from haematopoietic stem cells by different pathways and in different locations. Each immature or precursor dendritic cell acquires the antigen by phagocytosis, processes it and the mature dendritic cell presents it to a T-helper cell. At this stage , it is imperative to mention the follicular dendritic cells, which do not express class II MHC molecules and hence do not function as APCs. The follicular dendritic cell does not arise in the bone marrow and is so named because it is exclusively located in the B-cell rich lymph follicles in the lymph node. It expresses high levels of membrane receptor for antibody and hence can bind to antigen-antibody complexes.

Macrophages

The macrophages are transformed monocytes that leave the blood to move to the tissues. Macrophages can be activated by various stimulants or activators including microbes and their products, antigen – antibody complexes, inflammation, sensitized T lymphocytes, lymphokines and injury. Activated macrophages have an increased number of lysosomes and produce and release interleukin – 1. Interleukin – 1 participates in fever production and in activation of lymphoid cells, resulting in the release of other cytokines. Once activated these cells start expressing the class II MHC molecules as well as the co – stimulatory B7 membrane molecule. B7 is a molecule which is found on professional APCs such as B cells and macrophages. For T cell activation, an interaction is essential between B7 lead to their functional inactivation (anergy) or death.

B lymphocytes

These cells constitutively express class II MHC molecules but must be activated before they express the co-stimulatory B7 molecule.

13. Classify the types of Immunoglobulins and explain their properties.

Immunoglobulins: Types, Functions:

Immunoglobulins (Igs) are glycoprotein molecules also called antibodies(Abs) , that are produced in response to foreign substances entering the living body- antigens or immunogens (viruses, bacteria, or toxins etc), binding to them and forming antigen-antibody complexes resulting in Ag elimination and protection of the body of the host). Igs are produced by the lymphocytes and are found in fraction of blood called gamma globulin. Gerald M. Edelman and Rodney Robert Porter ere the notable researchers who worked extensively on purification and structural analysis of Igs, particularly the IgG type. Igs are synthesized with a molecular arrangement that fits the shape of molecules on the antigens or immunogens, in order to allow effective binding of the Abs. Igs binding to Ags basically help to inactivate, weaken or enhance phagocytosis of Ags.

GENERAL FUNCTIONS

1. Antigens binding- Igs bind to specific Antigenic determinants (AD) on an antigen. They bind to at least 2 or in a few cases more Ads which are closely related and the number of ADs an Ab can bind to is referred to as its valency.
2. Most Igs mediate several effector functions which include fixation of complement that results to lyses of cells and release of biologically active molecules, binding of various cells to facilitate specific functions by bound cells e.g. phagocytic cells, lymphocytes, platelets etc. Most effector functions of Abs are carried out after the Ab binds to Ags. Different Igs molecules can have different Ag binding properties because of different VH and VL regions.

Immunoglobiulins types and classes.

Based on differences in the amino acid sequences in the constant region of the heavy chains there are five classes of Igs.

1. IgG- gamma heavy chain
2. IgM-miu heavy chain
3. IgA- alpha heavy chain
4. IgD- delta heavy chain
5. IgE- epsilon heavy chain.

In each class of Ig small differences in the constant regions of the heavy chain still occur, leading to subclasses of the Igs e.g. IgG1,IgG2,IgG3 etc.

IgG

All IgG are monomers, subtypes and subclasses differ in number of disulphide bonds and lengths of hinge region.

Properties.

1. It is the most versatile Ig and can carry out all functions of Ig molecules.
2. It is the major Ig in serum
3. It is also found/ the major Ig in extravascular spaces.
4. It is the only Ig that crosses the placenta.
5. It fixes complement although not all subclasses do this well.
6. It binds to cells and is a good poisoning(substance that enhances phagocytosis).

IgM

It normally exists as a pen tamer in serum but can also occur as a monomer. It has an extra domain on the mui chain (CH4) and another protein covalently bound via S-S . called J-chain. This chain helps it to polymerize to the pentamer form.

Properties

1. It is the first Ig to be made by fetus in most species and new B cells when stimulated by Ags.
2. It is the 3rd most abundant Ig in serum.
3. It is a good complement fixing Ig leading to lyses of microorganisms
4. It is also a good agglutinating Ig, hence clumping microorganisms for eventual elimination from the body.
5. It is also able to bind some cells via Fc receptors.
6. B cells have surface IgMs , which exists as monomers and lacks J chain but have an extra 20 amino acid at the C-terminal that anchors it to the cell membrane.

IgA

Serum IgA is monomeric, but IgA found in secretions is a dimer having a J chain. Secretory IgA also contains a protein called secretory piece or T- piece, this is made in epithelial cells and added to the IgA as it passes into secretions helping the IgA to move across mucosa without degradation in secretions

Properties

1. It is the second most abundant Ig in serum
2. It is the major class of Ig in secretions- tears, saliva, colostrums,mucus,and is important in mucosal immunity.
3. It binds to some cells- PMN cells and lymphocytes
4. It does not normally fix complement.

IgD

It exists as monomers.

Properties

1. It is found in low levels in serum and its role in serum is uncertain
2. It is found primarily on B cells surface and serves as a receptor for Ag.
3. It does not fix complement.

IgE

It occurs as a monomer and has an extra domain in the constant region.

Properties

1. It is the least common serum Ig, but it binds very tightly to Fc receptors on basophils and mast cells even before interacting with Ags.
2. It is involved in allergic reactions because it binds to basophils and mast cells.
3. It plays a role in parasitic helminthic diseases. Serum levels rise in these diseases. Eosinophils have Fc receptors for IgEs and when eosinophoils bind to IgEs coated helminthes death of the parasite results.

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Department of Microbiology

Duration: 1 hr

Class : M.sc., 1st year

Subject Name & Code: PHARMACEUTICAL MICROBIOLOGY

Section A (5×1 =5)
(Answer any five questions)

CO1	BL1	1.Name the types of sterilization
CO1	BL2	2.Define contamination
CO1	BL1	3.Define spoilage
CO2	BL1	4.Define antiparasitic
CO2	BL1	5.Define antibiotics
CO1	BL1	6.Define preservation
CO3	BL1	7.Differentiate between exotoxin and endotoxin
CO3	BL2	8. Explain about ATCC

Section B (2×5 = 10)
(Answer any two question)

CO1	BL2	9.Describe the types of microbial spoilage occurs in pharmaceutical products
CO1	BL2	10.Explain about sterility testing
CO1	BL2	11.Explain about ecology of microbes in pharmaceutical industry
CO1	BL2	12.Describe the source and type of microbial contamination

Section C (1×10 = 10)
(Answer any one question)

CO3 BL1 13.Discuss about the factor affecting the microbial spoilage of pharmaceutical products.
CO1 BL2 14 Describe the chemical and biological indicators of sterilization process

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Duration: 1 hr

Class: M.sc., 1st year

Subject Name & Code: PHARMACEUTICAL MICROBIOLOGY

Section A (5×1 =5)
(Answer any five questions)

1.Name the types of sterilization.

Sterilization can be achieved through various means including heat, chemical, irradiation, high pressure and filtration.

2.Define contamination.

Contamination refers to the non intended or accidental introduction of infectious material like bacteria, fungi, virus, protozoa or their toxins and by products.

3.Define spoilage.

Spoilage is chemical and physiochemical degradation of pharmaceutical products rendering it unsuitable for use. Microbial spoilage may present potential health hazards to the consumers like toxicity, infection.

4.Define antiparasitic.

Anti parasitics are a class of medication which are indicated for the treatment of parasitic diseases, such as those caused by helminths, amoeba, ectoparasites, parasitic fungi and protozoa.

5.Define antibiotics.

Antibiotics are used to treat or prevent some types bacterial infection. They kill bacteria or prevent them from reproducing and spreading.

6.Define preservation.

A preservative is an antimicrobial substance added in the pharmaceutical formulations with a view to avoid contamination in the formulations

7.Differentiate between exotoxin and endotoxin.

Bacterial toxins are divided into exotoxin and endotoxin. while exotoxin are membrane compounds of gram negative bacteria which elict in inflammatory response in host, exotoxins are secreted protein which act locally and at distance of the bacterial colonization site.

8. Explain about ATCC.

The American type of culture collection (ATCC) is a private, non profit organization dedicated to the acquisition, preservation, authentication and distribution

Section B (2×5 = 10)
(Answer any two question)

9.Describe the types of microbial spoilage occurs in pharmaceutical products

Spoilage is chemical and physicochemical degradation of pharmaceutical products rendering it unsuitable for use. Damaged products may damage reputation of the manufacturing company

which may attract further financial loss. Microbial spoilage may present potential health hazards to the consumers like toxicity, infection or even death. Toxic metabolites may be produced due to microbial growth which may cause health hazards. Microbes may deteriorate drugs and thereby reduce potency of the medicament. There could be change in the appearance of the product like decolourisation, phase separation, and odour formation ete. Following types of microbial spoilage occurs in pharmaceutical products.

1.Chemical spoilage. 2. Physicochemical spoilage 3. Biological spoilage.

Chemical Spoilage- Chemical spoilage means deterioration of chemical nature of drugs and excipients. Molecular structure of the ingredients may change. Thischange may affect physicochemical properties of the preparation. Potency of the drug may decrease. Further microbial growth may occur if chemical degradation of preservative occurs.

Similarly chemical degradation of surfactants, organic polymers ete may damage specialised micro-environment for which they are used. Along with microbial contamination some- chemicals may also cause chemical spoilage like pesticide, disinfectants, bleaching agent, sanitizer etc. may add to chemical spoilage.

Physicochemical spoilage- This type of spoilage may change physico-chemical properties of product. Following types of changes may occur.

i) Viable growth- Viable growth of microbes may occur inside the container. These growth may be visible in the form of floating layers, turbidity, hemps, ete. Contamination of products by fungus species like *Aspergillus sp.* may cause this type spoilage. Some bacterial species may also show viable growth.

ii) Gas production -Some microbes may produce gas inside the containers. These gases may be visible in the form of bubbles, floccules etc. Contamination of products with bacteria like *E. coli* may produce gas if it contains sugars.

iii) Colouration / De-colouration -Some microbes may decolourise formulation or it may produce unique colour which is different from the normal colour of the product.

iv) Odour formation-Microbial growth in the finished product may produce bad odour or characteristic odour. It may produce a characteristic rotten smell.

v) Taste change -Microbial spoilage may change the taste of the oral formulations. It may impart bitter or obnoxious taste to the oral formulation.

Biological Spoilage - Spoilage of pharmaceuticals may produce some undesirable and dangerous molecule which has undesirable biological effects. Some microbes may produce toxins, pyrogens or other harmful metabolites. These biomolecules may be present in the product from the very beginning. Spoilage may occur, although no microbial contamination was there.

10.Explain about sterility testing.

Two methods are there i.e. direct innoculation and membrane filtration.

i) Direct inoculation- In this method, little amount of sample is directly added to the culture media which was specified in pharmacopeia. This inoculated media is then incubated for specified period of time. Presence of growth indicates the presence of micro organism which is sourced from sample. Hence it may be concluded that sample is not sterile. Sample may be termed sterile in absence of any growth.

ii) Membrane filtration- In this method sample is filtered through a membrane filter and washed with diluting fluid. Microbes, if present, will be there at the top of the filter paper. Now this filter paper is inoculated into specified culture media. If growth is observed then it indicates that product is not sterile.

A positive and negative control test must also be conducted in both the above mentioned method.

Microbial limit test-

The European pharmacopoeia recommends both qualitative and quantitative assessment of micro-organism. United States Pharmacopoeia recommends microbiological Limit test. It has two parts,(i) Total Aerobic microbial count and (ii) Test for specified microorganism.

(i) Total Aerobic microbial count-
In this method specified amount of test sample (10gm) is taken and mixed with specified amount (90ml) of peptone water.
This is sample dilution. There are specific procedure to make dilutions for water insoluble products and fatty products. Total microbial count is examined by following procedure-
First, examination of sample by membrane filtration method- 10 ml of prepared dilution is mixed with 90 ml of peptone water and filtered through membrane filter. It is then washed 3 times with sterile peptone water. One filter paper is placed in petridis containing Soyabean Caesin Digest Agar media and incubated for 5 days at 30-35oC. Bacterial count is determined by counting colonies. Another filter paper is placed in Sabouraud Dextrose Agar Media and incubated for 5 days at 20-25oC. Fungal count is then determined.Second, Examination of sample plate count method- In this method prepared dilution is directly transferred to 4 petridishes. Two for bacteria and two for fungus. In first two petridishes 15 ml of Soyabean Caesin Digest Agar media is added. Colonies are counter after incubation for 5 days at 30-35oC. In remaining two petridishes 15 ml of Sabouraud Dextrose Agar Media was transfered and incubated at 20-25oC. Colonies are counted.
(ii) Test for specified micro-organism-
Specific identification tests for *Escherichia coli*, *Salmonella, Pseudomonas aeruginea* and *Staphylococcus aureus* is performed. *E. coli* is cultivated in Mac Conkes agar media. Colonies are identified by characteristics metalic shine.
Salmonella are cultivated on bismuth sulphite agar media and identified by black or green colonies. *Pseudomonas aeruginosa* is identified by cultivating in cetrimide agar media. Colonies slow greenish colour. *Staphylococcus aureus* is cultivated in Vogel Johnson agar media and identified by black colonies surround by yellow zones.
3. Periodic test-
Periodic test of the product for total microbial count must be done in order to determine continuing efficacy of the product. Many alternative tests may be done for detection and determination of micro-organism *e.g* Luciferase test, Epifluorescence, electrical impedance etc.

11.Explain about ecology of microbes in pharmaceutical industry
Microbial ecology is a relatively young discipline within the field of microbiology. Its modern history spans just the past 60 years, and the field is defined by its emphasis on understanding the interactions of microbes with their environment, rather than their behaviour under artificial laboratory conditions. Because microbes are ubiquitous, microbial ecologists study a broad diversity of habitats that range from aquatic to terrestrial to plant- or animal-associated. This has made it a challenge to identify unifying principles within the field. One approach is to recognize that although the activity of microbes in nature have effects at the macro scale, they interact with their physical, chemical, and biological milieu at a scale of micrometers. At this scale, several different microbial ecosystems can be defined, based upon the association with particles, the presence of environmental gradients, and the continuous availability of water. Principles applicable to microbial ecology reflect not only their population ecology and physiological ecology, but also their broad versatility and quantitative importance in the biosphere as biogeochemical catalysts and capacity for rapid physiological and evolutionary responses

12.Describe the source and type of microbial contamination
Microbes are very important part of our environment. They are present almost anywhere and everywhere. So, contamination may occur to pharmaceutical products in large scale manufacturing, in small scale hospital manufacturing or during use by the patient. Following are the different source of microbial contamination in pharmaceutical products. In large scale manufacturing: - In large scale manufacturing as well as medium and small scale manufacturing contamination may occur from following sources.
Water -Water is a major source of contamination. Common water borne micro-organism like Pseudomonas, Achromo bacteria and other low demand gram negative groups are present in

portable water as well as in purified water. Ion-exchange column may be contaminated by water source and micro-organism may multiply there to contaminate purified water.
Water which is purified by reverser osmosis process may also be contaminated if osmosis membrane is no properly disinfected. Even distilled water may also be contaminated if it is stored for few day at normal temperature.
Raw materials - Pharmaceutical products are prepared from varieties of raw materials. Clays and earth materials like bentonite, kaolin ete may contain anaerobia spores like *Clostridium sp*. Starch may contain coliform batteria like *E. Coli.* Gums may contain actinomycetes. Animal Products may contain a variety of bacterial like *E. coli*, *Salmonella sp* ete.
Air of the manufacturing area:
Air is filled with billions of suspending particles and microbes. Fungus spores, like penicillium, mucor, aspergillus ete. Bacterial spores like *Bacillius sp*. etc are also present. These spores and micro-organism may contaminate pharmaceutical products. This type of contamination is minimised by practice of manufacturing in clean room and in aseptic room under continuous flow of sterile air through HEPA filter.
Personnel- manufacturing staff may also contaminate pharmaceutical products. Personnel may be infected with various types of infections like coliform bacteria, staphylococci, strepto cocci, Actino bacteria, Candida. This types of contamination may be minimised by pooper health check-up, vaccination and hygiene of the personnel. Protective gear and pooper training of the personnel may also minimise the contamination.
Equipments - Equipments of manufacturing may contain microbes if it is not sterilised properly. Grinder, blender, filter ete may contain non-specific and local communities of micro-organism.
Containers: containers may cause contamination if it is not sterile.
In hospital manufacturing -In hospital manufacturing water and environment are the major source of contaminants. In hospitals, water is stored in storage tank which may develop fungus, bacteria and algi type of microbes. Hospital air may be contaminated with pathogenic micro-organism due to the presences of infected patients and numerous visitors.
Herman source- Pharmaceutical products may be contaminated during use. Patient may self contaminate his medicine. Contaminants may travel to other patients through doctors nurses ete.
Preservation of pharmaceutical products using antimicrobial agents:
Antimicrobial agents are those substances which can kill of inhibit growth of micro-organism. These antimicrobial agents are included in formulation in order to minimise levels of contaminated micro-organism. These antimicrobial agents are called preservatives. These preservatives can generally prevent or kill low levels of contamination. Preservatives are not used in those formulations which has low risk of contamination and subsequent microbial growth. Formulations which contains high level of acid, alkali, sugar etc may not require preservative. Formulations of antibiotics and other anti-microbial substances may not require preservative.

Section C

(Answer any one question) $(1 \times 10 = 10)$

13.Discuss about the factor affecting the microbial spoilage of pharmaceutical products.

There are so many factors which affects Microbial spoilage. Some of these factors reduce rate of spoilage where as some factors increases the rate of spoilage. These factors are related to nutritional requirement of micro-organisms, environment and nature of micro-organism. There factors must be studied to minimise the impact of spoilage. Following factors affect the microbial spoilage of Pharmaceutical products.
i) **Number of contaminating micro-organism** - There may not be sufficient spoilage if number of contaminants are less. This low level it contaminants may not able to multiply due to design of the formulation. However during long storage these microbes may cause damage. If initial

contamination is high then it may present an undesirable challenge. Products will be damaged quickly due to presence of high numbers of microbes. High level of contamination occurs due to lapses in manufacturing process or due to high loads of contaminants in raw materials.

ii) **Type of micro-organisms** -Some microorganisms are more aggressive than others. They can quickly multiply and spoilage is much faster. However, aggressive microbes may not multiply initially due to presence of preservative and other substances. Contamination of product with natural communities of non-aggressive micro-organism can facilitate growth of other aggressive contaminants.

iii) **Presence of nutrients**- In product Micro-organism can utilise formulation components as nutrients and utilise these components for biosynthesis and growth. Many formulations may contain crude animal, vegetable and microbial products which creates a conductive environment for microbial growth and subsequent spoilage. Additives like sugar, amino acid, polyhydric alcohol may act as microbial nutrients. Primary contaminants may produce metabolites which could be used by aggressive microbes as nutrient. Demineralised water which is prepare by ion-exchange resins may contain nutrients.

iv) **Presence of water** - Presence of water in formulation may promote microbial growth and subsequent spoilage. Uncomplexed water or free excess water promotes this spoilage. Presence of free water may be measured by water activity. It is a ratio between 'vapour pressure of formulation and vapour pressure of water in similar condition'. If water activity is 1 then it is conducive for microbial growth. Chances of microbial growth decreases with decrease in value of water activity. A value less than 0.88 is considered safe to prevent
spoilage. However, some microbes can grow in extremely low water value condition. - *Aspergillus glaucus* can grow at a water activity value of 0.61.

v) **Oxidation-reduction potential**- Contaminating micro-organism may requires terminal electron accepter to facilitate functioning respiratory pathway. Presence of dissolved oxygen increases redox potential of the product thereby promote microbial growth and spoilage.

vi) **Temperature** -Storage temperature is a great controller of microbial growth and spoilage. However, spoilage may occur over a range -20oC to 60oC. Microbial growth and spoilage is less in low temperature and high temperature. Storing products at a cool place (8oC to 12oC) may cause negligible spoilage. High temperature can also prevent spoilage. Water for injection is stored above 80oC before filling and sealing. So extreme temperature can minimise spoilage.

vii) **pH**- Microbes prefer neutral pH for their growth. However some microbes may prefer slightly acidic pH. Extremely acidic or alkaline pH of the formulation may prevent microbial growth and subsequent spoilage. Some communities of microbes can survive in extreme pH and change the pH, there by support growth of other micro-organism.

viii) **Containers and packaging** - Chances of contamination in single dose ampoules and vials are negligible. However multidose containers be contaminated by users themselves. Change in designs of these containers may minimize contamination and spoilage. Wide mouthed containers for creams and ointments are replaced by narrow mouthed tubes with screw cap closures. Multidose injections are stored in containers which has self sealing rubber wads. Containers are sealed such a way so that it can prevent entry of water and oxygen to minimise water activity and redox potential.

ix) **Presence of protection materials** - Some materials in formulation may protect microbes during sterilisation process. Polymers like gelatin, starch ete may increase microbial resistance to heat. Microbes may get adsorbed in particles and become more resistant to heat.

14.Describe the chemical and biological indicators of sterilization process

Biological Indicators for Sterilization

Sterilization indicators, such as spore strips and indicator tape, enable routine monitoring, qualification,and load monitoring of the steam sterilization process. They indicate whether the conditions during a steam autoclave cycle were adequate to achieve a defined level of microbial inactivation.

Bacterial Spores:

- Bacillus atrophaeus (BA)
- Geobacillus stearothermophilus (GS)

Chemical Indicators for Sterilization
Chemical indicators are designed to respond to one or more of the physical conditions within the sterilizing chamber. Use them to routinely monitor the process parameters of your sterilization process to ensure that they meet your quality assurance goals.

Popular Applications:

- Pre-vacuum sterilizers
- Dry heat sterilization
- Steam sterilization processes
- Ethylene oxide (EO) sterilization processes
- VHP Biodecontamination Units

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Department of Microbiology

Date: 1.11.22 **Duration :1hr**
Subject Name & Code: Medical mycology & Parasitology SN25B **Class: III BSc**
Microbiology

Section A (5 x 2 = 10)
(Answer any **FIVE** questions)

CO1	BL1	1. Define NIH swab.
CO1	BL1	2. Define Piedra
CO1	BL1	3. State Cryptococcus neoformans.
CO4	BL1	4. Define Cyst.
CO1	BL6	5. Write about Corn meal agar.
CO4	BL4	6. Distinguish Sporozoite and Merozoite.
CO2	BL6	7. Write about Lugol's iodine.

Section B (1 x 5 = 5)
(Answer any ONE question)

CO1	BL2	8. Discuss Lab. diagnosis of fungal infections.
CO5	BL1	9. Examine the Faeces sample by Concentration method.

Section C (1 x 10 = 10)
(Answer any ONE question)

CO2	BL6	10. Write a detailed account on opportunistic fungal infection
CO5	BL4	11. Explain in detail about *Plasmodium malariae*.

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Section A

1. Define NIH swab.

   National Institute of Health, swab is used to collect the eggs from the perianal skin

2. Define Piedra

   Piedra is a hair disease caused by a fungus, which causes formation of nodules on the hair shaft.

3. State Cryptococcus neoformans.

   Cryptococcus neoformans is a fungus that has worldwide distribution and often found in bird droppings.

4. Define Cyst.

   protozoan cyst infectious form of many protozoan parasites such as *Entamoeba histolytica, Giardia lamblia, Balantidium coli,* etc., usually passed in the faeces and provided with a highly condensed cytoplasm and resistant cell wall.

5. Write about Corn meal agar.

   Corn Meal Agars are recommended for the cultivation of pathogenic fungi, production of chlamydospores by Candida albicans

6. Distinguish Sporozoite and Merozoite.

   Merozoites are an invasive form of malaria parasite that infects red blood cells, while Sporozoites are an invasive form of malaria parasite that infects liver cells.

7. Write about Lugol's iodine.

   Lugol's Iodine is a rapid, non-specific contrast dye that is added to direct wet mounts of fecal material to aid in differentiating parasitic cysts from host white blood cells.

Section B

8. Discuss Lab. diagnosis of fungal infections.

Common approaches for the laboratory diagnosis of fungal infections are:

1. Direct microscopic examination of clinical samples including histopathology
2. Culture of the organism

3. Antigen detection tests

4. Serologic tests

5. Molecular diagnostics (DNA)

Direct microscopic examination of clinical specimens such as sputum, biopsy, CSF, and/or skin scrapings provides a rapid and accurate diagnosis of some fungal infections. Diagnostic features of fungal pathogens, when stained by various dyes (e.g. asexual spores, hyphae etc), helps in the identification.

9. Examine the Faeces sample by Concentration method.

Concentration procedure separate parasites from fecal debris and increase the chances of detecting parasitic organisms when these are in small numbers. They are divided into flotation techniques and sedimentation techniques.

Flotation techniques (most frequently used: zinc sulfate or Sheather's sugar) use solutions which have higher specific gravity than the organisms to be floated so that the organisms rise to the top and the debris sinks to the bottom. The main advantage of this technique is to produce a cleaner material than the sedimentation technique. The disadvantages of most flotation techniques are that the walls of eggs and cysts will often collapse, thus hindering identification. Also, some parasite eggs do not float.

Sedimentation techniques use solutions of lower specific gravity than the parasitic organisms, thus concentrating the latter in the sediment. Sedimentation techniques are recommended for general diagnostic laboratories because they are easier to perform and less prone to technical errors. The sedimentation technique used at CDC is the formalin-ethyl acetate technique, a diphasic sedimentation technique that avoids the problems of flammability of ether, and which can be used with specimens preserved in formalin

Section c

10. Write a detailed account on opportunistic fungal infection

Many fungi are opportunists and are usually not pathogenic except in an immunocompromised host. Causes of immunocompromise include AIDS, azotemia, diabetes mellitus, lymphoma, leukemia, other hematologic cancers, burns, and therapy with corticosteroids, immunosuppressants, or antimetabolites. Patients who spend more than several days in an intensive care unit can become compromised because of medical procedures, underlying disorders, and/or undernutrition.

Typical opportunistic systemic fungal infections (mycoses) include

- Candidiasis
- Aspergillosis
- Mucormycosis (zygomycosis)
- Fusariosis

Systemic mycoses affecting severely immunocompromised patients often manifest acutely with rapidly progressive pneumonia, fungemia, or manifestations of extrapulmonary dissemination.

11. Explain in detail about *Plasmodium malariae*.

Plasmodium malariae is a parasitic protozoan that causes malaria in humans. It is one of several species of *Plasmodium* parasites that infect other organisms as pathogens, also including *Plasmodium falciparum* and *Plasmodium vivax*, responsible for most malarial infection. Found worldwide, it causes a so-called "benign malaria", not nearly as dangerous as that produced by *P. falciparum* or *P. vivax*. The signs include fevers that recur at approximately three-day intervals – a *quartan fever* or *quartan malaria* – longer than the two-day (tertian) intervals of the other malarial parasites. *Plasmodium malariae* causes a chronic infection that in some cases can last a lifetime. The *P. malariae* parasite has several differences

between it and the other *Plasmodium* parasites, one being that maximum parasite counts are usually low compared to those in patients infected with *P. falciparum* or *P. vivax*

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SRM ARTS AND SCIENCE COLLEGE
Department of Microbiology

Date: 02.10.22 **Duration: 1 hour** **Class: II B.Sc Microbiology**

Subject Name: Molecular Biology ***Sub Code SN23A***

Section A (2×5 =10)
(Answer any five questions)

CO1	BL2	1.Name the types of enzymes involved in replication
CO3	BL2	2.Explain theta replication
CO1	BL1	3.Define ribosome
CO5	BL1	4.Define Operon
CO4	BL1	5.Name the subunits present in RNA polymerase
CO5	BL1	6.Define the Positive regulation.
CO5	BL1	7.Differentiate between Lac and arab operon.

Section B (5×1 =5)
(Answer any one questions)

CO1	BL2	8. Describe the rolling circle mode of replication
CO5	BL2	9. Discuss about Arabinose operon.
CO5	BL7	10. Differentiate the Galactose operon and Lactose Operon

Section C (10×1 =10)
(Answer any one questions)

CO3	BL2	13. Explain about the formation of protein synthesis.
CO4	BL2	14 Describe in detail about Transcription process.

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Section A

Section A

1. Name the types of enzymes involved in replication

   DNA replication requires other enzymes in addition to DNA polymerase, including DNA primase, DNA helicase, DNA ligase, and topoisomerase.

2. Explain theta replication

   The theta mode of replication is similar to the linear mode of chromosome replication, where leading strands are replicated continuously, and lagging strands are replicated discontinuously.

3. Define ribosome

   A ribosome is a complex molecular machine found inside the living cells that produce proteins from amino acids during a process called protein synthesis

4. Define Operon

   An operon is a functioning unit of DNA containing a cluster of genes under the control of a single promoter.

5. Name the subunits present in RNA polymerase

   The Escherichia coli RNA polymerase (RNAP) is a multi-subunit enzyme composed of five subunits including α (two copies), β, β' and ω subunits. These five subunits form the RNAP core enzyme responsible for RNA synthesis using DNA as template and ribonucleotide

6. Define the Positive regulation.

   To begin the transcription process, the activator proteins bind to the operator on mRNA. This is referred to as "positive regulation.

7. Differentiate between Lac and arab operon.

   ara operon can be positively as well as negatively controlled. **Lactose** (lac) operon found in E.coli, is involved in the metabolism of lactose.

Section B

8. Describe the rolling circle mode of replication

   Rolling circle replication (RCR) is a process of unidirectional nucleic acid replication that can rapidly synthesize multiple copies of circular molecules of DNA or RNA, such as plasmids, the genomes of bacteriophages, and the circular RNA genome of viroids. Some eukaryotic viruses also replicate their DNA or RNA via the rolling circle mechanism. Rolling circle DNA replication is initiated by an initiator protein encoded by the plasmid or bacteriophage DNA, which nicks one strand of the double-stranded, circular DNA molecule at a site called the double-strand origin, or DSO. The initiator protein remains bound to the

5' phosphate end of the nicked strand, and the free 3' hydroxyl end is released to serve as a primer for DNA synthesis by DNA polymerase III.

9. Discuss about Arabinose operon.

Arabinose operon is one of the regulatory systems found in the bacterial cell (E.coli), facilitating arabinose catalysis. L-arabinose operon and ARA-operon are the two alternative names of the arabinose operon. Ara-operon system provides energy to the cell by the breakdown of arabinose into xylulose 5-phosphate.

Arabinose is a 5-C sugar or aldopentose that provides energy in a carbon source to the bacterial cells. Xylulose 5-phosphate is a ketose sugar and serves as an intermediary product of the pentose phosphate pathway. The bacteria utilize this carbon source to perform various functions. In the arabinose operon, there is a group of genes that perform specific functions within the cell.

Section C

13. Explain about the formation of protein synthesis.

Translation is the second part of the central dogma of molecular biology: RNA → Protein. It is the process in which the genetic code in mRNA is read to make a protein. Translation is illustrated in Figure 5.7.4. After mRNA leaves the nucleus, it moves to a ribosome, which consists of rRNA and proteins. The ribosome reads the sequence of codons in mRNA, and molecules of tRNA bring amino acids to the ribosome in the correct sequence.

Translation occurs in three stages: Initiation, Elongation and Termination.

Initiation:

After transcription in the nucleus, the mRNA exits through a nuclear pore and enters the cytoplasm. At the region on the mRNA containing the methylated cap and the start codon, the small and large subunits of the ribosome bind to the mRNA. These are then joined by a tRNA which contains the anticodons matching the start codon on the mRNA. This group of molecues (mRNA, ribosome, tRNA) is called an initiation complex.

Elongation:

tRNA keep bringing amino acids to the growing polypeptide according to complementary base pairing between the codons on the mRNA and the anticodons on the tRNA. As a tRNA moves into the ribosome, its amino acid is transferred to the growing polypeptide. Once this transfer is complete, the tRNA leaves the ribosome, the ribosome moves one codon length down the mRNA, and a new tRNA enters with its corresponding amino acid. This process repeats and the polypeptide grows.



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Department of Microbiology

Date : 03.11.22 **Duration : 1 hour** **Class : III B.Sc Microbiology**

Subject Name: Biotechnology and Genetic Engineering

Section A (5x2=10)

(Answer any **FIVE** questions)

CO2	BL3	1. Uses of insulin.
CO2	BL1	2. Define interferons.
CO3	BL2	3. Differentiate exonucleases and endonucleases.
CO3	BL1	4. Define ligase.
CO3	BL1	5. Name few examples of restriction enzymes.
CO2	BL6	6. Write the importance of gene therapy.
CO3	BL1	7. List the types of restriction enzymes.

Section B (1x5 = 5)

(Answer any **ONE** question)

CO2	BL2	8. Explain the production of interferons.
CO2	BL6	9. Write short notes on gene therapy.

Section C (1x10 = 10)

(Answer any **ONE** question)

CO3	BL6	10. Write in detail about different types and applications of restriction enzymes.
CO2	BL2	11. Describe about the steps involved in production of insulin.

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III B.Sc MICROBIOLOGY

BIOTECHNOLOGY AND GENETIC ENGINEERING

INTERNAL TEST II ANSWER KEY

1. Insulin is a hormone created by your pancreas that controls the amount of glucose in your bloodstream at any given moment. It also helps store glucose in your liver, fat, and muscles. Finally, it regulates your body's metabolism of carbohydrates, fats, and proteins.
2. A natural substance that helps the body's immune system fight infection and other diseases, such as cancer. Interferons are made in the body by white blood cells and other cells, but they can also be made in the laboratory to use as treatments for different diseases.
3. They are an important tool in DNA repair and molecular cloning. On the basis of the locus of their activity, nucleases are divided into endonucleases and exonucleases.
4. Ligases are enzymes that are capable of catalyzing the reaction of joining two large molecules by establishing a new chemical bond, generally with concomitant hydrolysis of a small chemical group on one of the bulky molecules or simply linking of two compounds together
5. Each restriction enzyme can recognize or identify only a single or few restriction sites. Once these enzymes identify and bind to the restriction sites, they make a cut at or near these sites cleaving the DNA. - EcoRI and smaI are the two examples of restriction enzymes.
6. Gene therapy replaces a faulty gene or adds a new gene in an attempt to cure disease or improve your body's ability to fight disease. Gene therapy holds promise for treating a wide range of diseases, such as cancer, cystic fibrosis, heart disease, diabetes, hemophilia and AIDS.
7. Restriction enzymes are traditionally classified into four types on the basis of subunit composition, cleavage position, sequence specificity and cofactor requirements.Type I Enzymes. Type II Enzymes. Type III Enzymes. Type IV Enzymes
8. Interferons are produced by living animal cells, both in vivo as well as cultured cells. Interferon production and its antiviral activity require expression of cellular genes, and these functions are blocked by inhibitors of transcription and translation. Thus, virus-infected host cells fail to produce interferon in presence of actinomycin D, an inhibitor of eukaryotic RNA polymerase. When the inhibitor is added after 2 hr of infection, interferon production is not inhibited, suggesting that transcription is completed by that time. Interferon production starts after initiation of viral maturation and continues for 20 to 50 hr after that. Then the production stops, due to formation of a repressor which presumably is formed or activated only when the interferon concentration in the producing cell exceeds a certain threshold concentration. Most of the interferon is transported from the producing cell to other neighbouring cells. The substance in a virus that is responsible for interferon synthesis by the host cell is known as interferon inducer. The nature of this substance was identified by Merigan (1970) as double-stranded RNA. The activity seems to reside in polyribonucleotide's with a high helical content. The double- stranded RNA viruses — like reoviruses — can act as interferon inducer without replication. Single- stranded RNA viruses can act as inducers only after replication when they form double-stranded replicative intermediates. DNA-viruses can also induce interferons, presumably due to overlapping transcription of viral DNA as observed in case of vaccinia virus .

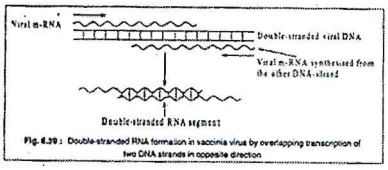


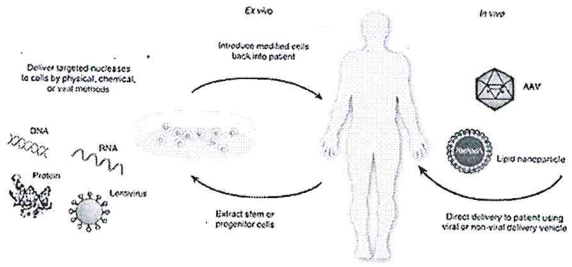
Fig. 6.39 : Double-stranded RNA formation in vaccinia virus by overlapping transcription of two DNA strands in opposite direction

9. Human gene therapy seeks to modify or manipulate the expression of a gene or to alter the biological properties of living cells for therapeutic use, Gene therapy is a technique that modifies a person's genes to treat or cure disease. Gene therapies can work by several mechanisms:

- Replacing a disease-causing gene with a healthy copy of the gene
- Inactivating a disease-causing gene that is not functioning properly
- Introducing a new or modified gene into the body to help treat a disease

Gene therapy products are being studied to treat diseases including cancer, genetic diseases, and infectious diseases. There are a variety of types of gene therapy products, including:

- Plasmid DNA: Circular DNA molecules can be genetically engineered to carry therapeutic genes into human cells.
- Viral vectors: Viruses have a natural ability to deliver genetic material into cells, and therefore some gene therapy products are derived from viruses. Once viruses have been modified to remove their ability to cause infectious disease, these modified viruses can be used as vectors (vehicles) to carry therapeutic genes into human cells.
- Bacterial vectors: Bacteria can be modified to prevent them from causing infectious disease and then used as vectors (vehicles) to carry therapeutic genes into human tissues.
- Human gene editing technology: The goals of gene editing are to disrupt harmful genes or to repair mutated genes.
- Patient-derived cellular gene therapy products: Cells are removed from the patient, genetically modified (often using a viral vector) and then returned to the patient.



Gene therapy products are biological products regulated by the FDA's Center for Biologics Evaluation and Research (CBER). Clinical studies in humans require the submission of an investigational new drug application (IND) prior to initiating clinical studies in the United States. Marketing a gene therapy product requires submission and approval of a biologics license application (BLA).

10. What are Restriction Enzymes? The restriction enzyme is a protein produced by bacteria that cleaves the DNA at specific sites. This site is known as the restriction site. The restriction enzymes protect the live bacteria from bacteriophages. They recognize and cleave at the restriction sites of the bacteriophage and destroy its DNA. Restriction enzymes are important tools for genetic engineering. They can be isolated from the bacteria and used in the laboratories. The restriction enzymes recognize short and specific nucleotide sequences in the DNA known as the recognition sequences. When the restriction enzyme recognizes a DNA sequence, it hydrolyzes the bond between adjacent nucleotide and cuts through the DNA molecule. The bacteria prevents its own DNA sequences from degradation by the addition of the methyl group at the adenine or cytosine bases within the recognition sequence with the help of enzyme methylases. Types of Restriction Enzymes: Type I : These restriction enzymes cut the DNA far from the recognition sequences. However, they do not produce discrete restriction fragments, hence, are of not much practical value. These are complex, multi-subunit restriction and modification enzymes. They were initially thought to be rare, but through genomic analysis, they are found to be common and are of considerable biochemical interest. Type II: These enzymes cut at specific positions closer to or within the restriction sites. Discrete restriction fragments and gel banding patterns are observed. They are exclusively used for DNA analysis and gene cloning in the laboratories. These are a family of unrelated proteins. They are named after the bacterial species from which they are isolated. For eg., EcoRI is isolated from bacterial species *E.coli*. The restriction enzymes generate two different types of cuts. Blunt ends are produced when they cut the DNA at the centre of the recognition sequence, and sticky ends produce an overhang. Type III: These are multi-functional proteins with two subunits- Res and Mod. It is a modification methyltransferase. The DNA sequence specific for the system is recognized by the Mod subunit. Applications of Restriction Enzymes: They are used in RFLP techniques to cut the DNA into smaller fragments to study the fragment length differences among the individuals. In Gene Cloning: During cloning, a gene is inserted into a plasmid. Restriction enzymes cut the plasmid producing single-stranded overhangs. The two DNA molecules are ligated with the help of DNA ligase to form a single DNA molecule.

11. Insulin is produced exclusively in the beta cells of the pancreatic islets in mammals, and the Brockmann body in some fish. Human insulin is produced from the *INS* gene, located on chromosome. Rodents have two functional insulin genes; one is the homolog of most mammalian genes (*Ins2*), and the other is a retroposed copy that includes promoter sequence but that is missing an intron (*Ins1*). Transcription of the insulin gene increases in response to elevated blood glucose. This is primarily controlled by transcription factors that bind enhancer sequences in the ~400 base pairs before the gene's transcription start site. The major transcription factors influencing insulin secretion are PDX1, NeuroD1, and MafA. During a low-glucose state, PDX1 (pancreatic and duodenal homeobox protein 1) is located in the nuclear periphery as a result of interaction with HDAC1 and 2, which results in downregulation of insulin secretion. An increase in blood glucose levels causes phosphorylation of PDX1, which leads it to undergo nuclear translocation and bind the A3 element within the insulin promoter. Upon translocation it interacts with coactivators HAT p300 and SETD7. PDX1 affects the histone modifications through acetylation and deacetylation as well as methylation. It is also said to suppress glucagon.

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Department of Microbiology

II UNIT TEST

Date : .11:2022 **Duration : 1 Hr** **Class : II B.Sc MB**
Subject Name & Code : Clinical Laboratory Technology **(SN33A)**

Section A (5 x 2 = 10)
(Answer any **FIVE** questions)

CO1	BL3	1. Illustrate first aid measures for asphyxiation emergency
CO1	BL3	2. Administer a first aid measure for wounds caused by broken glass
CO1	BL6	3. Write the parameter unit for the following abbreviations a) g/dl, b) IU/L, c) mcg/dL and d) nmol/L
CO2	BL2	4. Cite a preservative for transportation of urine
CO3	BL4	5. Differentiate RBC and WBC pipette
CO3	BL3	6. State the normal value of ESR in men and women
CO4	BL2	7. Explain a) anuria and b) glycosuria

Section B (1 x 5 = 5)
(Answer any **ONE** question)

CO4	BL6	8. Write about the physical examination of urine sample
CO4	BL5	9. Summarize the chemical analysis of urine sample in specification to a) sugar, b) protein, c) ketone bodies, d) bile and e) bilirubin.

Section C (1 x 10 = 10)
(Answer any **ONE** question)

CO4	BL6	11. Compile the steps involved in differential leucocyte count with a diagram
CO5	BL5	12. Criticize about the pre analytical errors in a clinical laboratory

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1. Illustrate first aid measures for asphyxiation emergency

Some first aid measures for asphyxiation include cardiopulmonary resuscitation (CPR) and oxygen therapy. If someone becomes unconscious due to asphyxiation, their heart may stop beating. When a person provides CPR, they essentially take on the role of the heart and lungs, helping blood and oxygen move around the body.

2. Administer a first aid measure for wounds caused by broken glass

- Rinse the wound under running tap water for 5 to 10 minutes.
- soak a gauze pad or cloth in saline solution or tap water, or use an alcohol-free wipe, and gently dab or wipe the skin with it
- don't use antiseptic as this may damage the skin.

3. Write the parameter unit for the following abbreviations

- g/dl - gram per deciliter
- IU/L -International unit per liter
- mcg/dL - microgram per deciliter
- nmol/L- nanomol per liter

4. Cite a preservative for transportation of urine

Boric acid

5. Differentiate RBC and WBC pipette

SL. NO	RBC pipette	WBC pipette
1)	It has a red bead	It has a white bead
2)	It has graduations upto mark 101	It has graduations upto mark 11
3)	Size of bulb is larger	Size of bulb is smaller
4)	Size of lumen is smaller	Size of lumen is

6. State the normal value of ESR in men and women

- Men - 5- 15 mm/hr
- Women - 5- 20 mm/hr

7. Explain a) anuria and b) glycosuria

- Anuria: It is characterized by reduced urine output (<100mL urine per day), reflecting renal injury.
- Glycosuria: Glucosuria, **glucose in the urine**, results from the glomerular filtration of more glucose than the renal tubule can absorb. It occurs in all normal individuals in amounts up to 25 mg/dl (1–5).

8. Write about the physical examination of urine sample

Physical examination of urine sample

a) *Naked-eye appearances*

Urochrome is the chief pigment and is responsible for the amber colour of normal urine. In addition, normal urine contains traces of urobilin and other pigments. Urobilinogen is colourless, contained also in traces. Irrespective of pathological conditions, urine may be pale owing to intake of large volumes of fluid or deeper in colour (more orange) owing to copious sweating or to reduction of fluid intake (= "concentrated").

Substances which may make urine depart from normal amber:

red - blood, hemoglobin, myoglobin, beets
port-wine - porphyrin
brownish-black - melanin (oxidation of melanogen), alkaptonuria (oxidation of homogentisic acid)
brown - bilirubin, methemoglobin
orange - small amount of bilirubin
greenish - biliverdin (oxidation product of bilirubin)
deep yellow - riboflavin, tetracycline antibiotics, certain chemotherapeutic
white - chyluria

Under naked-eye appearance will be noted also wheather urine is clear or cloudy, whether there is any deposit visible (see the examination of urinary sediments). As a rule phosphates are deposited when the urine is alkaline and urates or uric acid when it is acid. Brownish urates may be then dissolved in KOH, phosphates in acetic acid. The deposits mentioned in a cooled specimen are in most cases of no significance. On the other hand turbidity caused by the massive occurance of white blood cells microorganisms is always pathological.

b) *Odour*

There may be a characteristic odour, as, for example, of ammonia due to decomposition by bacteria (increased pH), or unpleasant odour of phenylacetic acid in phenylketonuria.

c) *Volume*

An average urine output ranges from 1 - 1.5 l/day. *Oliguria* is said to be present when the urine amount is less than 400 ml/day, *anuria* less than about 100 ml/day. When the urine output exceeds 2.5 l/day, *polyuria* is present.

d) *Density*

The specific gravity may be taken with an urinometer. It ranges from about 1.003 to 1.035 .

9. Summarize the chemical analysis of urine sample in specification to
a) sugar, b) protein, c) ketone bodies, d) bile and e) bilirubin.

1. Test for Reducing Sugar: (Glucose)

Test	Observation	Inference
1. Benedict's test : Take 5ml Benedict's reagent in test tube then add 8drops of urine sample and Boil it for 1-2 min and observe.	Green or yellowish green or orange or red precipitate obtained	Reducing sugar confirmed Therefore urine contains reducing sugar

Colour of the precipitate	Degree of Glycosuria	Approx. Glucose Conc. (gm %)
Green precipitate	+	0.5%
Yellow precipitate	+ +	1.0%
Orange precipitate	+ ++	1.5%
Brick Red precipitate	+ ++ +	2.0 or more

2. TEST FOR PROTEIN:-

Test	Observation	Inference
2. **Heat coagulation test:** Fill 3/4th of test tube with urine sample solution. Heat it at the top and observe. Then Add 1-2 drop of acetic acid to it and again observe.	White Coagulum or turbidity is obtained which after the addition of acetic acid gets intensified.	Albumin is confirmed. Therefore urine contains albumin

3. TEST FOR Ketone bodies :-

Test	Observation	Inference
3. **Rothera's test :** Saturate 5 ml of urine with Rothera's mixture and then add 1-2 ml of conc. Ammonia solution. Gently mix by rotation and allow to stand and observe.	Permagnate colour or deep purple ring is observed at the junction of two layers	Acetone and acetoacetic acid present. Therefore urine contains ketone bodies.

5. Test for Bile salts and bile pigments

Test	Observation	Inference
5. Hay's Sulphur powder test : Take 3ml urine in a test tube and sprinkle a pinch of sulphur powder and observe. **Control:** Take 3ml water in a test tube and sprinkle a pinch of sulphur powder and observe	Sulphur powder sinks down to bottom of the test tube. Sulphur powder floats.	Bile salts confirmed. Therefore urine contains bile salts.

b). Fouchet's test for bile pigments

Test	Observation	Inference
6. **Fouchet's test :** Take 3ml urine solution in test tube. add 2 ml 10% $BaCl_2$. until thick white precipitate is obtained. Filter it and to the precipitate on the filter paper add few drops of Fouchet's reagent and observe.	Colour changes from yellow to pista green	Bile pigments confirmed. Therefore urine contains bile pigments.

11. Compile the steps involved in differential leucocyte count with a diagram

ERYTHROCYTE SEDIMENTATION RATE (ESR)

INTRODUCTION

Erythryocyte Sedimentation Rate (ESR) is the measurement after 1hour of the sedimentation of red cells when blood is allowed to stand in an open ended glass tube mounted vertically on a stand.

ESR can be measured in the laboratory by two methods

1. Westergren method
2. Automated ESR analyser

The International Council for Standardization in Hematology recommends the use of Westergren method as the standard method for measuring ESR.

Westergen method

The Westergen pipette is a glass pipette 30 cm in length and 2.5mm in diameter. The bore is uniform to within 5% throughout. A graduated scale in mm extends over the lower 20 cm.

Sample: Venous blood collected in EDTA. Four volumes of blood is diluted in 1 volume of citrate. Alternatively, 2ml blood is directly collected in 0.5ml of

3.8% trisodium citrate.

Equipment required

1. Westergren pipette
2. Stainless steel rack for holding pipette
3. Timer

Normal value

Men - 5- 15 mm/hr

Women - 5- 20 mm/hr

Method

1. Mix the blood sample well and draw in the Westergren pipette to the 0mm mark with a rubber teat.

2. Place the tube exactly vertical in the rack which has a rubber cork at the bottom. Fix with adjustable screws after removing the teat.

3. Leave undisturbed for exactly 60min free from vibrations and not exposed to direct sunlight.

4. Read the column of clear plasma above the column of sedimented red cells to the nearest mm.

12. Criticize about the pre analytical errors in a clinical laboratory.

PRE ANALYTICAL ERRORS IN A CLINICAL LABORATORY

- Patient Identification
- Patient Preparation
- Selecting the Site
- Site Preparation
- Tourniquet Application and Time
- Proper Venipuncture Technique
- Order of Draw
- Proper Tube Mixing
- Correct Specimen Volume
- Proper Tube Handling and Specimen Processing
- Serum Samples
- Plasma Samples
- Centrifugation
- Special Handling of Blood Samples
- Stability for Whole Blood, Serum and Plasma

• Patient Identification:

- It is important to identify a patient properly so that blood is being collected from the correct person. Drawing blood from the wrong person or labeling the correct patient's sample with a different patient's label can certainly contribute to laboratory error. Blood should not be drawn from a patient before confirming that he is the right person. A nurse, physician, relative or guardian should identify patients that are unable to speak or identify themselves.

• Patient Preparation:

- Prior to collecting specimens for chemistry, certain patient variables need to be considered. For certain chemistry analytes, such as glucose and cholesterol, patients need to be fasting (absence of food and liquids) for at least 12 hours prior to veni-puncture. Other analytes, such as cortisol and adrenocorticotropin, have diurnal variations, where the analyte is at its highest level in the morning, and the levels gradually decrease during the course of the day.

- **Selecting the Site:**
  - Selecting the appropriate site for venipuncture can contribute to a better quality sample. The preferred site is the median cubital vein. This vein is usually the easiest to access. Generally, there is less need to probe to find the vein, which in turn should cause fewer traumas during the venipuncture. This will usually be the most comfortable for the patient. If the median cubital vein cannot be used, the next choice would be the cephalic vein. . The last vein to consider for venipuncture is the basilic vein. This vein is in close proximity to the median nerve and brachial artery, and extreme caution must be used so that only the basilic vein is being punctured.

- **Site Preparation:**
  - Prior to venipuncture, the site should be cleansed with alcohol. Cleansing starts at the center of the vein, and should continue outward in concentric circles. Before performing the venipuncture, the alcohol should be allowed to air dry. This will help to ensure that the specimen is not contaminated with alcohol, as this can lead to hemolysis. Hemolysis can result in the spurious elevation of such analytes as potassium, lactate dehydrogenase (LD), iron and magnesium in the chemistry lab. Allowing the alcohol to dry completely will also cause less burning and pain to the patient.

- **Tourniquet Application and Time:**
  - The tourniquet should be applied approximately three to four inches above the venipuncture site. The tourniquet should be on the arm no longer than one minute. A good rule of thumb to determine the one-minute tourniquet time is to remove the tourniquet when blood starts to flow into the first tube of blood being drawn. Prolonged tourniquet time can lead to an increase in various chemistry analytes, including serum protein, potassium and lactic acid due to heam concentration of blood at the puncture site.

- **Proper Venipuncture Technique:**
  - During phlebotomy, avoid probing to find the vein and achieve blood flow. Excessive probing and/or "fishing" to find a vein can result in a poor quality sample, including hemolysis. As mentioned previously, hemolysis can affect several chemistry analytes.

- **Order of Draw:**

  According to BD and CLSI (Clinical and Laboratory Standards Institute, formerly NCCLS), following is the correct order of draw during venipuncture will help to ensure accurate test results. Improper order of draw that can lead to an incorrect chemistry result is drawing an EDTA tube prior to a BD SST or heparin tube for chemistry testing. The potential cross contamination of K2 or K3EDTA on the needle from the lavender top tube to the chemistry tube can lead to an elevated potassium result. This in turn can require a recollection of the sample, or possible misdiagnosis or treatment of the patient.

- **Proper Tube Mixing:**
  - All tubes with additives need to be inverted to mix the additive evenly with the blood. Plastic serum tubes and BD SST tubes contain clot activator and should be inverted 5 times to mix the activator with the blood and help the specimen clot completely. Improper mixing of the tube after venipuncture could have contributed to the gelatinous serum sample. Other additive tubes, such as heparin, need to be inverted 8-10 times to mix the anticoagulant with the blood and prevent clotting. Be sure that tubes are not being shaken vigorously, as this can lead to a hemolyzed sample.

- **Correct Specimen Volume:**
  - All blood collection tubes need to be filled to the correct volume. This will ensure the proper amount of blood for the amount of additive in the tube (blood to additive ratio). For example, if a 5 mL draw heparin tube is only filled with 3 mL of blood, the heparin concentration is erroneously high and may potentially interfere with some chemistry analytes. Expiration dates should also be checked on the evacuated tubes. Expired tubes should not be used, as they may have a decreased vacuum, as well as potential changes in any additives in the tubes.

- **Proper Tube Handling and Specimen Processing:**
  - Once the blood collection tubes have been drawn in the correct order, to the proper fill volume and mixed thoroughly, the next step toward accurate test results is processing the tubes properly. Serum and plasma tubes would be discussed separately, as both specimen types have their own special handling requirements.

- **Serum Samples:**

  Serum specimens, namely red top tubes and BD SST gel tubes, need to clot completely prior to centrifugation and processing. Blood specimens in red top tubes should clot for 45 to 60 minutes, and those in BD SST tubes should be allowed to clot for 30 minutes to ensure complete clot formation. Blood from patients who are receiving anticoagulant therapy, such as heparin may take longer to clot. Tubes should be allowed to clot at room temperature, upright in a test tube rack, with the closures on the tubes. In the gelatinous sample, the blood does not clot completely prior to centrifugation because a cardiac patient is often heparanized. Spinning the tube too soon may result in a gelatinous and/or fibrinous serum sample that will require re-spinning.

- **Plasma Samples:**

  - Plasma specimens collected in plasma tubes, such as the plain heparinized green top tubes and the BD PST tubes with heparin and gel do not require clotting prior to centrifugation. This allows the tube of blood to be drawn, mixed and centrifuged immediately, resulting in a quicker turn-around-time for test results.

- **Centrifugation:**

  - The next step in sample processing is the centrifugation of the blood collection tubes. In a swinging bucket centrifuge (preferred type of spin for gel separation tubes), the tubes should be spun for ten minutes at a speed of 1100 to 1300 relative centrifugal force (RCF). A fifteen-minute spin at the same speed is required for spinning tubes in a fixed- angle centrifuge. Serum and plasma tubes without gel can be spun at a speed of 1000 RCF for ten minutes.

    It is important to spin gel tubes for the recommended time. The gel barrier in the tubes needs time to move and form a solid barrier between the red cells and the serum or plasma. Also, in BD PST tubes, the white blood cells and platelets that remain in the plasma need adequate time to spin out of the plasma. If the BD PST tubes are spun for less than the recommended 10 minutes, these cells and platelets may remain in the plasma and could cause interference with some chemistry analytes. It is recommended that BD SST tubes should not be re-centrifuged after their initial centrifugation. Re-spinning the tubes can result in elevated potassium values, as excess serum that has been in contact with the red cells will be expressed from underneath the gel barrier.

- **Special Handling of Blood Samples:**

  Certain chemistry analytes will require the tube of blood to be chilled after collection in order to maintain the stability of the analyte. A slurry of ice and water is recommended for chilling the tubes of blood. Examples of specimens that need to be chilled or transported on ice include adrenocorticotropic hormone (ACTH), angiotensin converting enzyme (ACE), acetone, ammonia, catecholamines, free fatty acids, lactic acid, pyruvate and rennin. Other anayltes are photo-sensitive, and need to be protected from light in order to remain stable and to ensure that the laboratory reports an accurate result. This can be done by wrapping the tube of blood in aluminum foil. The most common example of a light-sensitive analyte is bilirubin. Other chemistry analytes that need to be light-protected include beta-carotene and erythrocyte protoporphyrin.

- **Stability for Whole Blood, Serum and Plasma:**

A whole blood specimen that is going to be spun down should be centrifuged and the serum or plasma removed from the red blood cells within two hours after the venipuncture. Once the serum is removed or separated from the red blood cells (in the case of a gel barrier tube), the sample will be stable at room temperature for eight hours, and up to 48 hours at 2-4 degrees C. After 48 hours, the serum specimen should be frozen at –20 degrees C in an aliquot tube.

Paying close attention to the pre analytical variables associated with blood collection will help to ensure accurate test results in the chemistry department, as well as all areas of the clinical laboratory. As was evident, there are often several variables that can potentially contribute to erroneous test results. Therefore, it is important to remember that a better quality sample during the preanalytical phase of blood collection will yield a better test result.

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SRM ARTS AND SCIENCE COLLEGE
Department of Microbiology

Class: III B.Sc MB **Marks: 50**
Subject Name: Virology **Duration: 1 Hr**

Section A

(Answer any **FIVE** questions) (5 x 2 = 10)

CO3	BL1	1. Define Negribodies
CO2	BL2	2. Describe Oral polio vaccine
CO3	BL2	3. Explain serum Hepatitis
CO3	BL1	4. Define Dane particles
CO3	BL4	5. Differentiate neural vaccine and non neural vaccine.
CO3	BL1	6. Define street virus.
CO6	BL2	7. Describe Plaques

Section B

(Answer any **ONE** question) (1 x 5 = 5)

CO3	BL5	8. Summarize the general characters of Picorna virus.
CO3	BL6	9. Write a short notes on pathogenesis and clinical condition of rabies virus.

Section C

(Answer any **ONE** question) (1 x 10 = 10)

CO3	BL2	10. Explain in detail about Hepatitis B surface antigen.
CO3	BL4	11. Describe the structure pathogenicity and lab diagnosis of Polio virus.

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Section -A

1. Negri bodies are **cytoplasmic inclusions in neurons that are composed of rabies virus proteins and RNA**. Adelchi Negri an assistant pathologist working in the laboratory of Camillo Golgi, observed these inclusions in rabbits and dogs with rabies.

2. OPV consists of a mixture of live attenuated poliovirus strains of each of the three serotypes, selected by their ability to mimic the immune response following infection with wild polioviruses, but with a significantly reduced incidence of spreading to the central nervous system

3. **Hepatitis B is caused by a highly contagious virus that infects the liver**. In the past, hepatitis B was called serum hepatitis. Many people, especially children, have mild or no symptoms following infection with the virus. However, long-term infection can occur and may lead to liver disease, cancer or death.

4. The **double-layered mature infectious particle**, known as the Dane particle, is an icosahedral structure comprising an inner core formed from 180 or 240 copies of the HB core antigen (HBcAg) arranged with triangulation (T) numbers 3 or 4 and an outer proteolipid HB surface Ag (HBsAg) layer..

5. **Neural vaccine also called nerve tissue vaccine made from tissue of other animals Nerve and Non Neural vaccine made by growing on specific pathogen free eggs and on human diploid cell.**

6. Street virus is **rabies, which is obtained from a naturally infected animal and usually virulent** (as opposed to laboratory-attenuated strain). The rabies virus infects the central nervous system, ultimately causing disease in the brain and death.

7. A viral plaque is defined as a physical entity: "**a clear area on a lawn of bacteria or a monolayer of cells, where viruses have destroyed the cells**" or functionally; as "the progeny of one virus"

Section -B

8. There are certain characteristics according to which the picornavirus classification is performed, such as morphology, physicochemical and biologic properties, antigenic structures, genomic sequence, and mode of replication. This table lists some of those characteristics.

Property	**Enterovirus**	**Parechovirus**	**Rhinovirus**
Serotypes	68-78	1-3	>100
Acid pH at pH 3	Stable	Stable	Liable
Density	1.34	-	1.4
Optimal Growth temperature	37-degree celsius	37-degree celsius	32-degree celsius

The burden of hepatitis B infection is highest in the WHO Western Pacific Region and the WHO African Region, where 116 million and 81 million people, respectively, are chronically infected. Sixty million people are infected in the WHO Eastern Mediterranean Region, 18 million in the WHO South-East Asia Region, 14 million in the WHO European Region and 5 million in the WHO Region of the Americas.

Transmission

In highly endemic areas, hepatitis B is most commonly spread from mother to child at birth (perinatal transmission) or through horizontal transmission (exposure to infected blood), especially from an infected child to an uninfected child during the first 5 years of life. The development of chronic infection is common in infants infected from their mothers or before the age of 5 years.

Hepatitis B is also spread by needlestick injury, tattooing, piercing and exposure to infected blood and body fluids, such as saliva and menstrual, vaginal and seminal fluids. Transmission of the virus may also occur through the reuse of contaminated needles and syringes or sharp objects either in health care settings, in the community or among persons who inject drugs. Sexual transmission is more prevalent in unvaccinated persons with multiple sexual partners.

Hepatitis B infection acquired in adulthood leads to chronic hepatitis in less than 5% of cases, whereas infection in infancy and early childhood leads to chronic hepatitis in about 95% of cases. This is the basis for strengthening and prioritizing infant and childhood vaccination.

The hepatitis B virus can survive outside the body for at least 7 days. During this time, the virus can still cause infection if it enters the body of a person who is not protected by the vaccine. The incubation period of the hepatitis B virus ranges from 30 to 180 days. The virus may be detected within 30 to 60 days after infection and can persist and develop into chronic hepatitis B, especially when transmitted in infancy or childhood.

Symptoms

Most people do not experience any symptoms when newly infected. However, some people have acute illness with symptoms that last several weeks, including yellowing of the skin and eyes (jaundice), dark urine, extreme fatigue, nausea, vomiting and abdominal pain. People with acute hepatitis can develop acute liver failure, which can lead to death. Among the long-term complications of HBV infections, a subset of persons develops advanced liver diseases such as cirrhosis and hepatocellular carcinoma, which cause high morbidity and mortality.

HBV-HIV coinfection

About 1% of persons living with HBV infection (2.7 million people) are also infected with HIV. Conversely, the global prevalence of HBV infection in HIV-infected persons is 7.4%. Since 2015, WHO has recommended treatment for everyone diagnosed with HIV infection, regardless

Prevention

WHO recommends that all infants receive the hepatitis B vaccine as soon as possible after birth, preferably within 24 hours, followed by 2 or 3 doses of hepatitis B vaccine at least 4 weeks apart to complete the vaccination series. Protection lasts at least 20 years and is probably lifelong. WHO does not recommend booster vaccinations for persons who have completed the 3-dose vaccination schedule.

In addition to infant vaccination, WHO recommends the use of antiviral prophylaxis for the prevention of hepatitis B transmission from mother-to-child. Implementation of blood safety strategies and safer sex practices, including minimizing the number of partners and using barrier protective measures (condoms), also protect against transmission.

11. Characteristics of Poliovirus

1. Poliovirus is a member of a family of viruses called **Picornaviridae**. The Picornaviridae includes many other human pathogens, such as Coxsackieviruses, echoviruses, enteroviruses, hepatitis A virus, and rhinoviruses. **Poliovirus is one of the smallest viruses.**
2. Poliovirus is a small and simple virus composed of a shell, or capsid, made of protein. The poliovirus capsid is about 30 nanometers in diameter.
3. A single molecule of ribonucleic acid (RNA) is found within the capsid. This RNA carries genetic information to make new virus particles. **It has single-stranded RNA of positive polarity.** Its genome is infective. The infectious nucleic acid of poliovirus can bypass the host range specificity provided by the viral protein-cell receptor interaction. For example, intact poliovirus can grow only in human or primate cells, but purified poliovirus RNA can also enter and replicate in nonprimate cells.
4. **Polioviruses have three serotypes.** Based on the nature of surface antigens, polioviruses have three different antigenic determinants (poliovirus type 1, poliovirus type 2, and poliovirus type 3).
5. Poliovirus has a narrow range of specificity. It can enter the cells of only humans and other primates,

Pathogenesis

People acquire poliovirus infection from other humans through contact with virus-containing feces or contaminated water. The virus multiplies in the cells of the gastrointestinal tract and lymphatic tissue (tonsils/payers patches). Newly synthesized virus particles are released into the intestine and shed in the feces.

After multiplying in the gastrointestinal tract, poliovirus spreads to the regional lymph nodes and enters the bloodstream (minor / 2°viremia). It crosses the blood-brain barrier (BBB) and may enter the spinal cord and brain.

Direct neural transmission may also occur, e.g., after tonsillectomy. In the CNS, Virus multiplies selectively in the neurons and destroys the anterior horn cells of the spinal cord. The destruction of motor neurons by the virus leads to limb paralysis.

The earliest change is degeneration of Nissils bodies. When degeneration becomes irreversible, the necrotic cell lyses or is phagocytosed. Viruses don't multiply in muscle in vivo. Changes in peripheral nerves and voluntary muscles are secondary to the destruction of nerve cells.

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Department of Microbiology

Date : 31/10/2022 **Duration : 1 hr** **Class :BSc**

Subject Name & Code : Medical Bacteriology

Section A (5 x 2 = 10)

(Answer any **FIVE** questions)

CO3	BL2	1. Describe the diseases caused by Staphylococcus aureus.
CO4	BL1	2. Differentiate N. meningitidis and N. gonorrhoeae.
CO 4	BL6	3. Write the pathogenic species of Neisseria
CO3	BL4	4. Explain Toxic shock syndrome?
CO3	BL1	5. Define the principle of Coagulase test.
CO 3	BL1	6. What are viridian Streptococci?
CO 4	BL3	7. Describe the media used for cultivation of Neisseria.

Section B (1 x 5 = 5)

(Answer any ONE question)

CO3	BL4	8.Explain on MRSA.
CO3	BL6	9.Write in detail on classification of Streptococci.

Section C (1 x 10 = 10)

(Answer any ONE question)

CO3	BL1	10.Describe the pathogenesis and diagnosis of Streptococcus pyogenes.
CO4	BL4	11.Explain the pathogenesis and laboratory diagnosis of Neisseria meningitis

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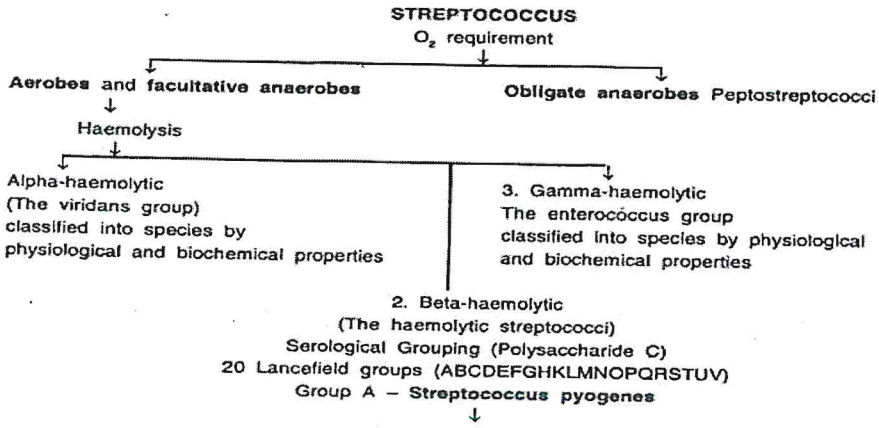
ANSWER KEY

1. It is the leading cause of skin and soft tissue infections such as abscesses (boils), furuncles, and cellulitis. Although most staph infections are not serious, S. aureus can cause serious infections such as bloodstream infections, pneumonia, or bone and joint infections.
2. N. meningitidis is a major cause of cerebrospinal meningitis, whereas N. gonorrhoeae is the agent of gonorrhoea.
3. The genus Neisseria includes many commensal species that form part of the flora of human and animal mucosa, but also includes two major pathogenic species: N. gonorrhoeae and N. meningitidis inhabits the upper respiratory tract and can cause meningococcal disease.
4. Toxic shock syndrome (TSS) is caused by either staphylococcus or streptococcus bacteria. These bacteria normally live on the skin and in the nose or mouth without causing harm, but if they get deeper into the body they can release toxins that damage tissue and stop organs working.
5. Bound coagulase (clumping factor) is bound to the bacterial cell wall and reacts directly with fibrinogen. This results in an alternation of fibrinogen so that it precipitates on the staphylococcal cell, causing the cells to clump when a bacterial suspension is mixed with plasma.
6. Viridans streptococci, a diverse group of streptococcal species, are important causes of sepsis and pneumonia in the neutropenic host and sepsis and meningitis in the neonate. The oral mucosa is the most common portal of entry.
7. Neisseria gonorrhoeae is one of the causatives of sexually transmitted diseases, and it is a fastidious organism. This organism is typically cultured using an agar medium such as chocolate agar plate.
8. Methicillin-resistant Staphylococcus aureus (MRSA) is a cause of staph infection that is difficult to treat because of resistance to some antibiotics. Staph infections—including those caused by MRSA—can spread in hospitals, other healthcare facilities, and in the community where you live, work, and go to school.
9.



10. Group A streptococci are extracellular bacterial pathogens which produce a variety of pyogenic infections involving the mucous membranes, tonsils, skin, and deeper tissues, including pharyngitis, impetigo/pyoderma, erysipelas, cellulitis, necrotizing fasciitis, toxic streptococcal syndrome, scarlet fever, septicaemia.
11. Neisseria meningitidis, a common cause of sepsis and bacterial meningitis, infects the meninges and central nervous system (CNS), primarily via paracellular traversal across the blood-brain barrier (BBB) or blood-cerebrospinal fluid barrier

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Department of Microbiology

Date : 02.11.22 **Duration :1hr** **Class :II M.Sc**

Subject Name & Code: Molecular Biology &MDT3C

Section A (5 x 1 = 5)

(Answer any **FIVE** questions)

CO2	BL1	1. Define: replicons.
CO3	BL1	2. Define transcription.
CO 6	BL4	3. Differentiate prokaryotic and eukaryotic replication.
CO3	BL1	4.Define : Rho protein
CO4	BL1	5. Define : palindrome sequence.
CO 3	BL1	6.Define : Okazaki fragment.
CO 3	BL6	7. Describe Spliceosome

Section B (2 x 5 = 10)

(Answer any **TWO** questions)

CO2	BL6	8. Describe in detail about DNA replication
CO3	BL6	9. Write a short note on RNA editing.
CO3	BL3	10. Explain the formation of initiation complex in protein synthesis.
CO3	BL3	11. Explain how does rho independent termination occur in transcription?

Section C (1 x 10 = 10)

(Answer any **ONE** question)

CO3	BL6	12. Describe the steps of mRNA synthesis in prokaryotes.
CO1	BL3	13. Explain how leading strand synthesis is different from lagging strand synthesis - Justify.

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1) A replicon is **the entire region of DNA that is independently replicated from a single origin of replication**. A bacterial chromosome contains a single origin, and therefore the whole bacterial chromosome is a replicon.

2) Listen to pronunciation. (tran-SKRIP-shun) In biology, **the process by which a cell makes an RNA copy of a piece of DNA**. This RNA copy, called messenger RNA (mRNA), carries the genetic information needed to make proteins in a cell.

3) **Prokaryotic Replication vs Eukaryotic Replication**

Following are the important difference between prokaryotic and eukaryotic replication:

Prokaryotic Replication	**Eukaryotic Replication**
This process occurs in prokaryotic cells.	This process occurs in eukaryotic cells.
It is a continuous process.	This process occurs in the S-phase of cell cycle.
Circular, double-stranded DNA	Linear, double-stranded DNA with end
The DNA replicates in the cytoplasm	The DNA replicates in the nucleus
Single origin of replication	Multiple origins of replication
Small amount of DNA	The DNA is 50 times more than prokaryotic DNA
DNA polymerase I and III are involved	DNA polymerase α, δ and ε are involved.
Large okazaki fragments	Small okazaki fragments
The process is rapid, 2000 base	The process is slow, 100 base

This process takes us from one starting molecule to two "daughter" molecules, with each newly formed double helix containing one new and one old strand.

DNA double helix.
Hydrogen bonds break and helix opens.
Each strand of DNA acts as a template for synthesis of a new, complementary strand.
Replication produces two identical DNA double helices, each with one new and one old strand.
In a sense, that's all there is to DNA replication! But what's actually most interesting about this process is how it's carried out in a cell.

Cells need to copy their DNA very quickly, and with very few errors (or risk problems such as cancer). To do so, they use a variety of enzymes and proteins, which work together to make sure DNA replication is performed smoothly and accurately.

DNA polymerase

One of the key molecules in DNA replication is the enzyme **DNA polymerase**. DNA polymerases are responsible for synthesizing DNA: they add nucleotides one by one to the growing DNA chain, incorporating only those that are complementary to the template.

Here are some key features of DNA polymerases:

- They always need a template
- They can only add nucleotides to the 3' end of a DNA strand
- They can't start making a DNA chain from scratch, but require a pre-existing chain or short stretch of nucleotides called a **primer**
- They **proofread**, or check their work, removing the vast majority of "wrong" nucleotides that are accidentally added to the chain

The addition of nucleotides requires energy. This energy comes from the nucleotides themselves, which have three phosphates attached to them (much like the energy-carrying molecule ATP). When the bond between phosphates is broken,

Bacterial chromosome. The double-stranded DNA of the circular bacteria chromosome is opened at the origin of replication, forming a replication bubble. Each end of the bubble is a replication fork, a Y-shaped junction where double-stranded DNA is separated into two single strands. New DNA complementary to each single strand is synthesized at each replication fork. The two forks move in opposite directions around the circumference of the bacterial chromosome, creating a larger and larger replication bubble that grows at both ends.

How does replication actually get going at the forks? **Helicase** is the first replication enzyme to load on at the origin of replication^3cubed. Helicase's job is to move the replication forks forward by "unwinding" the DNA (breaking the hydrogen bonds between the nitrogenous base pairs).

Proteins called **single-strand binding proteins** coat the separated strands of DNA near the replication fork, keeping them from coming back together into a double helix.

Primers and primase

DNA polymerases can only add nucleotides to the 3' end of an existing DNA strand. (They use the free -OH group found at the 3' end as a "hook," adding a nucleotide to this group in the polymerization reaction.) How, then, does DNA polymerase add the first nucleotide at a new replication fork?

Alone, it can't! The problem is solved with the help of an enzyme called **primase**. Primase makes an RNA **primer**, or short stretch of nucleic acid complementary to the template, that provides a 3' end for DNA polymerase to work on. A typical primer is about five to ten nucleotides long. The primer *primes* DNA synthesis, i.e., gets it started.

Once the RNA primer is in place, DNA polymerase "extends" it, adding nucleotides one by one to make a new DNA strand that's complementary to the template strand.

Topoisomerase also plays an important maintenance role during DNA replication. This enzyme prevents the DNA double helix ahead of the replication fork from getting too tightly wound as the DNA is opened up. It acts by making temporary nicks in the helix to release the tension, then sealing the nicks to avoid permanent damage.

Finally, there is a little cleanup work to do if we want DNA that doesn't contain any RNA or gaps. The RNA primers are removed and replaced by DNA through the activity of **DNA polymerase I**, the other polymerase involved in replication. The nicks that remain after the primers are replaced get sealed by the enzyme **DNA ligase**.

Summary of DNA replication in *E. coli*

Let's zoom out and see how the enzymes and proteins involved in replication work together to synthesize new DNA.

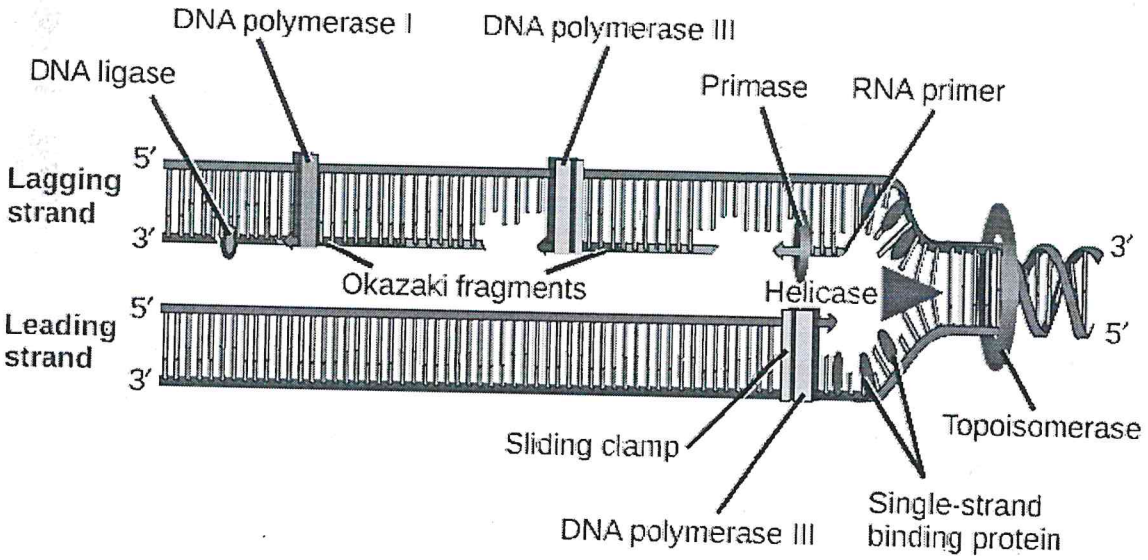

Illustration shows the replication fork. Helicase unwinds the helix, and single-strand binding proteins prevent the helix from re-forming. Topoisomerase prevents the DNA from getting too tightly coiled ahead of the replication fork. DNA primase forms an RNA primer, and DNA polymerase extends the DNA strand from the RNA primer. DNA synthesis occurs only in the 5' to 3' direction. On the leading strand, DNA synthesis occurs continuously. On the lagging strand, DNA synthesis restarts many times as the helix unwinds, resulting in many short

apparatus is now a complex machinery comprising at least eleven factors. This complexity provides a fertile ground for enhanced regulation, and many new mechanisms have been adopted by eukaryotes to control proteins synthesis. Indeed, many translation factors are phosphoproteins whose function can be regulated by extracellular signals. We will describe here the mechanism of translation initiation in eukaryotes, with a particular emphasis on translation factors and their function.

11) An mRNA sequence is created as RNA polymerase advances. Prokaryotic transcription is terminated using a second method called Rho-independent termination. A terminator region usually has an inverted repetitive pattern. An Adenine-rich region (AAAA) follows the inverted repeat sequence immediately.

Because the two areas in the inverted repeat sequence region complement one another, hydrogen bonding enables it to generate a hairpin loop structure. The hairpin structure stops the RNA polymerase activity. The U-rich region will follow next.

Moreover, weak interactions exist between the U bases of the transcript and the A bases of the template in the U-rich regions. The weak Adenine-Uracil interactions separate the RNA transcript and DNA template, destabilising them. Eventually, the transcript breaks out from the transcription location.

12) The nucleotide pair in the DNA double helix that corresponds to the site from which the first 5′ mRNA nucleotide is transcribed is called the +1 site, or the initiation site. Nucleotides preceding the initiation site are given negative numbers and are designated upstream. Conversely, nucleotides following the initiation site are denoted with "+" numbering and are called downstream nucleotides.

A promoter is a DNA sequence onto which the transcription machinery binds and initiates transcription. In most cases, promoters exist upstream of the genes they regulate. The specific sequence of a promoter is very important because it determines whether the corresponding gene is transcribed all the time, some of the time, or infrequently. Although promoters vary among prokaryotic genomes, a few elements are conserved. At the -10 and -35 regions upstream of the initiation site, there are two promoter consensus sequences, or regions that are similar across all promoters and across various bacterial species. The -10 consensus sequence, called the -10 region, is TATAAT. The -35 sequence, TTGACA, is recognized and bound by σ. Once this interaction is made, the subunits of the core enzyme bind to the site. The A–T-rich -10 region facilitates unwinding of the DNA template; several phosphodiester bonds are made. The transcription initiation phase ends with the production of abortive transcripts, which are polymers of approximately 10 nucleotides that are made and released.

Studies in the T7 phage system indicate lagging strand synthesis exacts a cost on the rate of replisome progression because primer synthesis by primase acts as a molecular brake that slows the replisome (16). However, other studies in the T4 and T7 phage systems contradict these findings (17,18). Reports in the *Escherichia coli* system also contradict one another; one report indicates that the processivity of the replisome is lowered by lagging strand events while another report concludes that it is enhanced by the lagging strand (19,20).

The current report combines single-molecule techniques and ensemble assays to study individual steps in lagging strand synthesis and their effect on the rate and processivity of the *E. coli* replisome. The *E. coli* replisome contains a helicase (the DnaB homohexamer) tightly associated with the replicative polymerase, DNA polymerase III (Pol III) holoenzyme, along with DnaG primase that transiently interacts with DnaB helicase for each priming event (2–4,21,22). The *E. coli* Pol III holoenzyme contains three Pol III cores and a single clamp loader that loads β clamps onto DNA for each polymerase (23–26). The leading strand only requires one Pol III-β clamp, while the lagging strand has multiple primed sites and utilizes the remaining two Pol III-β, as demonstrated both *in vitro* and *in vivo* (23–26).

This report demonstrates that primase action indeed lowers the processivity of the replisome, but only when lagging strand synthesis is inoperative. Okazaki fragment extension masks the negative effect of primase and significantly enhances replisome processivity. The greater processivity of the coupled leading/lagging strand replisome is based in the extra grip provided by additional polymerase-β clamp complexes engaged on the lagging strand. Our previous study showed that rNTPs decrease replisome speed by competing with dNTPs at the polymerase active site (27). Here we examine the effect on replisome processivity of adenosine triphosphate (ATP), the most prevalent rNTP in cells, needed for helicase, primase and clamp loading. We find that use of intracellular concentrations of ATP decreases replisome processivity as well as the rate of synthesis. Interestingly SSB, which binds the lagging strand, enhances leading strand replication in a species-specific fashion. This effect is based in contact of SSB with the χ subunit of the clamp loader within Pol III holoenzyme. Interestingly, visualization of fluorescent SSB during replication suggests that many copies of SSB accumulate at the fork. These SSB complexes appear to harbor extensive amounts of ssDNA, and may correspond to electron microscopy (EM) studies in the T7 phage system by the Griffith and Richardson groups that reveal large ssDNA-gp2.5 protein (i.e. T7 SSB) 'bobbins' at the replication fork (28). Pol III holoenzyme is faster on SSB coated ssDNA compared to the rate of leading strand synthesis, consistent with *in vivo* observations, and with biochemical reports in phage

SRM ARTS AND SCIENCE COLLEGE
Department of Microbiology

Date : **Duration :1hr** **Class :I Bsc**

Subject Name & Code : General microbiology& Microbial physiology

Section A (5 x 2 = 10)

(Answer any **FIVE** questions)

CO2	BL1	1. Define Acid fast staining
CO2	BL1	2. State Objective lenses
CO2	BL2	3.Describe Negative staining
CO3	BL1	4.Define Enrichment culture technique
CO3	BL1	5.State Differential media
CO1	BL1	6. Define Heterotroph.
CO1	BL6	7. Write about the arrangement of bacterial flagella

Section B (1 x 5 = 5)

(Answer any **ONE** question)

CO2	BL2	8.Describe the fluorescence microscopy and its uses.
CO3	BL3	9. Illustrate streak plate and pour plate methods of bacterial culturing

Section C (1 x 10 = 10)

(Answer any **ONE** question)

CO1	BL3	10. Give an account of ten important differences between prokaryotes and eukaryotes
CO2	BL2	11. Differentiate SEM and TEM

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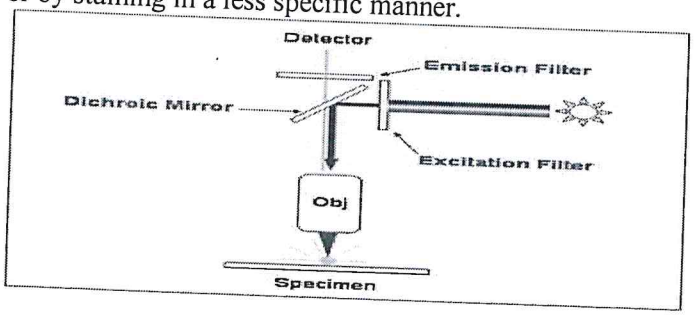
Department of Microbiology

Date : **Duration :1hr** **Class :I Bsc**
Subject Name & Code : General microbiology& Microbial physiology
Section A

1. The acid-fast stain is a laboratory test that determines if a sample of tissue, blood, or other body substance is infected with the bacteria that causes tuberculosis (TB) and other illnesses.
2. Objective lenses are the lenses that directly observe the object the microscope user is examining. In stationary microscopes, the objective lens then focuses reflected light from the object up a tube toward the ocular lens, which is the lens the user looks through.
3. The main purpose of Negative staining is to study the morphological shape, size and arrangement of the bacteria cells that is difficult to stain. eg: *Spirilla.* It can also be used to stain cells that are too delicate to be heat-fixed.
4. Enrichment culture is the use of certain growth media to favor the growth of a particular microorganism over others, enriching a sample for the microorganism of interest. Enrichment cultures are used to increase a small number of desired organisms to detectable levels.
5. Differential media contain compounds that allow groups of microorganisms to be visually distinguished by the appearance of the colony or the surrounding media, usually on the basis of some biochemical difference between the two groups.
6. A heterotroph is an organism that eats other plants or animals for energy and nutrients. The term stems from the Greek words hetero for "other" and trophe for "nourishment."
7. Based on their arrangement, bacteria are classified into four groups: monotrichous (having one flagellum), amphitrichous (single flagellum at both ends), lophotrichous (numerous flagella as a tuft), and peritrichous (flagella distributed all over the cell except at the poles)

Section B

8. Fluorescent microscopy is often used to image specific features of small specimens such as microbes. It is also used to visually enhance 3-D features at small scales. This can be accomplished by attaching fluorescent tags to anti-bodies that in turn attach to targeted features, or by staining in a less specific manner.



Applications:

The refinement of epi-fluorescent microscopes and advent of more powerful focused light sources, such as lasers, has led to more technically advanced scopes such as the confocal laser scanning microscopes and total internal reflection fluorescence microscopes (TIRF).

CLSM's are invaluable tools for producing high resolution 3-D images of subsurfaces in specimens such as microbes. Their advantage is that they are able to produce sharp images of thick samples at various

depths by taking images point by point and reconstructing them with a computer rather than viewing whole images through an eyepiece.

These microscopes are often used for -

- Imaging structural components of small specimens, such as cells
- Conducting viability studies on cell populations (are they alive or dead?)
- Imaging the genetic material within a cell (DNA and RNA)
- Viewing specific cells within a larger population with techniques such as FISH

9. Streak Plate Method Principle

The streak plate method is based on the principle of dilution. It can be described as a rapid qualitative isolation technique. The main criterion of isolation is to obtain a reduced number of colonies. In this technique, a loopful of culture is spread on an agar plate to get individual cells far apart enough from each other. The streaking method gradually dilutes the inoculum such that the bacterial cells can be counted as colony forming units (CFUs).

Types of Streak Plate Method

1. **Quadrant Streaking:** This is the most common method of streaking, where the petri dish is divided into four quadrants and then inoculated. It is also known as a four-quadrant streak. A loopful of inoculum is taken and streaked such that the first quadrant contains the highest concentration of the inoculum, followed by the second quadrant, third quadrant, and fourth quadrant.

This is a discontinuous method where the loop is sterilised after streaking in every quadrant. By the time the fourth quadrant is streaked, the inoculum is diluted enough to give rise to individual colonies.

1. **T-Streaking:** In this method, the petri dish is divided into three quadrants by drawing the letter 'T'. Similar to four-quadrant streaking, it is a discontinuous method where each quadrant is streaked after loop sterilisation, and the quadrant that is streaked last gives isolated colonies.
2. **Continuous Streaking:** In this type of streaking, the inoculum is spread from one edge to the centre of the plate. The plate is rotated 180°, and the remaining portion is streaked without sterilising the loop.

Another form of continuous streaking is used for diagnostic purposes. The petri dish is divided into sections, and different cultures, such as urine, sputum, pus, etc., are streaked in each section to get maximum output.

1. **Radiant Streaking:** In this streaking method, the inoculum is spread on one edge of the petri dish. From the edge, vertical lines are streaked in the upward direction. Next, the vertical lines are streaked horizontally to obtain pure isolated cultures.
2. The pour plate method is a plating technique that is commonly used for obligate and anaerobic bacteria. This technique is used to isolate microbial colonies by serial dilution and then counting the colony forming units (CFUs). In this method, the liquid sample is poured into the petri dish before the solidification of the agar medium. After solidification, colonies grow both inside and on the surface of the medium. However, the colonies growing inside the medium are confluent; those on the surface are used for viable counting.

10.

Prokaryotes	Eukaryotes	
Type of Cell	Always unicellular	Unicellular and multi-cellular
Cell size	Ranges in size from 0.2 μm – 2.0 μm in diameter	Size ranges from 10 μm – 100 μm in diameter
Cell wall	Usually present; chemically complex in nature	When present, chemically simple in nature
Nucleus	Absent. Instead, they have a nucleoid region in the cell	Present
Ribosomes	Present. Smaller in size and spherical in shape	Present. Comparatively larger in size and linear in shape
DNA arrangement	Circular	Linear
Mitochondria	Absent	Present
Cytoplasm	Present, but cell organelles absent	Present, cell organelles present
Endoplasmic reticulum	Absent	Present
Plasmids	Present	Very rarely found in eukaryotes
Ribosome	Small ribosomes	Large ribosomes
Lysosome	Lysosomes and centrosomes are absent	Lysosomes and centrosomes are present
Cell division	Through binary fission	Through mitosis
Flagella	The flagella are smaller in size	The flagella are larger in size
Reproduction	Asexual	Both asexual and sexual
Example	Bacteria and Archaea	Plant and Animal cell

11.Difference between SEM and TEM

SEM	TEM
SEM is based on scattered electrons	TEM is based on transmitted electrons.
SEM focuses on the surface and composition of the sample. As a result SEM simply reveals the morphology of materials.	TEM offers information on the internal composition. As a result, TEM can reveal various sample properties such as morphology, crystallisation, stress, and even magnetic domains.
The sample in SEM does not require to be sliced thin.	The sample in TEM must be sliced thinner
SEM can analyse a big amount of samples at once.	TEM can only analyse a limited amount of samples at a time.
Surfaces, powders, polished and etched microstructures, IC chips, and chemical segregation are all imaged with SEM.	TEM is used to image dislocations, small precipitates, grain boundaries, and other defect structures in solids.
SEM images are displayed on monitors; SEM also gives a 3-dimensional image, whilst TEM displays a 2-dimensional image.	TEM images are displayed on fluorescent screens
SEM has 0.5 to 4nm resolution.	The resolution of TEM is significantly higher than that of SEM. Its resolution is 0.1 to 0.3nm.

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CRITERION I

CONTINUOUS INTERNAL EVALUATION (CIE)

1. TIME TABLE
2. SEATING ARRANGEMENT
3. INVIGILATION SCHEDULE
4. QUESTION PAPER WITH ANSWER KEY

2022-2023 - ODD SEM

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DEPARTMENT OF COMPUTER SCIENCE - CIRCULAR

UNIT TEST-I EXAM SCHEDULE – SEPTEMBER, 2022 TIME: 12.00 NOON to 01.00 PM

II M.SC COMPUTER SCIENCE

Principles of Compiler Design	12.09.2022	PSD3A
Information Security	13.09.2022	PSD3B
Artificial Intelligence	14.09.2022	PSD3C
Elective-II: Big Data Analysis	15.09.2022	PSDED
Elective-III: Cloud Computing	16.09.2022	PSDEJ

II B.SC COMPUTER SCIENCE

Language (T/H/F)	12.09.2022	LA13A
English	13.09.2022	LZ13B
Java& Data Structure	14.09.2022	SE23A
Statistics I	15.09.2022	SP3AA
Core Practical-IV - Data Structures Using Java	16.09.2022	SE231

III B.SC COMPUTER SCIENCE

Computer Network	12.09.2022
Operating System	13.09.2022
Relational Database Management System	14.09.2022
Artificial Intelligence And Expert System	15.09.2022
Core Practical-V - Operating System Lab	16.09.2022
Core Practical-Vi - Pl/Sql Lab	19.09.2022

11/9/22

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SEATING ARRANGEMENT
ODD SEM - UNIT TEST - I EXAMINATIONS, SEPTEMBER 2022

DATE: 12.09.2022-13.09.2022 & 16.09.2022 TIME: 12.00 PM- 1.00 PM

01	UCS200571 - UCS200587 222106448 - 222106470 832100424 - 832100431	III B.SC(CS) II BATCH II B.SC(CS) II BATCH II M.SC(CS)	17 16 8	JAMES GOSLING LAB – I (MBA BLOCK)
02	UCS200588 - UCS200606 832100402 - 832100423	III B.SC(CS) II BATCH II M.SC(CS)	18 22	RASMUS LERDORF LAB – II (MBA BLOCK

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SEATING ARRANGEMENT
ODD SEM - UNIT TEST - I EXAMINATIONS, SEPTEMBER 2022

DATE: 15.09.2022 TIME: 12.00 PM- 1.00 PM

S.NO	ROLL NO / REGISTER NO	CLASS	STRENGTH	HALL NO
01	UCS200571 - UCS200587	III B.SC(CS) II BATCH	17	JAMES GOSLING LAB – I (MBA BLOCK)
	222106448 - 222106470	II B.SC(CS) II BATCH	16	
	832100424 - 832100431	II M.SC(CS)	8	
02	UCS200588 - UCS200606	III B.SC(CS) II BATCH	18	103 (MAIN BLOCK)
	832100402 - 832100423	II M.SC(CS)	22	

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SEATING ARRANGEMENT
ODD SEM - UNIT TEST - I EXAMINATIONS, SEPTEMBER 2022

DATE: 14.09.2022 TIME: 12.00 PM- 1.00 PM

S.NO	ROLL NO / REGISTER NO	CLASS	STRENGTH	HALL NO
01	UCS200571 - UCS200587 222106448 - 222106470 832100424 - 832100431	III B.SC(CS) II BATCH II B.SC(CS) II BATCH II M.SC(CS)	17 16 8	102 (MAIN BLOCK)
02	UCS200588 - UCS200606 832100402 - 832100423	III B.SC(CS) II BATCH II M.SC(CS)	18 22	RASMUS LERDORF LAB – II (MBA BLOCK

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I UNIT TEST – INVIGILATION DUTY SCHEDULE (ODD SEM – SEPTEMBER 2022)

CLASS ROOM	12/09/22	Staff sign	13/09/22	Staff sign	14/09/22	Staff sign	15/09/22	Staff sign	16/09/22	Staff sign
302 (MBA BLOCK)	RM		VS		VSH		VS		KN	
303 (MBA BLOCK)	MS		RM		TAM		DRJ		TAM	
304 (MBA BLOCK)	VS		MAT		TAM		TAM		TAM	
202 (MBA BLOCK)	TP		MAT		DB		TAM		VS	
LAB – I (MBA BLOCK)	DB		VSH		VPN		MS		DRJ	
RASMUS LERDORF LAB – II (MBA BLOCK)	KN		TP		MS		KN		VPN	

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SRM ARTS AND SCIENCE COLLEGE
I UNIT TEST – SEP 2022
Department of Computer Science

Date : 28.09.22 **Duration : 1 hour** **Class : I BSc CS(Batch I)**

Subject Name & Code : Problem Solving using Python & SE21A

Section A
(5 x 2 = 10)

(Answer any **FIVE** questions)

CO1	BL1	1. Define Interpreter.
CO6	BL2	2. Demonstrate format( ) function in Python.
CO2	BL4	3. Explain keywords in Python.
CO2	BL6	4. Write about Python standard library.
CO3	BL3	5. Illustrate simple if control structure with example.
CO5	BL2	6. Compare definite and infinite loops.
CO3	BL1	7. Define expression in python.

Section B
(1 x 5 = 5)

(Answer any **ONE** question)

CO3	BL2	8. Explain the use of numeric and string literal values.
CO4	BL6	9. Write Python program to find the biggest among two numbers.

Section C
(1 x 10 = 10)

(Answer any **ONE** question)

CO3	BL2	10.Explain python data types with example.
CO5	BL5	11. Summarize about the loop control statements in Python.

26/9/22

27/9/22

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DEPARTMENT OF COMPUTER SCIENCE - I UNIT TEST, SEP 2022

CLASS: I BSc CS (Batch I) TIME : 1 Hour

SUB: *Problem Solving using Python & SE21A* Max : 25 Marks

ANSWER KEY

PART A – (5 X 2 = 10 Marks)
Answer any FIVE questions

1. **Define Interpreter**.
   An interpreter is a kind of program that executes other programs. When we write Python programs, it converts source code written by the developer into intermediate language which is again translated into the native language / machine language that is executed.
2. **Demonstrate format( ) function in Python**
   The format() method returns a formatted representation of the given value controlled by the format specifier.

```
value = 45

# format the integer to binary
binary_value = format(value, 'b')
print(binary_value)

# Output: 101101
```

3. **Explain keywords in python**

   Python keywords are special reserved words that have specific meanings and purposes and can't be used for anything but those specific purposes. List the things to solve a problem computationally.
4. **Write about Python standard library.**

   Python standard library. The Python Standard Library **contains the exact syntax, semantics, and tokens of Python**. It contains built-in modules that provide access to basic system functionality like I/O and some other core modules. Most of the Python Libraries are written in the C programming language.
5. **Illustrate simple if control structure with example.**

```
num = 3
if num > 0:
    print(num, "is a positive number.")
print("This is always printed.")

num = -1
if num > 0:
    print(num, "is a positive number.")
print("This is also always printed.")
```

3. All the statements indented by the same number of character spaces after a programming construct are considered to be part of a single block of code. Python uses indentation as its method of grouping statements.

for in Loop: For loops are used for sequential traversal. For example: traversing a list or string or array etc. In Python, there is no C style for loop, i.e., for (i=0; i<n; i++). There is "for in" loop which is similar to for each loop in other languages. Let us learn how to use for in loop for sequential traversals.

Syntax:

for iterator_var in sequence:

    statements(s)

It can be used to iterate over a range and iterators.

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SRM ARTS AND SCIENCE COLLEGE
I UNIT TEST – SEP 2022
Department of Computer Science

Date : 28.09.22 **Duration : 1 hour** **Class : I BSc CS(Batch II)**

Subject Name & Code : Problem Solving using Python & SE21A

Section A (5 x 2 = 10)
(Answer any **FIVE** questions)

CO1	BL2	1. What is an algorithm?
CO1	BL1	2. Define Variable and Constant.
CO1	BL2	3. What is token in python?
CO2	BL1	4. List the things to solve a problem computationally.
CO3	BL2	5. Differentiate between List and Tuples in python?
CO1	BL2	6. What is meant by software? What are its types?
CO3	BL1	7. Define Expression in python.

Section B (1 x 5 = 5)
(Answer any **ONE** question)

CO3	BL2	8. Explain any five operators in python with example.
CO1	BL2	9. Explain briefly the fundamental hardware components.

Section C (1 x 10 = 10)
(Answer any **ONE** question)

CO3	BL2	10.Explain python data types with example.
CO2	BL4	11. Explain the steps in the process of computational problem solving.

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Python Set is the unordered collection of the data type. It is iterable, mutable(can modify after creation), and has unique elements. In set, the order of the elements is undefined; it may return the changed sequence of the element. The set is created by using a built-in function **set(),** or a sequence of elements is passed in the curly braces and separated by the comma.

11. Explain the steps in the process of computational problem solving.

Throughout these lessons we will advocate a five-step approach to solving computational problems. Below, we outline the approach and relate it to the problem at hand.

1. **Problem.** We begin with a clear statement of the problem. Ours is to calculate the number of square feet of the earth's surface that every human would receive if the surface were divided up evenly.
2. **Model.** Before we can employ a computer we must find a mathematical model for the problem. We will model the earth as a perfect sphere of radius 4000 miles and the earth's population as 5.5 billion people. As is almost always the case, we are making some significant simplifications in moving from the problem to the model.
3. **Method.** Once a problem can be described in mathematical terms, we must settle upon a method for solving it on a computer. This requires knowing what a computer can and cannot do. Our method here is quite simple: we will use the formula for the surface area of a sphere to calculate the earth's area, and then divide by the earth's population.
4. **Implementation.** Once we have a method, we need to carry it out with a computer, whether human or silicon. The method that we have just devised could be carried out with pencil and paper, by punching buttons on a pocket calculator, or by writing and running a C program on a supercomputer, to give just three examples. We will use Maple to carry out the computations, primarily because we want you to start learning how to use it.
5. **Assessment.** The assessment step is usually the most important. We must think carefully about the answers that we obtain to see if they make sense, and try to identify the places where errors or unwarranted assumptions crept into our solution. We might have made mistakes in describing the problem, coming up with a model, designing a computational approach, and/or implementing that approach. As we identify errors, we must try to fix the problems and come up with an improved solution using the revised approach.

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SRM ARTS AND SCIENCE COLLEGE
I - UNIT TEST, SEPTEMBER 2022

Department of Computer Science

Date : 14/09/22 **Duration : 1 Hour** **Class :II B.Sc CS**

Subject Name & Code : Java with Datastructures & SE23A

Section A (5 x 2 = 10)

(Answer any **FIVE** questions)

CO1	BL1	1. Identify the importance of Java.
CO3	BL1	2.List the Operations of Stack.
CO 5	BL2	3. Differentiate Classes and Objects?
CO2	BL1	4.Define Abstract Data Types(ADTs)
CO2	BL4	5. Categories the type of Data Structures.
CO5	BL1	6. Define Array.
CO2	BL2	7. Discuss Packages in Java.

Section B (1 x 5 = 5)

(Answer any **ONE** question)

CO2	BL2	8. Explain Asymptotic Notation in Data Structures.
CO1	BL2	9. Summarize Operators in java.

Section C (1 x 10 = 10)

(Answer any **ONE** question)

CO5	BL2	10. Describe Object Oriented Programming Concepts in Java.
CO4	BL2	11. Demonstrate Arithmetic Expression in Data structures.

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SRM ARTS AND SCIENCE COLLEGE
Department of Computer Science

Date : 14/09/22 **Duration : 1 Hour** **Class :II B.Sc**

Subject Name & Code :SE23A, Java with Datastructures

Section A (5 x 2 = 10)
(Answer any **FIVE** questions)

CO1 BL1 1. Identify the importance of Java.

One of the most significant advantages of Java is its ability to move easily from one computer system to another. The ability to run the same program on many different systems is crucial to World Wide Web software, and Java succeeds at this by being platform-independent at both the source and binary levels

CO3 BL1 2.List the Operations of Stack.

- Push: Add an element to the top of a stack.
- Pop: Remove an element from the top of a stack.
- IsEmpty: Check if the stack is empty.
- IsFull: Check if the stack is full.
- Peek: Get the value of the top element without removing it.

CO 5 BL2 3. Differentiate Classes and Objects?

A class is a template used for the creation of objects. An object is an instance of a class. While a class is a logical entity, an object is a physical entity. Each object has a state in which all the member variables have specific values. A class can be used to create many objects.

CO2 BL1 4.Define Abstract Data Types(ADTs)

- ADT stands for Abstract Data Type.
- An abstract data type is special kind of data type, whose behavior is defined by a set of values and set of operations.

CO2 BL4 5. Categories the type of Data Structures.

There are two types of data structures:

- Primitive data structure
- Non-primitive data structure

Primitive Data structure : The primitive data structures are primitive data types. The int, char, float, double, and pointer are the primitive data structures that can hold a single value.

Non-Primitive Data structure : The non-primitive data structure is divided into two types:

- **Linear data structure**: Data structure in which data elements are arranged sequentially or linearly, where each element is attached to its previous and next adjacent elements, is called a linear data structure. *Examples of linear data structures are array, stack, queue, linked list, etc.*
- **Non-linear data structure** : Data structures where data elements are not placed sequentially or linearly are called non-linear data structures. In a non-linear data structure, we can't traverse all the elements in a single run only. *Examples of non-linear data structures are trees and graphs.*

CO5 BL1 6. Define Array.

Arrays are defined as the collection of similar types of data items stored at contiguous memory locations.

CO2 BL2 7. Discuss Packages in Java.

❖ **A package is a group of related classes and interfaces**. The grouping is usually done according to functionality. In fact, packages act as "containers" for classes.

❖ Java classes can be grouped together in *packages*. A package name is the same as the directory (folder) name which contains the .java files.

Section B (1 x 5 = 5)

(Answer any **ONE** question)

CO2 BL2 8. Explain Asymptotic Notation in Data Structures.

❖ There are three **types of analysis** that we perform on a particular algorithm.

- **Best Case** – Minimum time required for program execution.
- **Average Case** – Average time required for program execution.
- **Worst Case** – Maximum time required for program execution.

❖ Asymptotic Notations are the expressions that are used to represent the complexity of an algorithm.

❖ There are mainly three types of asymptotic notations:

- Big-O Notation
- Omega Notation
- Theta Notation

i) Big-O Notation (O)

- The Big-O Notation is used to express the upper bound of an algorithm's running time.
- It measures the worst case time complexity of an algorithm.

  f(n) = O(g(n))

  Here, f(n) and g(n) are the two functions defined for positive integers.

ii) Omega Notation (Ω)

- The Omega Notation is used to express the lower bound of an algorithm's running time.
- It measures the best case time complexity of an algorithm.

  f(n) = Ω (g(n))

  Here, f(n) and g(n) are the two functions defined for positive integers.

i) Theta Notation (Θ)

- The Theta Notation is used to express both the lower bound and the upper bound of an algorithm's running time.
- It measures thee average case time complexity of an algorithm.

  f(n)= θg(n)

  Here, f(n) and g(n) are the two functions defined for positive integers.

CO1 BL2 9. Summarize Operators in java.

- *Operators* are used to perform operations on variables and values.
- Java provides a rich set of operators to manipulate variables.
- Java Operators can be classified into a number of related categories as below:

- Arithmetic Operators
- Relational Operators
- Logical Operators
- Assignment Operators
- Conditional Operators
- Bitwise Operators
- Special Operators

Arithmetic Operators

- **Arithmetic Operators are used to perform common mathematical operations.**
- The following table lists the Arithmetic Operators:

Operator	Meaning
+	Addition or Unary Plus

-	Subtraction or Unary Minus
*	Multiplication
/	Division
%	Modulus
++	Increment
--	Decrement

Relational Operators

- **Relational Operators in Java are used to compare two or more objects.**
- Java supports **six** relational operators.
- The following table lists the relational operators:

Operator	Meaning
==	Equal to
!=	Not Equal to
>	Greater than
<	Less than
>=	Greater than or equal to
<=	Less than or equal to

Logical Operators

- Logical Operators return a true or false value based on the state of the variables.
- Java has three Logical or Boolean Operators.
- The following table lists the logical operators:

Operator	Meaning
&&	Logical AND
||	Logical OR
!	Logical NOT

Assignment Operators

- **Assignment Operators are used to assign values to variables.**
- The simplest assignment operator is =.
- In addition, Java has a set of 'shorthand' assignment operators which are used in the form

  v op= exp;

  where v is a variable, exp is an expression and op is a Java binary operator. The operator

op= is known as the shorthand assignment operator.

Operator	Meaning
=	Simple assignment operator
+=	Add AND assignment operator
-=	Subtract AND assignment operator
*=	Multiply AND assignment operator
/=	Divide AND assignment operator
%=	Modulus and assignment operator

The Conditional Operator

- **Conditional Operator is also known as the ternary operator.**
- The character pair ? : is a ternary operator available in Java. This operator consists of three operands and is used to evaluate Boolean expressions.
- This operator is used to evaluate conditional expression of the form

  expression1 ? expression2 : expression3

  Here, expression1 can be any expression that evaluates to a **boolean** value. If expression1 is true, then expression2 is evaluated; otherwise, expression3 is evaluated. Both expression2 and expression3 are required to return the same type, which can't be void.

Example:

```
a=10;
b=15;
x=(a>b)?a:b;
```

In this example, x will be assigned the value of b.

Bitwise Operators

- Java defines several *bitwise operators* that can be applied to the integer types: **long, int, short, char,** and **byte.**
- These operators act upon the individual bits of their operands.
- The following table lists the bitwise operators:

Operator	Meaning
&	Bitwise AND
|	Bitwise OR
^	Bitwise exclusive OR
~	One's complement

<<	Shift left
>>	Shift right
>>>	Shift right with zero fill
&=	Bitwise AND assignment
!=	Bitwise OR assignment
^=	Bitwise exclusive OR assignment
<<=	Shift left assignment
>>=	Shift right assignment
>>>=	Shift right with zero fill assignment

Special Operators

- Java supports some special operators of interest such as instanceof operator and member selection operator (.).

instanceOf Operator

- The **instanceOf** is an object reference operator and return true if the object on the left-hand side is an instance of the class given on the right-hand side.
- This operator allows us to determine whether the object belongs to a particular class or not.
- The instanceOf operator is written as:

  (Object reference variable) instanceOf (class/interface type)

  Example:

  person **instanceOf** student

  is **true** if the object **person** belongs to the class **student**; otherwise it is **false**.

Dot Operator

- The dot operator (.) is used to access the instance variables and methods of class objects.

  Examples:

  person1.age //Reference to the variable age

  person1.salary() //Reference to the method salary()

- It is also used to access classes and sub-packages from a package.

Section C (1 x 10 = 10)

(Answer any **ONE** question)

CO5 BL2 10. Describe Object Oriented Programming Concepts in Java.

- **Object Oriented Programming** is a method of implementation in which programs are organized as cooperative collection of objects, each of which represents an instance of a class, and whose classes are all members of a hierarchy of classes united via inheritance relationships.
- The general concepts of OOP are as follows:

1. Classes

- *Collection of objects* is called class. It is a logical entity.
- A class can also be defined as a blueprint from which we can create an individual object. Class doesn't consume any space.

2. Objects

- An Object can be defined as an instance of a class. An object contains an address and takes up some space in memory.
- Any entity that has state and behavior is known as an object. For example, a chair, pen, table, keyboard, bike, etc.
- In other terms, objects are the runtime entities of a class. For example, the object for *Student* class can be created as follows:

  Student st1;

  st1 is the runtime entity of Student and it will have the data members Name, DOB and marks and the functions Total, Average and Display can be used by st1 to calculate.

3. Abstraction

- Abstraction refers to the act of representing essential features without including the explanations. Since the classes use the concept of data abstraction, they are known as Abstract Data Types.

4. Encapsulation

- The wrapping up of data and functions into a single unit is called as encapsulation.
- A java class is the example of encapsulation.

5. Inheritance

- Inheritance is the process by which objects of one class acquire the properties of another class.

- For example, a student as well as a staff is a Person. Both have some common properties. Inheritance allows the programmer to reuse defined properties.

6. Polymorphism

- Polymorphism means the ability to take more than one form. For example, consider the operation of addition.
  - For two numbers, the operation will generate a sum.
  - If the operands are strings, then the operation would produce a third string by concatenation.

7. Dynamic Binding

- Binding refers to the linking of a procedure call to the code to be executed.
- Dynamic Binding means that the code associated with a given procedure call is not known until the time of the call at run-time.

8. Message Passing

- Objects communicate with one another by sending and receiving information. A message for an object is a request for execution of a procedure.
- Message Passing involves specifying the name of the object, the name of the function (message) and the information to be sent.

CO4 BL2 11. Demonstrate Arithmetic Expression in Data structures.

- Stack data structure is used for evaluating the given expression.
- There are three ways of writing an expression: Infix, Prefix, and Postfix.
- Computers evaluate expressions in Prefix or Postfix, whereas humans are more familiar with Infix way of denoting an expression.
- Conversion from one form of the expression to another form needs a stack.

Infix, Prefix and Postfix Notation

- An arithmetic expression can be written in three different but equivalent notations, i.e., without changing the output of an expression. These notations are:
  - Infix Notation
  - Prefix (Polish) Notation
  - Postfix (Reverse-Polish) Notation

Infix:

- **An expression is called the infix expression if the operator appears in between the operands.**

- It has the following format:

  (Operand1 Operator Operand2)

  Example: (A+B) * (C-D))

Prefix:

- **An expression is called the prefix expression if the operator appears in the expression before the operands.**
- It has the following format:

  (Operator Operand1 Operand2)
- Prefix Notation is also known as **Polish Notation**.

  Example: *+AB-CD (Infix: (A+B) * (C-D))

Postfix:

- **An expression is called the postfix expression if the operator appears in the expression after the operands.**
- It has the following format:

  (Operand1 Operand2 Operator)
- Postfix notation is also known as **Reversed Polish Notation**.

  Example: AB+CD-* (Infix: (A+B * (C-D))

The following table shows the difference in all three notations –

Sr. No.	Infix Notation	Prefix Notation	Postfix Notation
1	a + b	+ a b	a b +
2	(a + b) * c	* + a b c	a b + c *
3	a * (b + c)	* a + b c	a b c + *
4	a / b + c / d	+ / a b / c d	a b / c d / +
5	(a + b) * (c + d)	* + a b + c d	a b + c d + *

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Department of Computer science

Date : 12.9.2022 **Duration : 1 Hour** **Class: III BSc CS I Batch**

Subject Name & Code : Computer Networks &

Section A (5 x 2 = 10)

(Answer any **FIVE** questions)

CO6	BL1	1. Define Packets.
CO1	BL2	2. Explain full duplex.
CO3	BL3	3. Illustrate of LAN networks.
CO3	BL4	4. Explain Broadcast network.
CO5	BL5	5. Compare the wire and wireless communication.
CO2	BL2	6. Explain TCP/IP
CO4	BL1	7. Define ATM.

Section B (1 x 5 = 5)

(Answer any **ONE** question)

CO3	BL2	8. Explain about LAN and WAN.
CO2	BL2	9. Discuss on network software.

Section C (1 x 10 = 10)

(Answer any **ONE** question)

CO2	BL6	10. Write about TCP/IP reference model
CO4	BL2	11. Explain the communication satellites.

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Department of Computer science

Computer Networks :Answer keys

Date : 12.9.2022 **Duration : 1 Hour** **Class: III BSc CS I Batch**

Subject Name & Code : Computer Networks &

Section A (5 x 2 = 10)

(Answer any **FIVE** questions)

1 .Define Packets.

A network packet is a small amount of data sent over Transmission Control Protocol/Internet Protocol (TCP/IP) networks. The packet size is around 1.5 kilobytes for Ethernet and 64 KB for IP payloads.

2 .Explain full duplex.

The term full-duplex describes **simultaneous data transmission and receptions over one channel**. A full-duplex device is capable of bi-directional network data transmissions at the same time.

3. Illustrate of LAN networks.

A computer network is a system that connects numerous independent computers in order to share information (data) and resources. The integration of computers and other different devices allows users to communicate more easily

4. Explain Broadcast network.

In computer networking, broadcasting refers to **transmitting a packet that will be received by every device on the network**. In practice, the scope of the broadcast is limited to a broadcast domain. Broadcasting in computer network is a group communication, where a sender sends data to receivers simultaneously. This is an all − to − all communication model where each sending device transmits data to all other devices in the network domain.The ways of operation of broadcasting may be −

- A high level operation in a program, like broadcasting in Message Passing Interface.
- A low level networking operation, like broadcasting on Ethernet.

5. Compare the wire and wireless communication.

A wired network uses cables to connect with devices, such as laptop or computers, to the Internet. And, a wireless network allows devices to stay connected to the network and access points amplify Wi-Fi signals, so a device can be far from a router but still be connected to the network.

6. Explain TCP/IP

TCP/IP stands for Transmission Control Protocol/Internet Protocol. TCP/IP is a set of standardized rules that allow computers to communicate on a network such as the internet.

7. Define ATM.

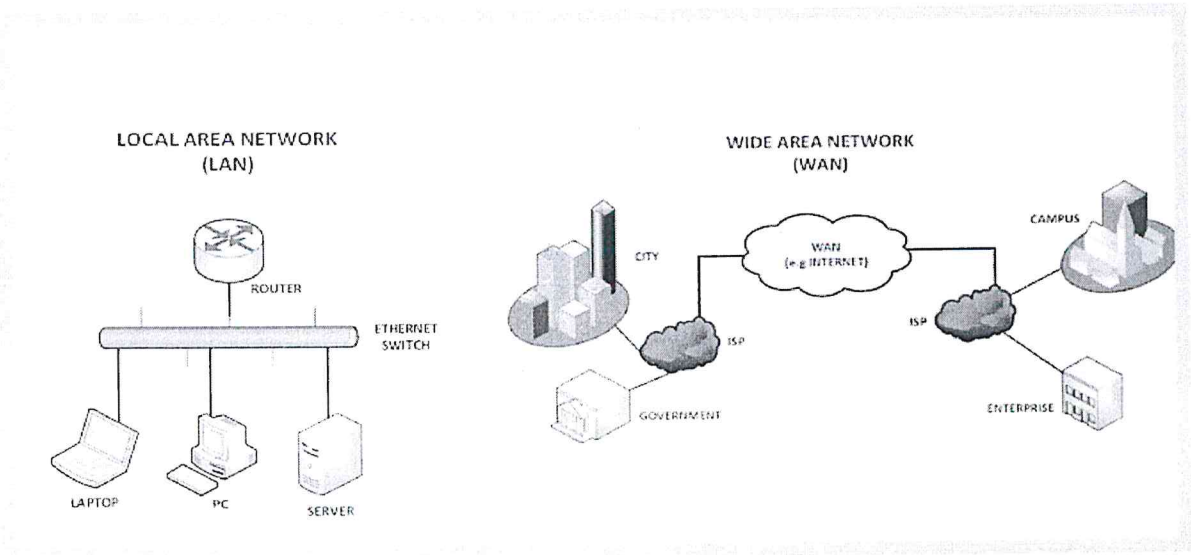
Asynchronous Transfer Mode (ATM) is **a cell-switching, connection-oriented technology**. In ATM networks, end stations attach to the network using dedicated full duplex connections. The ATM networks are constructed using switches, and switches are interconnected using dedicated physical connections.

Section B (1 x 5 = 5)

(Answer any **ONE** question)

8. Explain about LAN and WAN.

A LAN, abbreviated from Local Area Network, is a network that covers a small geographical area such as homes, offices, and groups of buildings.Whereas a WAN, abbreviated from Wide Area Network, is a network that covers larger geographical areas that can span the globe.An example of a widely used WAN is the Internet, which is a collection of tens of thousands of networks that connects tens of billions of devices.Local Area Networks predominantly use Ethernet technology, which is a group of networking technologies that dictates how data is transmitted over the physical media, with the most common media being CAT# cabling.Local Area Networks can use both Layer 1 and Layer 2 devices; Layer 1 devices include HUB's and repeaters and the Layer 2 devices that can be used are switches and bridge devices. While LAN's use Layer 1 and Layer 2 devices. WAN's operate using Layer 3 devices such as multi-layer switches and routers.



9.Discuss on network software.

Network software is an umbrella term used to describe a wide range of software that streamlines the operations, design, monitoring, and implementation of computer networks. Network software is a fundamental element for any networking system.

Example:

Protocol Hierarchies (Layer structure)
Design Issues for the Layers
Connection-Oriented and Connectionless Services
Service Primitives
The Relationship of Services to Protocols

Protocol Hierarchies

– a series of layers (levels)

– lower layer provides service to higher layers – protocol:
• an agreement between the communication parties on how communication is to proceed

– Peers:

• the corresponding layers on different machines.

– Network architecture: a set of layers and protocols

– Protocol stack:

• a list of protocols used by a certain system, one protocol per layer

Design Issues for the Layers

Addressing (telephone number, e-mail address, IP address,...)

Error Control (error correction codes, ARQ, HARQ,...)

Flow Control (feedback-based, rate-based)

Multiplexing (gathering several small messages with the same destination into a single large message or vice versa → Demultiplexing)

Routing (directing traffic to the destination)

Flow control
– feedback from the receiver

– agreed upon transmission rate
Length of messages
– long messages: disassemble, transmit, and reassmeble messages
– short messages: gather several small messages
Multiplexing and Demultiplexing
– when expensive to set up a separate connection – needed in physical layer

Connection-Oriented and Connectionless Services

Six service primitives that provide a simple connection-oriented service

If the protocol stack is located in the operating system, the primitives are normally system calls.

Packets sent in a simple client-server interaction on a connection-oriented network

Service Primitives and The Relationship of Services to Protocols

The service defines what operations the layer is prepared to perform on behalf of its users

A service is a set of primitives that a layer provides to the layer above it.

A protocol is a set of rules governing the format and meaning of the packets which are exchanged by the peer entities in the same layer.

⇨Services related to the interfaces between layers;
⇨ Protocols related to the packets sent between peer entities on different machine. Service Users

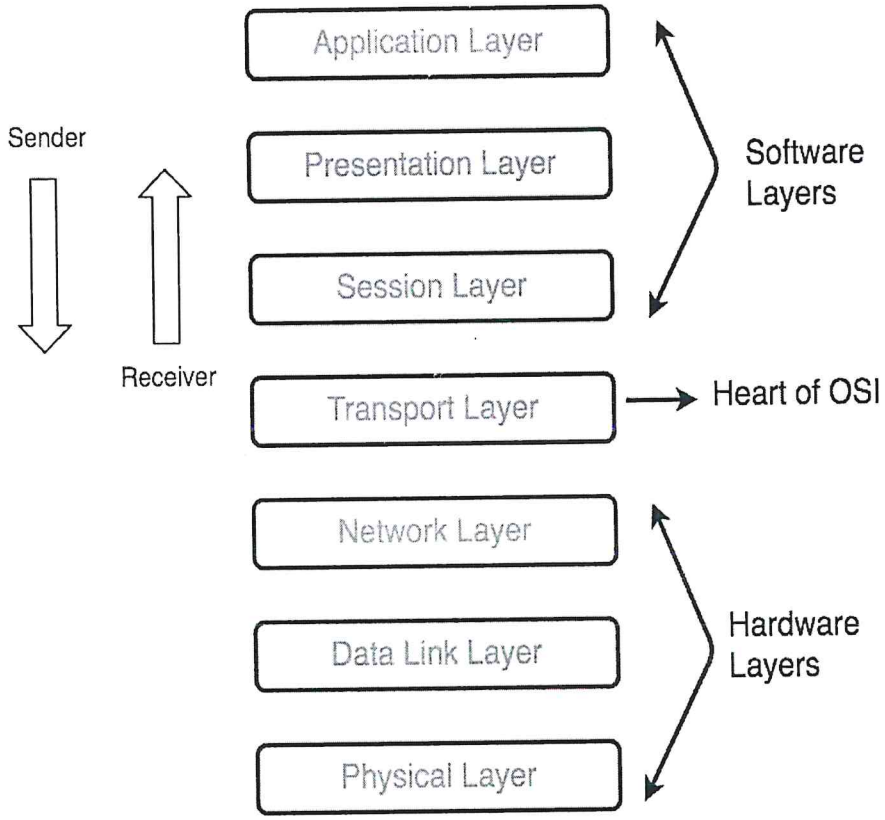
Section C

(1 x 10 = 10)

(Answer any **ONE** question)

10. Write about TCP/IP reference model

The Open Systems Interconnect (OSI) model is a conceptual framework that describes networking or telecommunications systems as seven layers, each with its own function.



Layer 7 - Application

The Application Layer in the OSI model is the layer that is the "closest to the end user". It receives information directly from users and displays incoming data to the user. Oddly enough, applications themselves do not reside at the application layer. Instead the layer facilitates communication through lower layers in order to establish connections with applications at the other end. Web browsers (Google Chrome, Firefox, Safari, etc.) TelNet, and FTP, are examples of communications that rely on Layer 7.

Layer 6 - Presentation

The Presentation Layer represents the area that is independent of data representation at the application layer. In general, it represents the preparation or translation of application format to network format, or from network formatting to application format. In other words, the layer "presents" data for the application or the network. A good example of this is encryption and decryption of data for secure transmission; this happens at Layer 6.

Layer 5 - Session

When two computers or other networked devices need to speak with one another, a session needs to be created, and this is done at the Session Layer. Functions at this layer involve setup, coordination (how long should a system wait for a response, for example) and termination between the applications at each end of the session.

Layer 4 – Transport

The Transport Layer deals with the coordination of the data transfer between end systems and hosts. How much data to send, at what rate, where it goes, etc. The best known example of the Transport Layer is the Transmission Control Protocol (TCP), which is built on top of the Internet Protocol (IP), commonly known as TCP/IP. TCP and UDP port numbers work at Layer 4, while IP addresses work at Layer 3, the Network Layer.

Layer 3 - Network

Here at the Network Layer is where you'll find most of the router functionality that most networking professionals care about and love. In its most basic sense, this layer is responsible for packet forwarding, including routing through different routers. You might know that your Boston computer wants to connect to a server in California, but there are millions of different paths to take. Routers at this layer help do this efficiently.

Layer 2 – Data Link

The Data Link Layer provides node-to-node data transfer (between two directly connected nodes), and also handles error correction from the physical layer. Two sublayers exist here as well--the Media Access Control (MAC) layer and the Logical Link Control (LLC) layer. In the networking world, most switches operate at Layer 2. But it's not that simple. Some switches also operate at Layer 3 in order to support virtual LANs that may span more than one switch subnet, which requires routing capabilities.

Layer 1 - Physical

At the bottom of our OSI model we have the Physical Layer, which represents the electrical and physical representation of the system. This can include everything from the cable type, radio frequency link (as in a Wi-Fi network), as well as the layout of pins, voltages, and other physical requirements. When a networking problem occurs, many networking pros go right to the physical layer to check that all of the cables are properly connected and that the power plug hasn't been pulled from the router, switch or computer

11.Explain the communication satellites.

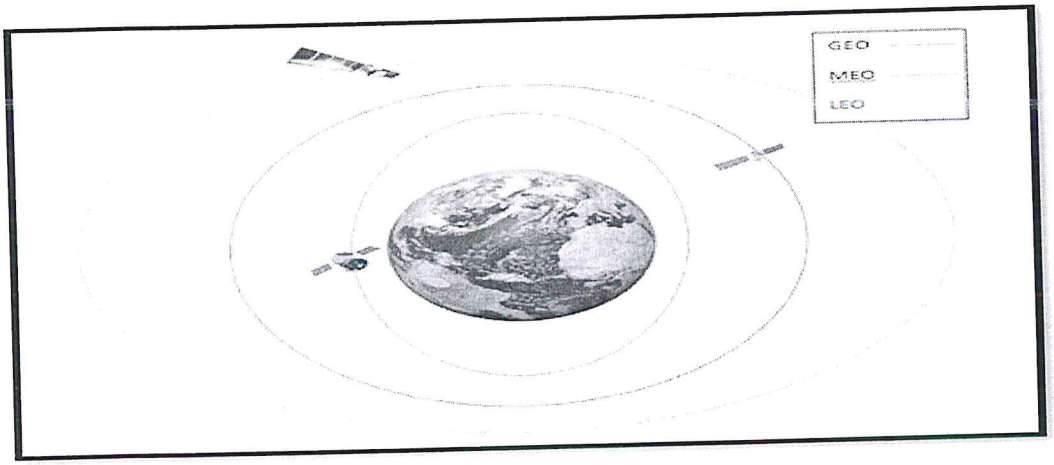
A communication satellite is an artificial satellite that acts as a large repeater in the sky. It receives signals from the source transmitter, amplifies using transponders, and relays them to the receiver. Thus, it creates a communication channel between locations of the earth that would not have been able to communicate due to long distance or obstruction by earth's curvature.

Communication satellites may be owned by government or private organizations. Presently, there are more than 2000 communication satellites in the sky. Some of its uses are –

- Internet
- Military operations
- Television
- Telephone
- Radio

Communication satellites are broadly categorized into three types depending upon the orbit in which they are placed.

- **Geostationary Satellite (GEO)** – They are at 36,000 km from the earth's surface. They have same orbital period as earth's rotation. So they appear to be still in the sky. At least 3 GEOs are needed for global coverage.
- **Medium Earth Orbit Satellite (MEO)** – They are placed between the two Van Allen belts, at a distance between 2,000 km to 36,000 km from the earth's surface. At least 10 MEOs are needed for global coverage.
- **Low Earth Orbit Satellite (LEO)** – They are situated below the Lower Van Allen belt. Their orbital altitude is 160 km to 2000 km. For global coverage, as high as 50 LEOs are required.



The communication satellites are similar to the space mirrors that help us bounce signals such as radio, internet data. and television from one side of the earth to another. Three stages are involved, which explain the working of satellite communications. These are:

- Uplink
- Transponders
- Downlink

Let's consider an example of signals from a television. In the first stage, the signal from the television broadcast on the other side of the earth is first beamed up to the satellite from the ground station on the earth. This process is known as uplink.

The second stage involves transponders such as radio receivers, amplifiers, and transmitters. These transponders boost the incoming signal and change its frequency so that the outgoing signals are not altered. Depending on the incoming signal sources, the transponders vary.

The final stage involves a downlink in which the data is sent to the other end of the receiver on the earth. It is important to understand that usually, there is one uplink and multiple downlinks.

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I - UNIT TEST, SEPTEMBER 2022

DEPARTMENT OF COMPUTER SCIENCE

Date : 12.09.2022 **Duration : 1 Hr** **Class : III B.Sc CS - II BATCH**

Subject Name & Code: COMPUTER NETWORK **Max : 25 Marks**

SECTION – A

Answer any FIVE Questions **(5 x 2 = 10)**

CO	5	**BL**	B1	1. Identify – Computer Networks
CO	1	**BL**	B2	2. Differentiate base banding and broad banding
CO	1	**BL**	B2	3. Classify the Packets.
CO	3	**BL**	B4	4. Categorize the types of Transmission media
CO	2	**BL**	B2	5. Discuss the use of computer networks.
CO	6	**BL**	B2	6. Describe the features of LAN
CO	1	**BL**	B1	7. List the features of internetworking.

SECTION – B

Answer any ONE Question **(1 x 5 = 5)**

CO	3	**BL**	B6	8. Write short notes on a. Packet Switching b. Message Switching c. Circuit Switching.
CO	2	**BL**	B2	9. Explain the functions of data link layers. .

SECTION – C

Answer any ONE Question **(1 x 10 = 10)**

CO	3	**BL**	B2	10. Briefly explain OSI reference model
CO	4	**BL**	B4	11. Explain the various guided transmission media for data communication.

∞****∞

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Answer Key

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DEPARTMENT OF COMPUTER SCIENCE

Date : **Duration : 1 Hr** **Class : III B.Sc CS - II BATCH**

Subject Name & Code: **COMPUTER NETWORK** **Max : 25 Marks**

PART A – (5 X 1 = 5 Marks)

Answer any FIVE questions

1. **Identify – Computer Networks**

   Ans: A computer network is a set of devices connected through links. A node can be computer, printer, or any other device capable of sending or receiving the data. The links connecting the nodes are known as communication channels.

2. **Differentiate base banding and broad banding**

   Ans: **a) Base Band**

   These transmissions use the entire media band width for a single channel.

   b) Broad Band

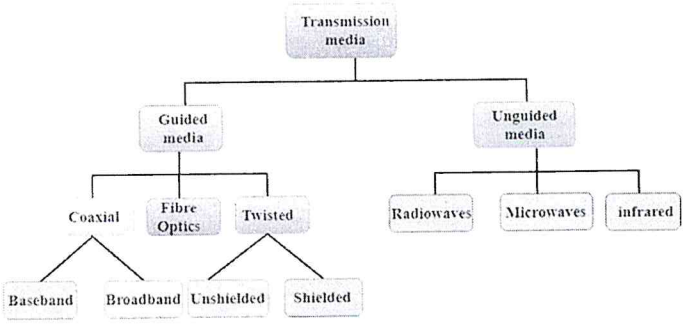
   These transmissions allow the division of entire media band width into multiple channels. Since each channel can carry a different analog or digital signal, broad band network support multiple simultaneous conversation over a single transmission media.

3. **Classify the Packets.**

   Ans: n networking, a packet **is a small segment of a larger message**. Data sent over computer networks*, such as the Internet, is divided into packets

4. **Categorize the types of Transmission media**

Classification of Transmission Media:



5. Discuss the use of computer networks

- Business Applications
- Home Applications
- Mobile Users
- Social Issues

6. Describe the features of LAN

- Local Area Network is a group of computers connected to each other in a small area such as building, office.
- LAN is used for connecting two or more personal computers through a communication medium such as twisted pair, coaxial cable, etc.
- It is less costly as it is built with inexpensive hardware such as hubs, network adapters, and ethernet cables.
- The data is transferred at an extremely faster rate in Local Area Network.
- Local Area Network provides higher security.

7. List the features of internetworking

- Accessibility. An Internet is a global service and accessible to all. ...
- Easy to Use. ...
- Interaction with Other Media. ...
- Low Cost. ...
- Extension of Existing IT Technology. ...
- Flexibility of Communication. ...
- Security.

PART B – (2 X 5 = 10 Marks)

Answer any TWO questions

8. Write Short notes on a) Circuit Switching b) Message Switching c)packet Switching

- **Circuit Switching**
- In this approach, there is a dedicated route between sender and receiver. Before the link is determined in the circuit switching approach, the dedicated route will continue until the connection is eliminated.
- **Message Switching**
- Message Switching is an approach in which a message is sent as a whole unit and routed by the intermediate hub at which it is saved and delivered. There is no installation of a dedicated route between the sender and receiver in the message switching approach.

- The destination location is added to the message. It supports flexible routing as the message is routed by the intermediate hub based on its data.
- **Packet Switching**
- Packet switching is a switching approach in which the message is transmitted in one go, but it is split into the lower item, and they are sent separately. The message divided into lower elements are called packets, and these packets are provided with a specific number to recognize their series at the receiving end.
- Data is sent in various units of variable length of structures which are known as packets in a packet-switched network. Each packet includes some data in its headers, including source address, destination address and order number.

9. Explain the functions of data link layers

- **Framing**
  - Data-link layer takes packets from Network Layer and encapsulates them into Frames.Then, it sends each frame bit-by-bit on the hardware. At receiver' end, data link layer picks up signals from hardware and assembles them into frames.
- **Addressing**
  - Data-link layer provides layer-2 hardware addressing mechanism. Hardware address is assumed to be unique on the link. It is encoded into hardware at the time of manufacturing.
- **Synchronization**
  - When data frames are sent on the link, both machines must be synchronized in order to transfer to take place.
- **Error Control**
  - Sometimes signals may have encountered problem in transition and the bits are flipped.These errors are detected and attempted to recover actual data bits. It also provides error reporting mechanism to the sender.
- **Flow Control**
  - Stations on same link may have different speed or capacity. Data-link layer ensures flow control that enables both machine to exchange data on same speed.
- **Multi-Access**
  - When host on the shared link tries to transfer the data, it has a high probability of collision. Data-link layer provides mechanism such as

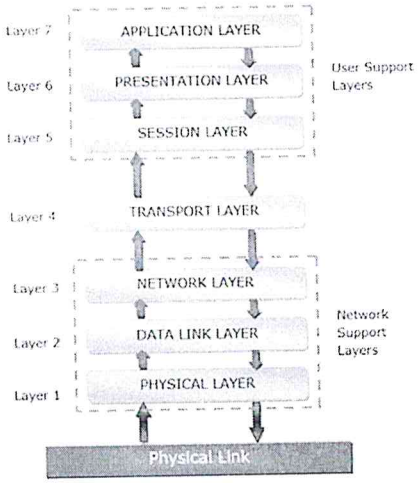
CSMA/CD to equip capability of accessing a shared media among multiple Systems

PART C – (1 X 10 = 10 Marks)

Answer any ONE question

10. Briefly explain OSI reference model

OSI or Open System Interconnection model was developed by International Standards Organization (ISO). It gives a layered networking framework that conceptualizes how communications should be done between heterogeneous systems. It has seven interconnected layers. The seven layers of the OSI Model are a physical layer, data link layer, network layer, transport layer, session layer, presentation layer, and application layer, as shown in the following diagram –



The physical layer, data link layer and the network layer are the network support layers. The layers manage a physical transfer of data from one device to another. Session layer, presentation layer, and application layer are the user support layers. These layers allow communication among unrelated software in dissimilar environments. Transport layer links the two groups.

The main functions of each of the layers are as follows –

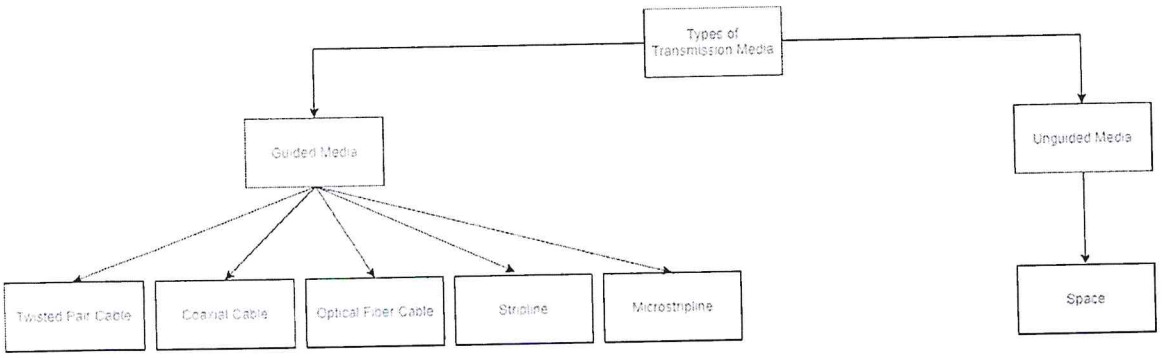
- **Physical Layer –** Its function is to transmit individual bits from one node to another over a physical medium.
- **Data Link Layer –** It is responsible for the reliable transfer of data frames from one node to another connected by the physical layer.
- **Network Layer –** It manages the delivery of individual data packets from source to destination through appropriate addressing and routing.
- **Transport Layer –**It is responsible for delivery of the entire message from the source host to destination host.
- **Session Layer –** It establishes sessions between users and offers services like dialog control and synchronization.
- **Presentation Layer –** It monitors syntax and semantics of transmitted information through translation, compression, and encryption.

- **Application Layer –** It provides high-level APIs (application program interface) to the users.

11. Explain the various guided transmission media for data communication.

Types of Transmission Media

In data communication terminology, a transmission medium is a physical path between the transmitter and the receiver i.e. it is the channel through which data is sent from one place to another. Transmission Media is broadly classified into the following types:



1. Guided Media:

It is also referred to as Wired or Bounded transmission media. Signals being transmitted are directed and confined in a narrow pathway by using physical links.

Features:

- High Speed
- Secure
- Used for comparatively shorter distances

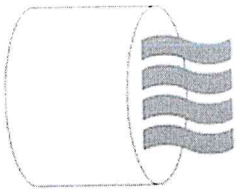
There are 3 major types of Guided Media:

(i) Twisted Pair Cable –

It consists of 2 separately insulated conductor wires wound about each other. Generally, several such pairs are bundled together in a protective sheath. They are the most widely used Transmission Media. Twisted Pair is of two types:

- **Unshielded Twisted Pair (UTP):**

  UTP consists of two insulated copper wires twisted around one another. This type of cable has the ability to block interference and does not depend on a physical shield for this purpose. It is used for telephonic applications.



Unshielded Twisted Pair

Advantages:

⇢ Least expensive

⇢ Easy to install

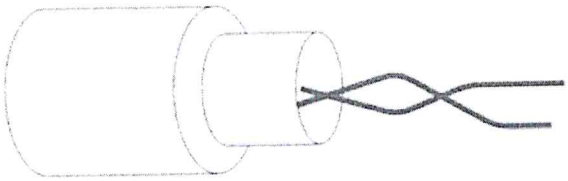
⇢ High-speed capacity

⇢ Susceptible to external interference

⇢ Lower capacity and performance in comparison to STP

⇢ Short distance transmission due to attenuation

- **Shielded Twisted Pair (STP):**
  This type of cable consists of a special jacket (a copper braid covering or a foil shield) to block external interference. It is used in fast-data-rate Ethernet and in voice and data channels of telephone lines.



Shielded Twisted Pair

Advantages:

⇢ Better performance at a higher data rate in comparison to UTP

⇢ Eliminates crosstalk

⇢ Comparatively faster

⇢ Comparatively difficult to install and manufacture

⇢ More expensive

⇢ Bulky

(ii) Coaxial Cable –

It has an outer plastic covering containing an insulation layer made of PVC or Teflon and 2 parallel conductors each having a separate insulated protection cover. The coaxial cable transmits information in two modes: Baseband mode(dedicated cable bandwidth) and Broadband mode(cable bandwidth is split into separate ranges). Cable TVs and analog television networks widely use Coaxial cables.

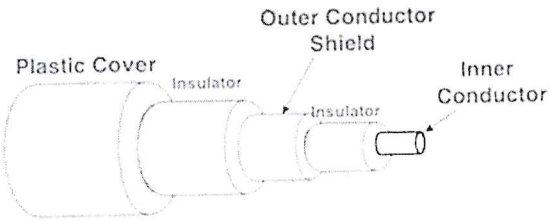


Figure of Coaxial Cable

Advantages:

- High Bandwidth
- Better noise Immunity
- Easy to install and expand
- Inexpensive

Disadvantages:

- Single cable failure can disrupt the entire network

(iii) Optical Fiber Cable –

It uses the concept of reflection of light through a core made up of glass or plastic. The core is surrounded by a less dense glass or plastic covering called the cladding. It is used for the transmission of large volumes of data.

The cable can be unidirectional or bidirectional. The WDM (Wavelength Division Multiplexer) supports two modes, namely unidirectional and bidirectional mode.

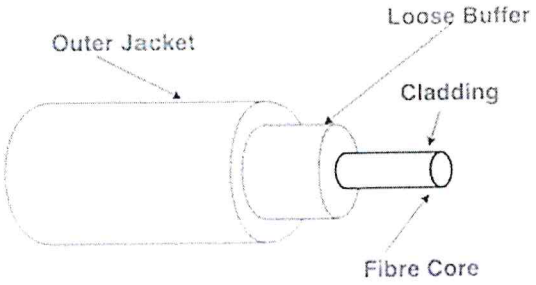


Figure of Optical Fibre Cable

Advantages:

- Increased capacity and bandwidth
- Lightweight
- Less signal attenuation
- Immunity to electromagnetic interference
- Resistance to corrosive materials

Disadvantages:

- Difficult to install and maintain
- High cost
- Fragile

(iv) Stripline

Stripline is a transverse electromagnetic (TEM) transmission line medium invented by Robert M. Barrett of the Air Force Cambridge Research Centre in the 1950s. Stripline is the earliest form of the planar transmission line. It uses a conducting material to transmit high-frequency waves it is also called a waveguide. This conducting material is sandwiched between two layers of the ground plane which are usually shorted to provide EMI immunity.

(v) Microstripline

In this, the conducting material is separated from the ground plane by a layer of dielectric.

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Date : 13.09.2022 **Duration : 1 Hour** **Class :III B.Sc CS**
Subject Name & Code : Operating System

Section A (5 x 2 = 10)

(Answer any **FIVE** questions)

CO1	BL1	1. State an operating system?
CO1	BL2	2. Describe the operating system operations?
CO2	BL2	3. Explain simple batch system?
CO2	BL1	4. List out any four process control system calls?
CO5	BL4	5. Differentiate the preemptive and non preemptive operations.
CO5	BL2	6. Classify the types of schedulers?
CO5	BL1	7. Define critical section?

Section B (1 x 5 = 5)

(Answer any **ONE** question)

CO1	BL3	8. Discover the various objectives and functions of Operating systems?
CO5	BL2	9. Explain about process scheduling? Explain different types of schedulers?

Section C (1 x 10 = 10)

(Answer any **ONE** question)

CO1	BL1	10. List out the different types of operating system? Explain them in detail
CO5	BL6	11. Write about the various CPU scheduling algorithms.

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Date : 13.09.2022 **Duration : 01 Hour** **Class :III B.Sc CS**

Subject Name & Code : Operating System

Section A (5 x 2 = 10)

(Answer any **FIVE** questions)

CO1 BL1 1. State an operating system?

An Operating System (OS) is an interface between a computer user and computer hardware. An operating system is a software which performs all the basic tasks like file management, memory management, process management, handling input and output, and controlling peripheral devices such as disk drives and printers.

CO1 BL2 2. Describe the operating system operations?

An operating system is a construct that allows the user application programs to interact with the system hardware. Operating system by itself does not provide any function but it provides an atmosphere in which different applications and programs can do useful work.

CO2 BL2 3. Explain simple batch system?

In the simple batch operating system, there is no direct communication between the user and the computer. In this, firstly, the user submits a job to the computer operator, and after submitting the job, the computer operator creates a batch of the jobs on an input device.

CO2 BL1 4. List out any four process control system calls?

- Process Control. These system calls deal with processes such as process creation, process termination etc.
- File Management.
- Device Management.
- Information Maintenance.
- Communication.

CO5 BL4 5. Differentiate the premptive and non premptive operations.

Key Differences Between Preemptive and Non-Preemptive Scheduling: In preemptive scheduling, the CPU is allocated to the processes for a limited time whereas, in Non-preemptive scheduling, the CPU is allocated to the process till it terminates or switches to the waiting state.

CO5 BL2 6. Classify the types of schedulers?

There are three types of process scheduler.

- Long Term or job scheduler : It brings the new process to the 'Ready State'. ...
- Short term or CPU scheduler : It is responsible for selecting one process from ready state for scheduling it on the running state.
- Medium-term scheduler : It is responsible for suspending and resuming the process. It mainly does swapping (moving processes from main memory to disk and vice versa).

CO5 BL1 7. Define critical section?

The critical section is a code segment where the shared variables can be accessed. An atomic action is required in a critical section i.e. only one process can execute in its critical section at a time. All the other processes have to wait to execute in their critical sections.

Section B (1 x 5 = 5)

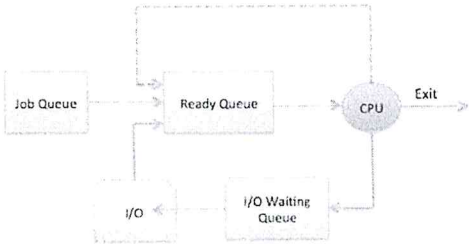
(Answer any **ONE** question)

CO1 BL3 8. Discover the various objectives and functions of Operating systems?

- Security.
- Control Over System Performance.
- Job Accounting.
- Error Detecting Aids.
- Coordination Between Other Software and Users.
- Memory Management.
- Processor Management/Scheduling.
- Device Management.

CO5 BL2 9. Explain about process scheduling? Explain different types of schedulers?

The process scheduling is the activity of the process manager that handles the removal of the running process from the CPU and the selection of another process on the basis of a particular strategy. Process scheduling is an essential part of a Multiprogramming operating systems.

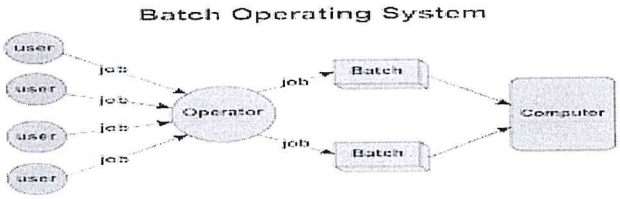


Section C (1 x 10 = 10)

(Answer any **ONE** question)

CO1 BL1 10. List out the different types of operating system? Explain them in detail

There are two basic types of network operating systems, discussed as follows: Peer-to-Peer Network Operating Systems: allow users to share network resources saved in a common, accessible network location. Client/Server Network Operating Systems: provide users with access to resources through a server.



CO5 BL6 11. Write about the various CPU scheduling algorithms.

The different CPU algorithms are:

- First Come First Serve.
- Shortest Job First.
- Shortest Remaining Time First.
- Round Robin Scheduling.
- Priority Scheduling.
- Multilevel Queue Scheduling.
- Multilevel Feedback Queue Scheduling.

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Date: 14.09.2022 **Duration: 1 Hour** **Class: III B.Sc. (CS) I Batch**
Subject Name & Code: Relational Database Management System

Section A (5 x 2 = 10)

(Answer any **FIVE** questions)

CO1	BL1	1. Define – DBMS.
CO1	BL1	2. Define Database.
CO1	BL4	3. Point out the advantages of using DBMS.
CO3	BL2	4. Distinguish COUNT, COUNT DISTINCT, and COUNT (*) in SQL.
CO2	BL2	5. Define subqueries. Classify them.
CO3	BL2	6. Differentiate SQL and PL/SQL.
CO3	BL1	7. List the Lexical units related with PL/SQL.

Section B (1 x 5 = 5)

(Answer any **ONE** question)

CO3	BL2	8. Differentiate the SQL commands DROP TABLE and TRUNCATE TABLE.
CO2	BL3	9. Illustrate the different DML queries.

Section C (1 x 10 = 10)

(Answer any **ONE** question)

CO1	BL2	10. Explain the different components of DBMS.
CO5	BL2	11. Explain the Operators Precedence in PL/SQL.

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DEPARTMENT OF COMPUTER SCIENCE - I UNIT TEST, September 2022

Answer Key

CLASS: III B.Sc. (Computer Science) I – Batch TIME: 1 Hour

SUB: Relational Database Management System Max: 25 Marks

PART A – (5 X 2 = 10 Marks)

Answer any FIVE questions

1. Define – DBMS

   A database management system (DBMS) consists of collection of interrelated data and a set of programs to access that data. It is software that is helpful in maintaining and utilizing a database.

2. Define Database

   A Database is a collection of related data. Here, the term "data" means that known facts that can be record. Examples of database are library information system, bus, railway, and airline reservation system, etc.

3. Point out the advantages of using DBMS

   Controlling Redundancy – Enforcing Integrity Constraints so as to maintain the consistency of the database – Providing Backup and recovery facilities – Restricting unauthorized access – Providing multiple user interfaces – Providing persistent storage of program objects and datastructures.

4. Distinguish COUNT, COUNT DISTINCT, and COUNT (*) in SQL

   The command COUNT counts the number of rows in a table by ignoring all null values. The command COUNT (*) counts the number of rows in a table by including the rows that contains null values. COUNT DISTINCT counts the number of rows in the table by ignoring duplicate values.

5. Define subqueries. Classify them

   Subquery is query within a query. A SELECT statement can be nested inside another query to form a subquery. The query which contains the subquery is called outer query. It can be classified as (a) scalar subquery and (b) correlated subquery, and (c) uncorrelated subquery.

6. Differentiate SQL and PL/SQL

   SQL is a declarative language. PL/SQL is a procedural language that makes up for all the missing elements in SQL.

7. List the Lexical units related with PL/SQL

A line of PL/SQL program contains groups of characters known as lexical units, which can be classified as follows:

– Delimiters – Identifiers – Literals – Comments.

PART B – (1 X 5 = 5 Marks)

Answer any ONE question

8. Differentiate the SQL commands DROP TABLE and TRUNCATE TABLE

Drop table command deletes the definition as well as the contents of the table, whereas truncate table command deletes only the contents of the table but not the definition of the table.

9. Illustrate the different DML queries

The data manipulation language is used to add, update, and delete data in the database. The SQL command INSERT is used to add data into the database, the SQL command UPDATE is used to modify the data in the database, and the SQL command DELETE is used to delete data in the database. Here the term database refers to the table.

Adding a New Row to the Table The INSERT command is to add new row to the table. The syntax of INSERT command is: INSERT INTO table name VALUES ('&column1-name', '&column2-name'. . . &columnN-name);

Updating the Data in the Table The data in the table can be updated by using UPDATE command. The syntax of the UPDATE command is: UPDATE table name SET attribute value=new value WHERE condition.

Deleting Row from the Table The DELETE command in SQL is used to delete row(s) from the table. The syntax of DELETE command is DELETE FROM table name WHERE condition;

PART C – (1 X 10 = 10 Marks)

Answer any ONE question

10. Explain the different components of DBMS

Hardware The hardware can range from a single personal computer, to a single mainframe, to a network of computers. The particular hardware depends on the 1.14 Components and Interfaces of Database Management System 15 Forms Data Files

Application Front ends DML Interface DDL Query Evaluation Engine File and Access Methods Buffer Manager Disk Space Manager Transaction And Lock Manager Recovery Manager DDL Compiler Indexes System Catalog Fig. 1.7. Database management system components and interfaces requirements of the organization and the DBMS used. Some DBMSs run only on particular operating systems, while others run on a wide variety of operating systems. A DBMS requires a minimum amount of main memory and disk space to run, but this minimum configuration may not necessarily give acceptable performance.

Software The software includes the DBMS software, application programs together with the operating systems including the network software if the DBMS is being used over a network. The application programs are written in third-generation programming languages like "C," COBOL, FORTRAN, Ada, Pascal, etc. or using fourth-generation language such as SQL, embedded in a third-generation language. The target DBMS may have its own fourth-generation tools which allow development of applications through the provision of nonprocedural query languages, report generators, graphics generators, and application generators. The use of fourth-generation tools can improve productivity significantly and produce programs that are easier to maintain.

Data A database is a repository for data which, in general, is both integrated and shared. Integration means that the database may be thought of as a unification of several otherwise distinct files, with any redundancy among those files partially or wholly eliminated. The sharing of a database refers to the sharing of data by different users, in the sense that each of those users may have access to the same piece of data and may use it for different purposes. Any given user will normally be concerned with only a subset of the whole database. The main features of the data in the database are listed later: 1. The data in the database is well organized (structured) 2. The data in the database is related 3. The data are accessible in different orders without great difficulty The data in the database is persistent, integrated, structured, and shared. Integrated Data A data can be considered to be a unification of several distinct data files and when any redundancy among those files is eliminated, the data are said to be integrated data. Shared Data A database contains data that can be shared by different users for different application simultaneously. It is important to note that in this way of sharing of data, the redundancy of data are reduced, since repetitions are avoided, the possibility of inconsistencies is reduced. Persistent Data Persistent data are one,

which cannot be removed from the database as a side effect of some other process. Persistent data have a life span that is not limited to single execution of the programs that use them

11. Explain the Operators Precedence in PL/SQL

The operations within an expression are done in a particular order depending on their precedence (priority). Table 5.1 lists the operator's level of precedence from top to bottom. Operators listed in the same row have equal precedence. Operators with higher precedence are applied first, but if parentheses are used, expression within innermost parenthesis is evaluated first. For example the expression 8 + 4/2 2 results in a value 9, because exponentiation has the highest priority followed by division and addition. Now in the same expression if we put parentheses, the expression 8+((4/2) 2) results in a value 12 not 9, because now first it will solve the expression within innermost parentheses. 224 5 PL/SQL Table 5.1. Order of operations operator operation **, NOT exponentiation, logical negation +, − identity, negation *, / multiplication, division +, −, || addition, subtraction, concatenation =, !=, , <=, >=, IS NULL, comparison LIKE, BETWEEN, IN AND conjunction OR disjunction.

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Date :14.9.2022 **Duration : 1 Hour** **Class : III BSc CS II Batch**

Subject Name & Code :RDBMS &

Section A

(5 x 2 = 10)

(Answer any **FIVE** questions)

CO1	BL1	1. List the components of DBMS
CO1	BL1	2. List down the advantages of DBMS.
CO2	BL1	3. Define entity.
CO2	BL2	4. Explain Foreign key.
CO4	BL2	5. Explain primary key
CO4	BL4	6. Explain constraints.
CO2	BL3	7. Use of RDBMS.

Section B

(1 x 5 = 5)

(Answer any **ONE** questions)

CO4	BL4	8. Explain the Relationship degree with example.
CO4	BL2	9. Describe the E –R diagram table.

Section C

(1 x 10 = 10)

(Answer any ONE question)

CO1	BL4	10. Explain the E.F .Codd's of 12 rules in RDBMS
CO2	BL4	11. Explain the types of keys

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RDBMS : Answer keys

Date : 14.9.2022 **Duration : 1 Hour** **Class : III BSc CS II Batch**

Subject Name & Code : RDBMS &

Section A

(5 x 2 = 10)

(Answer any **FIVE** questions)

1. List the components of DBMS

The DBMS can be classified into five main components which are explained as follows: Hardware. Software. Data. Procedures. Database Access Language. and People.

2. List down the advantages of DBMS.

A database management system helps improve organizational security, integration, compliance, and performance.Improved data sharing and data security. Effective data integration,Consistent, reliable data. Data that complies with privacy regulations. Increased productivity.Better decision-making.

3. Define entity.

An entity in DBMS (Database management System) is **a real-world thing or a real-world object which is distinguishable from other objects in the real world**. For example, a car is an entity. An attribute of an entity gives us information about the characteristic features of an entity.

4. Explain Foreign key.

A foreign key is **a set of attributes that references a candidate key**. For example, a table called TEAM may have an attribute, MEMBER_NAME, which is a foreign key referencing a candidate key, PERSON_NAME, in the PERSON table.

5. Explain primary key

A primary key is **a column -- or a group of columns -- in a table that uniquely identifies the rows of data in that table**. For example, in the table below, CustomerNo, which displays the ID number assigned to different customers, is the primary key

6. Explain constraints.

In DBMS, constraints are **the set of rules that ensures that when an authorized user modifies the database they do not disturb the data consistency** and the constraints are specified within the DDL commands like "alter" and "create" command

7. Use of RDBMS.

A relational database management system (RDBMS) is a program used to create, update, and manage relational databases. Some of the most well-known RDBMSs include **MySQL, PostgreSQL, MariaDB, Microsoft SQL Server, and Oracle Database**.

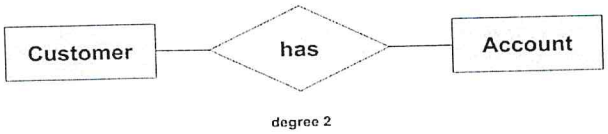
Section B

(1 x 5 = 5)

(Answer any ONE question)

8. Explain the Relationship degree with example.

The degree of a relationship is the number of entity types that participate(associate) in a relationship. By seeing an E-R diagram, we can simply tell the degree of a relationship i.e **the number of an entity type that is connected to a relationship is the degree of that relationship**.***For example,*** If we have two entity type 'Customer' and 'Account' and they are linked using the primary key and foreign key. We can say that the degree of relationship is 2 because here two entities are taking part in the relationship.

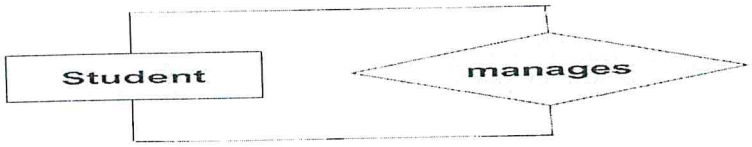


degree 2

Based on the number of entity types that are connected we have the following degree of relationships: Unary,Binary,Ternary,N-ary

Unary (degree 1)

A unary relationship exists when both the participating entity type are the same. When such a relationship is present we say that the degree of relationship is 1.



Unary Relationship
(degree 1)

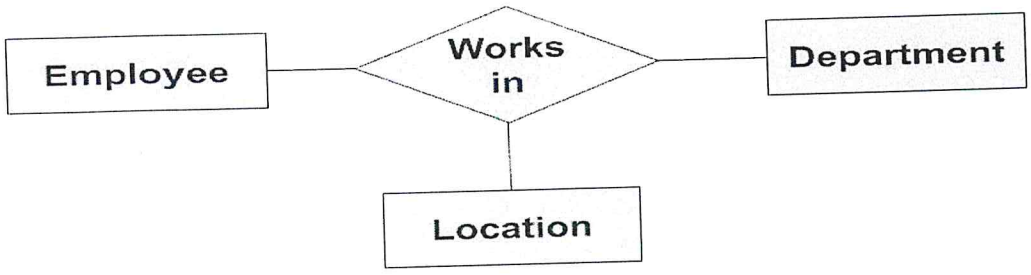
Binary (degree 2)

A binary relationship exists when exactly two entity type participates. When such a relationship is present we say that the degree is 2. This is the most common degree of relationship. It is easy to deal with such relationship as these can be easily converted into relational tables.



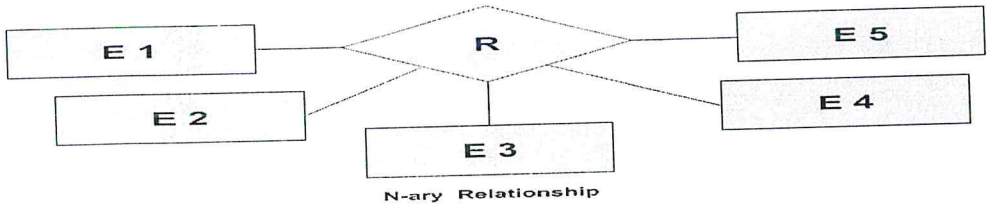
Binary Relationship
(degree 2)

Ternary(degree 3)
A ternary relationship exists when exactly three entity type participates. When such a relationship is present we say that the degree is 3. As the number of entity increases in the relationship, it becomes complex to convert them into relational tables.



Ternary Relationship
(degree 3)

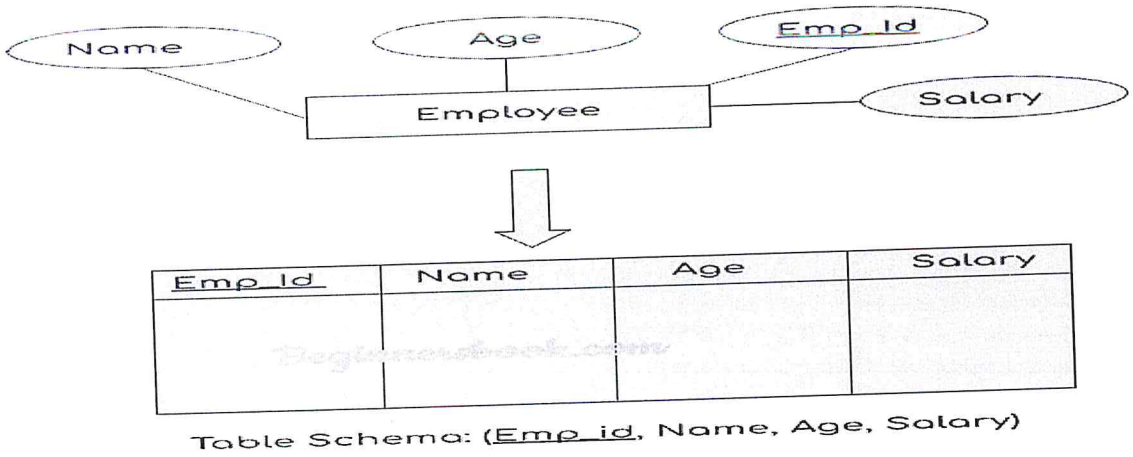
N-ary (n degree)
An N-ary relationship exists when 'n' number of entities are participating. So, any number of entities can participate in a relationship.



N-ary Relationship

9. Describe the E –R diagram table.

The Strong Entity set becomes the table and the attributes of the Entity set becomes the table attributes. The key attribute of the entity set becomes the primary key of the table.
example: Here we have an entity set Employee with the attributes Name, Age, Emp_Id and Salary. When we convert this ER diagram to table, the entity set becomes table so we have a table named "Employee" as shown in the following diagram. The attributes of the entity set becomes the attributes of the table.



Section C

(1 x 10 = 10)

(Answer any ONE question)

10. Explain the E.F .Codd's of 12 rules in RDBMS

Dr Edgar F. Codd, after his extensive research on the Relational Model of database systems, came up with twelve rules of his own, which according to him, a database must obey in order to be regarded as a true relational database.

These rules can be applied on any database system that manages stored data using only its relational capabilities. This is a foundation rule, which acts as a base for all the other rules.

Rule 1: Information Rule

The data stored in a database, may it be user data or metadata, must be a value of some table cell. Everything in a database must be stored in a table format.

Rule 2: Guaranteed Access Rule

Every single data element (value) is guaranteed to be accessible logically with a combination of table-name, primary-key (row value), and attribute-name (column value). No other means, such as pointers, can be used to access data.

Rule 3: Systematic Treatment of NULL Values

The NULL values in a database must be given a systematic and uniform treatment. This is a very important rule because a NULL can be interpreted as one the following – data is missing, data is not known, or data is not applicable.

Rule 4: Active Online Catalog

The structure description of the entire database must be stored in an online catalog, known as **data dictionary**, which can be accessed by authorized users. Users can use the same query language to access the catalog which they use to access the database itself.

Rule 5: Comprehensive Data Sub-Language Rule

A database can only be accessed using a language having linear syntax that supports data definition, data manipulation, and transaction management operations. This language can be used directly or by means of some application. If the database allows access to data without any help of this language, then it is considered as a violation.

Rule 6: View Updating Rule

All the views of a database, which can theoretically be updated, must also be updatable by the system.

Rule 7: High-Level Insert, Update, and Delete Rule
A database must support high-level insertion, updation, and deletion. This must not be limited to a single row, that is, it must also support union, intersection and minus operations to yield sets of data records.

Rule 8: Physical Data Independence
The data stored in a database must be independent of the applications that access the database. Any change in the physical structure of a database must not have any impact on how the data is being accessed by external applications.

Rule 9: Logical Data Independence
The logical data in a database must be independent of its user's view (application). Any change in logical data must not affect the applications using it. For example, if two tables are merged or one is split into two different tables, there should be no impact or change on the user application. This is one of the most difficult rule to apply.

Rule 10: Integrity Independence
A database must be independent of the application that uses it. All its integrity constraints can be independently modified without the need of any change in the application. This rule makes a database independent of the front-end application and its interface.

Rule 11: Distribution Independence
The end-user must not be able to see that the data is distributed over various locations. Users should always get the impression that the data is located at one site only. This rule has been regarded as the foundation of distributed database systems.

Rule 12: Non-Subversion Rule
If a system has an interface that provides access to low-level records, then the interface must not be able to subvert the system and bypass security and integrity constraints.

11. Explain the types of keys

KEYS in DBMS is an attribute or set of attributes which helps you to identify a row(tuple) in a relation(table). They allow you to find the relation between two tables. Keys help you uniquely identify a row in a table by a combination of one or more columns in that table. Key is also helpful for finding unique record or row from the table. Database key is also helpful for finding unique record or row from the table.

keys in DBMS with example:

Super Key – A super key is a group of single or multiple keys which identifies rows in a table.
Primary Key – is a column or group of columns in a table that uniquely identify every row in that table.
Candidate Key – is a set of attributes that uniquely identify tuples in a table. Candidate Key is a super key with no repeated attributes.
Alternate Key – is a column or group of columns in a table that uniquely identify every row in that table.
Foreign Key – is a column that creates a relationship between two tables. The purpose of Foreign keys is to maintain data integrity and allow navigation between two different instances of an entity.
Compound Key – has two or more attributes that allow you to uniquely recognize a specific record. It is possible that each column may not be unique by itself within the database.
Composite Key – is a combination of two or more columns that uniquely identify rows in a table. The combination of columns guarantees uniqueness, though individual uniqueness is not guaranteed.
Surrogate Key – An artificial key which aims to uniquely identify each record is called a surrogate key. These kind of key are unique because they are created when you don't have any natural primary key.

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SRM ARTS AND SCIENCE COLLEGE
I UNIT TEST – SEP 2022
Department of Computer Science

Date : 15.09.22 **Duration : 1 hour** **Class :III B.Sc CS**

Subject Name & Code : Artificial Intelligence and Expert System

Section A
(Answer any **FIVE** questions) (5 x 2 = 10)

CO1	BL1	1. Define Expert System.
CO2	BL2	2. Describe the Travelling Sales man problems.
CO2	BL1	3. Define DFS.
CO4	BL1	4. List out any four AI Techniques?
CO1	BL4	5. Differentiate the AI and Expert System.
CO2	BL2	6. Classify the Criteria For Success.
CO3	BL1	7. Define Problem Space.

Section B
(Answer any **ONE** question) (1 x 5 = 5)

CO3	BL2	8. Explain About Hill-Climbing with Example.
CO4	BL2	9.Explain AI Technique with Tic-Tac-Toe Problem example.

Section C
(Answer any **ONE** question) (1 x 10 = 10)

CO5	BL2	10.Explain Briefly with example Best-first search Algorithms.
CO4	BL1	11.Define Problem State space and Explain Water jug Problem.

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DEPARTMENT OF COMPUTER SCIENCE - I UNIT TEST, SEP 2022

CLASS: **III BSc CS** TIME : 1 Hour

SUB: ***Artificial Intelligence and Expert System*** Max : 25 Marks

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ANSWER KEY

PART A – (5 X 2 = 10 Marks)
Answer any FIVE questions

1. **Define Expert System.**

An expert system is a computer program that is designed to solve complex problems and to provide decision-making ability like a human expert. It performs this by extracting knowledge from its knowledge base using the reasoning and inference rules according to the user queries.

2. **Describe the Travelling Sales man problems.**

The traveling salesman problem (TSP) is an algorithmic problem tasked with finding the shortest route between a set of points and locations that must be visited. In the problem statement, the points are the cities a salesperson might visit.

3. **Define DFS.**

The **Depth First Search** (DFS) is an algorithm for traversing or searching tree or graph data structures which uses the idea of backtracking. It explores all the nodes by going forward if possible or uses backtracking.

4. **List out any four AI Techniques?**

- Heuristics, Support Vector Machines, Artificial Neural Networks, Markov Decision Process, Natural Language Processing.

5. **Differentiate the AI and Expert System.**

Artificial Intelligence	Expert System
AI is the ability of a machine or a computer program to think, work, learn and react like humans.	Expert systems represent the most successful demonstration of the capabilities of AI.
AI involves the use of methods based on the intelligent behavior of humans to solve complex problems.	Experts systems are computer programs designed to solve complex decision problems.

6. **Classify the Criteria For Success.**

The standards/levels by which to judge whether an objective/goal/ target/outcome has been achieved/successful. Success criteria are linked to intended outcomes and targets e.g. of action plans, of strategic plans. Success criteria are often linked to metrics.

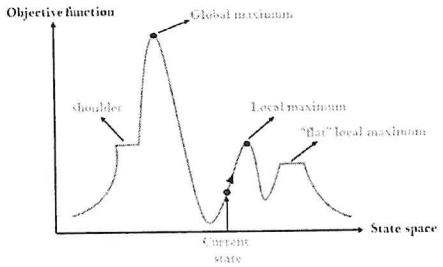
7. **Define Problem Space.**

The Problem Space is the problem and everything associated with the problem, including such things as the history of the problem; the stakeholders (those who benefit from the problem, those who contribute to the problem, and those who feel the problem most deeply, as pain).

PART B – (1 X 5 = 5 Marks)
Answer any ONE question

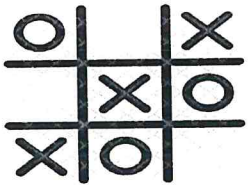
8. Explain About Hill-Climbing with Example

- Hill climbing algorithm is a local search algorithm which continuously moves in the direction of increasing elevation/value to find the peak of the mountain or best solution to the problem. It terminates when it reaches a peak value where no neighbor has a higher value.
- Hill climbing algorithm is a technique which is used for optimizing the mathematical problems. One of the widely discussed examples of Hill climbing algorithm is Traveling-salesman Problem in which we need to minimize the distance traveled by the salesman.
- It is also called greedy local search as it only looks to its good immediate neighbor state and not beyond that.
- A node of hill climbing algorithm has two components which are state and value.
- Hill Climbing is mostly used when a good heuristic is available.



9. Explain AI Technique with Tic-Tac-Toe Problem example.

Implementation of Tic-Tac-Toe



Following are the data structures used in the program or solution:
Board: 9 element vectors representing the board, with 1-9 for each square. An element contains the value 0 if it is blank, 1 if it is filled by X, or 2 if it is filled with an O
Move table: A large vector of 19,683 elements (3^9), each element is a 9-element vector.
Algorithm:
1. View the 9 element vector as a ternary number. Convert ternary number to a decimal number.
2. Use the computed decimal number as an index in the Move-Table and access the vector stored there.
3. Set the new board to that vector.

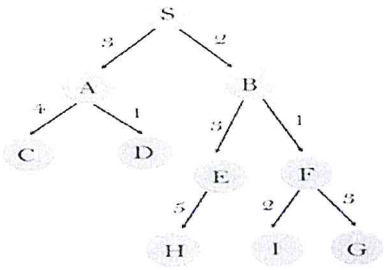
PART C – (1 X 10 = 10 Marks)
Answer any ONE question

10. Explain Briefly with example Best-first search Algorithms.

Greedy best-first search algorithm always selects the path which appears best at that moment. It is the combination of depth-first search and breadth-first search algorithms. It uses the heuristic function and search. Best-first search allows us to take the advantages of both algorithms. With the help of best-first search, at each step, we can choose the most promising node. In the best first search algorithm, we expand the node which is closest to the goal node and the closest cost is estimated by heuristic function, i.e.

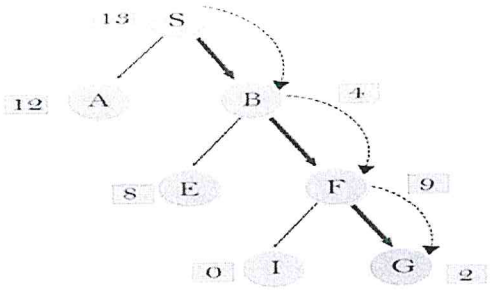
f(n)= g(n).

Example:



node	H (n)
A	12
B	4
C	7
D	3
E	8
F	2
H	4
I	9
S	13
G	0

In this search example, we are using two lists which are **OPEN** and **CLOSED** Lists. Following are the iteration for traversing the above example.



Expand the nodes of S and put in the CLOSED list

Initialization: Open [A, B], Closed [S]
Iteration 1: Open [A], Closed [S, B]
Iteration 2: Open [E, F, A], Closed [S, B]
: Open [E, A], Closed [S, B, F]
Iteration 3: Open [I, G, E, A], Closed [S, B, F]
: Open [I, E, A], Closed [S, B, F, G]
Hence the final solution path will be: **S----> B----->F----> G**

11.Define Problem State space and Explain Water jug Problem.

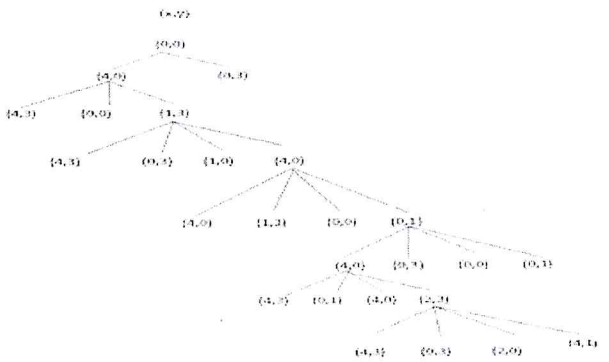
Water Jug Problem:

Problem: You are given two jugs, a 4-gallon one and a 3-gallon one.Neither has any measuring mark on it.There is a pump that can be used to fill the jugs with water.How can you get exactly 2 gallons of water into the 4-gallon jug.

Solution:

The state space for this problem can be described as the set of ordered pairs of integers **(x,y)**
Where,
X represents the quantity of water in the 4-gallon jug **X= 0,1,2,3,4**
Y represents the quantity of water in 3-gallon jug **Y=0,1,2,3**
Start State: (0,0)
Goal State: (2,0)
Generate production rules for the water jug problem
Production Rules:

Rule	State	Process
1	(X,Y | X<4)	(4,Y) {Fill 4-gallon jug}
2	(X,Y |Y<3)	(X,3) {Fill 3-gallon jug}
3	(X,Y |X>0)	(0,Y) {Empty 4-gallon jug}
4	(X,Y | Y>0)	(X,0) {Empty 3-gallon jug}
5	(X,Y | X+Y>=4 ^ Y>0)	(4,Y-(4-X)) {Pour water from 3-gallon jug into 4-gallon jug until 4-gallon jug is full}
6	(X,Y | X+Y>=3 ^X>0)	(X-(3-Y),3) {Pour water from 4-gallon jug into 3-gallon jug until 3-gallon jug is full}
7	(X,Y | X+Y<=4 ^Y>0)	(X+Y,0) {Pour all water from 3-gallon jug into 4-gallon jug}
8	(X,Y | X+Y <=3^ X>0)	(0,X+Y) {Pour all water from 4-gallon jug into 3-gallon jug}
9	(0,2)	(2,0) {Pour 2 gallon water from 3 gallon jug into 4 gallon jug}



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SRM ARTS AND SCIENCE COLLEGE
I - UNIT TEST, SEPTEMBER 2022

Department of Computer Science

Date : 12.09.2022 **Duration : 1 Hr** **Class :II M.Sc**

Subject Name & Code : **Principles of Compiler Design , PSD3A**

Section A

(5 x 1 = 5)

(Answer any **FIVE** questions)

CO1	BL2	1. Differentiate compiler and interpreter.
CO2	BL1	2. Define Handle pruning.
CO1,5	BL1	3. Identify the tokens in the following statement. If (T <= MIN) goto 200.
CO1,5	BL3	4. What is the use of context-free grammar?
CO2	BL1	5. Define leftmost derivation.
CO2,4	BL1	6. Name the bottom up parsing methods.
CO2	BL1	7. List down the role of parser.

Section B

(2 x 5 = 10)

(Answer any **TWO** questions)

CO1,4	BL2	8. Discuss about various compiler writing tools..
CO1,5	BL2	9. Describe implementation of lexical analyzer.
CO2,5	BL6	10. Write FIRST and FOLLOW of E->E+T/T, T->T*F/F, F->(E)/id
CO2,4	BL6	11.Write about terminals and non-terminals?

Section C

(1 x 10 = 10)

(Answer any **ONE** question)

CO1	BL2	12. Discuss the structure of a compiler.
CO2,5	BL3	13. Demonstrate SLR parser with example.

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SRM ARTS AND SCIENCE COLLEGE
Department of Computer Science

Date : 12.09.2022 **Duration : 1 Hr** **Class :II M.Sc**
Subject Name & Code : **Principles of Compiler Design , PSD3A**

Answer Key

Section A (5 x 1 = 5)
(Answer any **FIVE** questions)

CO1 BL2 1. Differentiate compiler and interpreter.

1. Compiler**:**
It is a translator which takes input i.e., High-Level Language, and produces an output of low-level language i.e. machine or assembly language.

- A compiler is more intelligent than an assembler it checks all kinds of limits, ranges, errors, etc.
- But its program run time is more and occupies a larger part of memory. It has a slow speed because a compiler goes through the entire program and then translates the entire program into machine codes.

2. Interpreter**:**
An interpreter is a program that translates a programming language into a comprehensible language. –

- It translates only one statement of the program at a time.
- Interpreters, more often than not are smaller than compilers.

CO2 BL1 2. Define Handle pruning.
Removing the children of the left-hand side non-terminal from the parse tree is called Handle Pruning. A rightmost derivation in reverse can be obtained by handle pruning.

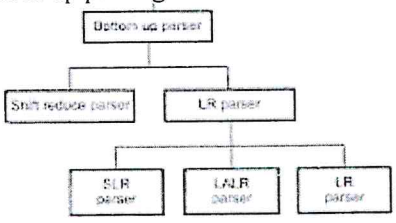
CO1,5 BL1 3. Identify the tokens in the following statement. If (T <= MIN) goto 200.
If, (, T, <=, MIN,), goto, 200

CO1,5 BL3 4. What is the use of context-free grammar?
Context Free Grammars are used **to define the High Level Structure of a Programming Languages**. Every Context Free Grammars can be converted to a Parser which is a component of a Compiler that identifies the structure of a Program and converts the Program into a Tree.

CO2 BL1 5. Define leftmost derivation.

- The process of deriving a string by expanding the leftmost non-terminal at each step is called as **leftmost derivation**.
- The geometrical representation of leftmost derivation is called as a **leftmost derivation tree**.

CO2,4 BL1 6. Name the bottom up parsing methods.



CO2 BL1 7. List down the role of parser.

Parser is a compiler that is used **to break the data into smaller elements coming from lexical analysis phase**. A parser takes input in the form of sequence of tokens and produces output in the form of parse tree. Parsing is of two types: top down parsing and bottom up parsing.

Section B (2 x 5 = 10)

(Answer any **TWO** questions)

CO1,4 BL2 8. Discuss about various compiler writing tools.

Some commonly used compiler construction tools include:

- Parser Generator
- Scanner Generator
- Syntax directed translation engines
- Automatic code generators
- Data-flow analysis engines
- Compiler construction toolkits

CO1,5 BL2 9. Describe implementation of lexical analyzer.

Lexical Analysis is the first phase of the compiler also known as a scanner. It converts the High level input program into a sequence of Tokens. Lexical Analysis can be implemented with the Deterministic finite Automata.

The output is a sequence of tokens that is sent to the parser for syntax analysis

How Lexical Analyzer functions

1. Tokenization i.e. Dividing the program into valid tokens.
2. Remove white space characters.
3. Remove comments.
4. It also provides help in generating error messages by providing row numbers and column numbers.

CO2,5 BL6 10. Write FIRST and FOLLOW of E->E+T/T, T->T*F/F, F->(E)/id

FIRST (E) = FIRST(T) = FIRST(F) = {(, id}

FOLLOW (E) = {$, +,)}

FOLLOW (T) = FOLLOW (F) = {$, +,),*}

CO2,4 BL6 11.Write about terminals and non-terminals?

Any Grammar can be represented by 4 tuples – <N, T, P, S>

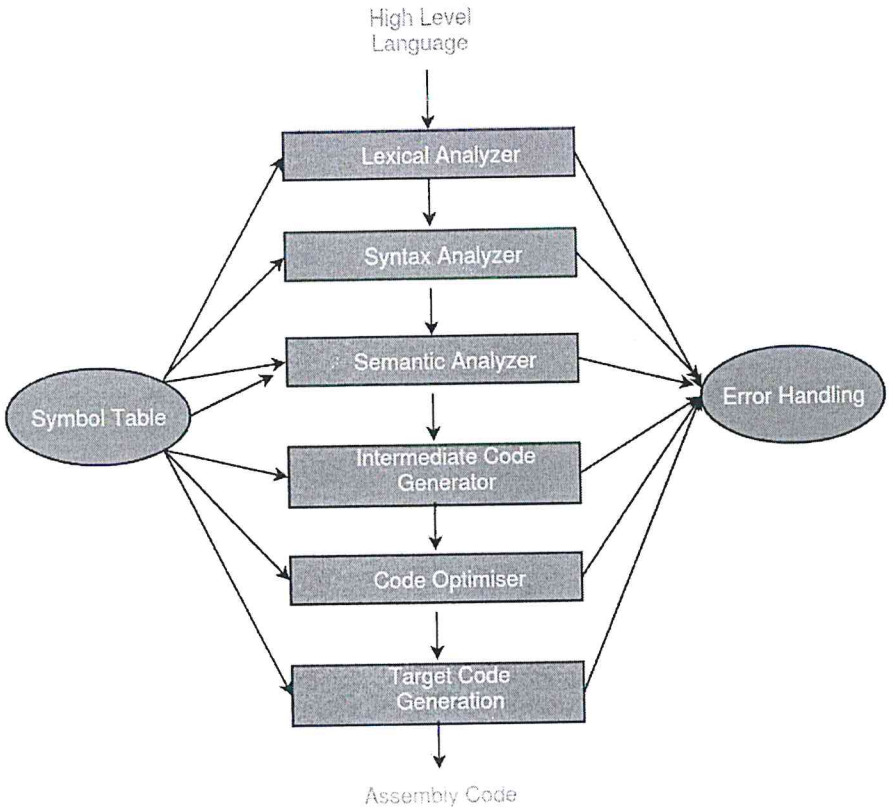
- **N** – Finite Non-Empty Set of Non-Terminal Symbols.
- **T** – Finite Set of Terminal Symbols.
- **P** – Finite Non-Empty Set of Production Rules.
- **S** – Start Symbol (Symbol from where we start producing our sentences or strings).

1. **Terminal Symbols** –
   Terminal symbols are those which are the components of the sentences generated using a grammar and are represented using small case letter like a, b, c etc.
2. **Non-Terminal Symbols** –
   Non-Terminal Symbols are those symbols which take part in the generation of the sentence but are not the component of the sentence. Non-Terminal Symbols are also called Auxiliary Symbols and Variables. These symbols are represented using a capital letter like A, B, C, etc.

Section C (1 x 10 = 10)

(Answer any **ONE** question)

CO1 BL2 10. Discuss the structure of a compiler.



CO2,5 BL3 11. Demonstrate SLR parser with example.

1. Construct C = { I 0 , I 1 , ……. I n }, the collection of sets of LR(0) items for G'.
2. State i is constructed from Ii. The parsing actions for state i are determined as follow :
   - If [A -> ?.a?] is in I i and GOTO(I i , a) = I j , then set ACTION[i, a] to "shift j".
     Here a must be terminal.
   - If [A -> ?.] is in I i , then set ACTION[i, a] to "reduce A -> ?" for all a in
     FOLLOW(A); here A may not be S'.
   - Is [S -> S.] is in I i , then set action[i, $] to "accept". If any conflicting actions are generated by the above rules we say that the grammar is not SLR.
3. The goto transitions for state i are constructed for all nonterminals A using the rule:
   if GOTO(I i , A) = I j then GOTO [i, A] = j.
4. All entries not defined by rules 2 and 3 are made error.

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SRM ARTS AND SCIENCE COLLEGE
Department of Computer Science

Date: 13.09.2022 **Duration: 1 Hour** **Class: II M.Sc. (CS)**
Subject Name & Code: Information Security, PSD3B

Section A (5 x 1 = 5)

(Answer any **FIVE** questions)

CO3	BL1	1. Define the term secure.
CO2	BL2	2. Explain attack.
CO3	BL1	3. Define error.
CO4	BL2	4. Explain denial of service.
CO4	BL4	5. Explain malicious code
CO4	BL1	6. Define virus.
CO4	BL1	7. Define threat.

Section B (2 x 5 = 10)

(Answer any **TWO** questions)

CO2	BL2	8. Discuss on the nature of computer criminals.
CO5	BL6	9. Write briefly about software program controls.
CO4	BL2	10. Describe the system security threats.
CO3	BL2	11. Explain the procedure to secure programs

Section C (1 x 10 = 10)

(Answer any **ONE** question)

CO4	BL2	11. Discuss different kinds of malicious code.
CO3	BL2	12. Discuss on the methods of Defense on Computer-based Crime.

T.B

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DEPARTMENT OF COMPUTER SCIENCE - I UNIT TEST, September 2022

Answer Key

CLASS: II M.Sc. (CS) TIME: 1 Hour

SUB: Information Security (PSD3B) Max: 25 Marks

PART A – (5 X 1 = 5 Marks)

1. Define the term secure

   Computer security is the protection of the items you value, called the assets of a computer or computer system.

2. Explain attack.

   A human who exploits a vulnerability perpetrates an attack on the system. An attack can also be launched by another system, as when one system sends an overwhelming flood of messages to another, virtually shutting down the second system's ability to function.

3. Define error.

   When a human makes a mistake, called an error, in performing some software activity, the error may lead to a fault, or an incorrect step, command, process, or data definition in a computer program, design, or documentation.

4. Explain denial of service.

   A Denial-of-Service (DoS) attack is an attack meant to shut down a machine or network, making it inaccessible to its intended users.

5. Explain malicious code

   Malicious code is unwanted files or programs that can cause harm to a computer or compromise data stored on a computer.

6. Define virus

   Virus is a type of malicious software, or malware that spreads between computers and causes damage to data and software.

7. Define threat

   Threat can be anything that can take advantage of a vulnerability to breach security and negatively alter, erase, harm object or objects of interest

PART B – (2 X 5 = 10 Marks)

8. Discuss on the nature of computer criminals.

   - Amateurs

- Crackers or Malicious Hackers
- Career Criminals
- Terrorists

9. Write briefly about software program controls.

If encryption is the primary way of protecting valuables, programs themselves are the second facet of computer security. Programs must be secure enough to prevent outside attack. They must also be developed and maintained so that we can be confident of the programs' dependability. Program controls include the following:

- internal program controls: parts of the program that enforce security restrictions, such as access limitations in a database management program
- operating system and network system controls: limitations enforced by the operating system or network to protect each user from all other users
- independent control programs: application programs, such as password checkers, intrusion detection utilities, or virus scanners, that protect against certain types of vulnerabilities
- development controls: quality standards under which a program is designed, coded, tested, and maintained to prevent software faults from becoming exploitable vulnerabilities

We can implement software controls by using tools and techniques such as hardware components, encryption, or information gathering. Software controls frequently affect users directly, such as when the user is interrupted and asked for a password before being given access to a program or data. For this reason, we often think of software controls when we think of how systems have been made secure in the past. Because they influence the way users interact with a computing system, software controls must be carefully designed. Ease of use and potency are often competing goals in the design of a collection of software controls.

10. Describe the system security threats.

A threat is blocked by control of a vulnerability. Much of the rest of this book is devoted to describing a variety of controls and understanding the degree to which they enhance a system's security. To devise controls, we must know as much about threats as possible. We can view any threat as being one of four kinds: interception, interruption, modification, and fabrication. Each threat exploits vulnerabilities of the assets in computing systems;

An interception means that some unauthorized party has gained access to an asset. The outside party can be a person, a program, or a computing system. Examples of this type of failure are illicit copying of program or data files, or wiretapping to obtain data in a network. Although a loss may be discovered fairly quickly, a silent interceptor may leave no traces by which the interception can be readily detected.

In an interruption, an asset of the system becomes lost, unavailable, or unusable. An example is malicious destruction of a hardware device, erasure of a program or data file, or malfunction of an operating system file manager so that it cannot find a particular disk file. If an unauthorized party not only accesses but tampers with an asset, the threat is a modification. For example, someone might change the values in a database, alter a program so that it performs an additional computation, or modify data being transmitted electronically. It is even possible to modify hardware. Some cases of modification can be detected with simple measures, but other, more subtle, changes may be almost impossible to detect. Finally, an unauthorized party might create a fabrication of counterfeit objects on a computing system. The intruder may insert spurious transactions to a network communication system or add records to an existing database. Sometimes these additions can be detected as forgeries, but if skillfully done, they are virtually indistinguishable from the real thing. These four classes of threats interception, interruption, modification, and fabrication describe the kinds of problems we might encounter. In the next section, we look more closely at a system's vulnerabilities and how we can use them to set security goals.

11. Explain the procedure to secure programs.

- Fixing Faults One approach to judging quality in security has been fixing faults. You might argue that a module in which 100 faults were discovered and fixed is better than another in which only 20 faults were discovered and fixed, suggesting that more rigorous analysis and testing had led to the finding of the larger number of faults. Au contraire, challenges your friend: a piece of software with 100 discovered faults is inherently full of problems and could clearly have hundreds more waiting to appear.
- Unexpected Behavior The inadequacies of penetrate-and-patch led researchers to seek a better way to be confident that code meets its security requirements. One way to do that is to compare the requirements with the behavior. That is, to

understand program security, we can examine programs to see whether they behave as their designers intended or users expected. We call such unexpected behavior a program security flaw; it is inappropriate program behavior caused by a program vulnerability

- Types of Flaws To aid our understanding of the problems and their prevention or correction, we can define categories that distinguish one kind of problem from another. For example, Landwehr et al. [LAN94] present a taxonomy of program flaws, dividing them first into intentional and inadvertent flaws. They further divide intentional flaws into malicious and nonmalicious ones. In the taxonomy, the inadvertent flaws fall into six categories: x validation error (incomplete or inconsistent): permission checks x domain error: controlled access to data x serialization and aliasing: program flow order x inadequate identification and authentication: basis for authorization x boundary condition violation: failure on first or last case x other exploitable logic errors

PART C – (1 X 10 = 10 Marks)

12. Discuss different kinds of malicious code.

Types of Malicious Code. Code Type Characteristics Virus Attaches itself to program and propagates copies of itself to other programs Trojan horse Contains unexpected, additional functionality Logic bomb Triggers action when condition occurs Time bomb Triggers action when specified time occurs Trapdoor Allows unauthorized access to functionality Worm Propagates copies of itself through a network Rabbit Replicates itself without limit to exhaust resources.

13. Discuss on the methods of Defense on Computer-based Crime.

we investigate the legal and ethical restrictions on computer-based crime. But unfortunately, computer crime is certain to continue for the foreseeable future. For this reason, we must look carefully at controls for preserving confidentiality, integrity, and availability. Sometimes these controls can prevent or mitigate attacks; other, less powerful methods can only inform us that security has been compromised, by detecting a breach as it happens or after it occurs. Harm occurs when a threat is realized against a vulnerability. To protect against harm, then, we can neutralize the threat, close the vulnerability, or both. The possibility for harm to occur is called risk. We can deal with harm in several ways. We can seek to x prevent it, by blocking the attack or closing the vulnerability x deter it, by making the attack harder but not

impossible x deflect it, by making another target more attractive (or this one less so) x detect it, either as it happens or some time after the fact x recover from its effects.

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I - UNIT TEST, SEPTEMBER 2022

Department of Computer Science

Date: 14.9.2022 **Duration: 1 Hour** **Class: II M.Sc CS**

***Subject Name & Code: Artificial Intelligence* & PSD3C**

Section A (5 x 1 = 5)

(Answer any **FIVE** questions)

CO1 BL1 1. Define Artificial Intelligence

CO2 BL2 2. Discuss about heuristic function.

CO1 BL5 3. Summarize about rationality

CO1 BL2 4. Discuss problem-solving agent.

CO3 BL1 5. Define syntax.

CO2 BL3 6. Interpret PEAS.

CO4 BL4 7. Differentiate atomic and complex sentence.

Section B (2 x 5 = 10)

(Answer any **ONE** question)

CO1 BL2 8. Discuss about the type of agents in artificial intelligence.

CO6 BL3 9. Sketch the central component of knowledge base.

CO2 BL4 10. Differentiate forward and backward chaining.

CO3 BL2 11. Explain breadth first search and depth first search.

Section C (1 x 10 = 10)

(Answer any **ONE** question)

CO2 BL2 12. Describe about un-informed searching strategies in artificial intelligence.

CO3 BL3 13. Demonstrate the conjunctive normal form for first order logic.

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SRM ARTS AND SCIENCE COLLEGE
Department of Computer Science

Date: 14.9.2022 **Duration: 1 Hour** **Class: II M.Sc CS**

***Subject Name & Code: Artificial Intelligence* & PSD3C**

Section A (5 x 1 = 5)

(Answer any **FIVE** questions)

CO1 BL1 1. Define Artificial Intelligence

Artificial intelligence is the simulation of human intelligence processes by machines, especially computer systems. Specific applications of AI include expert systems, natural language processing, speech recognition and machine vision.

CO2 BL2 2. Discuss about heuristic function.

A heuristic function, also simply called a heuristic, is a function that ranks alternatives in search algorithms at each branching step based on available information to decide which branch to follow. For example, it may approximate the exact solution

CO1 BL5 3. Summarize about rationality.

Rationality means that an AI agent is assumed to take account of available information and uncertainty, potential costs and benefits, and to act consistently (logically) in choosing the best action.

CO1 BL2 4. Discuss problem-solving agent.

Problem-solving agent in Artificial Intelligence is goal-based agents that focus on goals, is one embodiment of a group of algorithms, and techniques to solve a well-defined problem in the area of Artificial Intelligence. And these agents are different from reflex agents who just have to map states into actions and can't map when storing and learning both are bigger.

CO3 BL1 5. Define Syntax.

Syntax – It refers to arranging words to make a sentence. It also involves determining the structural role of words in the sentence and in phrases. Semantics – It is concerned with the meaning of words and how to combine words into meaningful phrases and sentences.

CO2 BL3 6. Interpret PEAS.

PEAS stands for a Performance measure, Environment, Actuator, Sensor. Performance Measure: Performance measure is the unit to define the success of an agent. Performance varies with agents based on their different precepts. Environment: Environment is the surrounding of an agent at every instant.

CO4 BL4 7. Differentiate atomic and complex sentence.

Atomic Sentence = predicate (term1,.....,termn)
orterm1 =term2An **atomic sentence** is formed from a predicate symbol followed by list of terms.
Complex Sentences-We make complex sentence with connectives (just like in propositional logic).

Section B
(2 x 5 = 10)

(Answer any **ONE** question)

CO1 BL2 8. Discuss about the type of agents in artificial intelligence.

Types of AI Agents-Agents can be grouped into five classes based on their degree of perceived intelligence and capability. All these agents can improve their performance and generate better action over the time. These are given below:Simple Reflex Agent,Model-based reflex agent,Goal-based agents,Utility-based agent AND Learning agent

CO6 BL3 9. Sketch the central component of knowledge base.

An intelligent agent needs knowledge about the real world for taking decisions and reasoning to act efficiently.Knowledge-based agents are those agents who have the capability of maintaining an internal state of knowledge, reason over that knowledge, update their knowledge after observations and take actions. These agents can represent the world with some formal representation and act intelligently.Knowledge-based agents are composed of two main parts:

- Knowledge-base and
- Inference system.

A knowledge-based agent must able to do the following:

- An agent should be able to represent states, actions, etc.
- An agent Should be able to incorporate new percepts
- An agent can update the internal representation of the world
- An agent can deduce the internal representation of the world
- An agent can deduce appropriate actions.

CO2 BL4 10. Differentiate forward and backward chaining.

Forward Chaining	Backward Chaining
When based on available data a decision is taken then the process is called as Forward chaining.	Backward chaining starts from the goal and works backward to determine what facts must be asserted so that the goal can be achieved.
Forward chaining is known as data-driven technique because we reaches to the goal using the available data.	Backward chaining is known as goal-driven technique because we start from the goal and reaches the initial state in order to extract the facts.
It is a bottom-up approach.	It is a top-down approach.
It applies the Breadth-First Strategy.	It applies the Depth-First Strategy.
Its goal is to get the conclusion.	Its goal is to get the possible facts or the required

data.

CO3 BL2 11. Explain breadth first search and depth first search.

BFS	DFS
BFS stands for Breadth First Search.	DFS stands for Depth First Search.
BFS(Breadth First Search) uses Queue data structure for finding the shortest path.	DFS(Depth First Search) uses Stack data structure.
BFS is a traversal approach in which we first walk through all nodes on the same level before moving on to the next level.	DFS is also a traversal approach in which the traverse begins at the root node and proceeds through the nodes as far as possible until we reach the node with no unvisited nearby nodes.
BFS can be used to find a single source shortest path in an unweighted graph because, in BFS, we reach a vertex with a minimum number of edges from a source vertex.	In DFS, we might traverse through more edges to reach a destination vertex from a source.
BFS builds the tree level by level.	DFS builds the tree sub-tree by sub-tree.
It works on the concept of FIFO (First In First Out).	It works on the concept of LIFO (Last In First Out).
BFS considers all neighbours first and therefore not suitable for decision-making trees used in games or puzzles.	DFS is more suitable for game or puzzle problems. We make a decision, and the then explore all paths through this decision. And if this decision leads to win situation, we stop.
Here, siblings are visited before the children.	Here, children are visited before the siblings.
Nodes that are traversed several times are deleted from the queue.	The visited nodes are added to the stack and then removed when there are no more nodes to visit.
In BFS there is no concept of backtracking.	DFS algorithm is a recursive algorithm that uses the idea of backtracking
BFS is used in various applications such as bipartite graphs, shortest paths, etc.	DFS is used in various applications such as acyclic graphs and topological order etc.
BFS requires more memory.	DFS requires less memory.

Section C (1 x 10 = 10)

(Answer any **ONE** question)

CO2 BL2 12. Describe about un-informed searching strategies in artificial intelligence.

Uninformed Search' means the machine blindly follows the algorithm regardless of whether right or wrong, efficient or in-efficient. These algorithms are brute force operations, and they don't have extra information about the search space; the only information they have is on how to traverse or visit the nodes in the tree. Thus uninformed search algorithms are also called blind search algorithms. The search algorithm produces the search tree without using any domain knowledge, which is a brute force in nature. They don't have any background information on how to approach the goal or whatsoever. But these are the basics of search algorithms in AI.

Following are the techniques of Uninformed Search Techniques:-

- Breadth First Search (BFS)
- Depth First Search (DFS)
- Uniform Cost Search (UCS)
- Depth Limited Search (DLS)
- Iterative Deepening Search (IDS) or Progressive Deepening Search (PDS)
- Bi-directional Search Technique (BDS)

CO3 BL3 13. Demonstrate the conjunctive normal form for first order logic. First-Order logic: First-order logic is another way of knowledge representation in artificial intelligence. It is an extension to propositional logic.FOL is sufficiently expressive to represent the natural language statements in a concise way.First-order logic is also known as Predicate logic or First-order predicate logic. First-order logic is a powerful language that develops information about the objects in a more easy way and can also express the relationship between those objects.First-order logic (like natural language) does not only assume that the world contains facts like propositional logic but also assumes the following things in the world:

- Objects: A, B, people, numbers, colors, wars, theories, squares, pits, wumpus, ...
- Relations: It can be unary relation such as: red, round, is adjacent, or n-any relation such as: the sister of, brother of, has color, comes between
- Function: Father of, best friend, third inning of, end of, ...

- As a natural language, first-order logic also has two main parts:
  a. Syntax
  b. Semantics

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SRM ARTS AND SCIENCE COLLEGE
Department of Computer Science

Date:15 .09.2022 **Duration: 1 Hour** **Class: II M.Sc. (CS)**

Subject Name & Code: Big Data Analytics, PSDED

Section A (5 x 1 = 5)

(Answer any **FIVE** questions)

CO1	BL1	1. List out the types of data elements.
CO1	BL1	2. Define big data analytics.
CO1	BL1	3. Define Standardizing Data.
CO2	BL2	4. Explain Linear regression.
CO6	BL1	5. Identify the missing values.
CO2	BL1	6. State the Variable selection.
CO4	BL6	7. Write down the four computing resources of Big Data Storage.

Section B (2 x 5 = 10)

(Answer any **TWO** questions)

CO1	BL5	8. Summarize the Types of data sources.
CO4	BL6	9. Write briefly about software program controls.
CO2	BL2	10. Describe the steps involved in support vector based inference methodology.
CO2	BL2	11. Explain the sampling and sampling distribution give a detailed analysis.

Section C (1 x 10 = 10)

(Answer any **ONE** question)

CO2	BL2	12. Discuss an Outlier Detection and Treatment.
CO6	BL2	13. Briefly explain Predictive Analytics.

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Department of Computer Science

Date:15 .09.2022 **Duration: 1 Hour** **Class: II M.Sc. (CS)**

Subject Name & Code: Big Data Analytics, PSDED

Section A (5 x 1 = 5)

(Answer any **FIVE** questions)

CO1 BL1 1. List out the types of data elements.

- Name – The name of the data element within the data store.
- Data Element Offset – The offset of the data element.
- Type – The data type of the data element. ...
- Nature – The nature of the data element. ...
- Integer – The number of integers within a numeric data element.

CO1 BL1 2. Define big data analytics.

Big data analytics is the use of advanced analytic techniques against very large, diverse data sets that include structured, semi-structured and unstructured data, from different sources, and in different sizes from terabytes to zettabytes.

CO1 BL1 3. Define Standardization Data.

Data standardization is the process of converting data to a common format to enable users to process and analyze it. Most organizations utilize data from a number of sources; this can include data warehouses, lakes, cloud storage, and databases.

CO2 BL2 4. Explain Linear regression.

Linear regression is the most basic and commonly used predictive analysis. Regression estimates are used to describe data and to explain the relationship.

CO6 BL1 5. Identify the missing values.

Missing values are common when working with real-world datasets – not the cleaned ones available on Kaggle, for example. Missing data could result from a human factor (for example, a person deliberately failing to respond to a survey question), a problem in electrical sensors, or other factors.

CO2 BL1 6. State the Variable selection.

Variable selection (i.e. selection of the regression coefficient to update) is done by evaluating in each step all univariable regression models conditional on the estimates of the previous steps (used as offsets) and to select the variable corresponding to the best-fitting univariable model.

CO4 BL6 7. Write down the four computing resources of Big Data Storage.

The data itself in big data is unstructured, which means mostly file-based and object storage. Although a specific volume size or capacity is not formally defined, big data storage usually refers to volumes that grow exponentially to terabyte or petabyte scale.

Section B

(2 x 5 = 10)

(Answer any **TWO** questions)

CO1 BL5 8. Summarize the Types of data sources.

- Reports: Conversion funnel and pathing. Study these reports.
- Internal search queries. This seems like a no-brainer, but some brands forget to assess what people are searching for on their website.
- Store locators.
- Reviews & Customer Service inquiries.
- Domain reports.

CO4 BL6 9. Write briefly about software program controls.

Software is a generic term used to refer to applications, scripts and programs that run on a device. It can be thought of as the variable part of a computer, while hardware is the invariable part. The two main categories of software are application software and system software.

CO2 BL2 10. Describe the steps involved in support vector based inference methodology.

Support Vector Machine or SVM is one of the most popular Supervised Learning algorithms, which is used for Classification as well as Regression problems. However, primarily, it is used for Classification problems in Machine Learning.

The goal of the SVM algorithm is to create the best line or decision boundary that can segregate n-dimensional space into classes so that we can easily put the new data point in the correct category in the future. This best decision boundary is called a hyperplane.

SVM chooses the extreme points/vectors that help in creating the hyperplane. These extreme cases are called as support vectors, and hence algorithm is termed as Support Vector Machine. Consider the below diagram in which there are two different categories that are classified using a decision boundary or hyperplane.

CO2 BL2 11. Explain the sampling and sampling distribution give a detailed analysis.

Sampling distributions are important for inferential statistics. In practice, one will collect sample data and, from these data, estimate parameters of the population distribution. Thus, knowledge of the sampling distribution can be very useful in making inferences about the overall population.

Section C

(1 x 10 = 10)

(Answer any **ONE** question)

CO2 BL2 12. Discuss an Outlier Detection and Treatment.

For outlier identification in a dataset, it is very important to keep in mind the context and finding answer the very basic and pertinent question: "Why do I want to detect outliers?" The context will explain the meaning of your findings.

Remember two important questions about your dataset in times of outlier identification:

(i) Which and how many features am I considering for outlier detection? (univariate / multivariate)

(ii) Can I assume a distribution(s) of values for my selected features? (parametric / non-parametric)

CO6 BL2 13. Briefly explain Predictive Analytics.

Predictive analytics is a branch of advanced analytics that makes predictions about future outcomes using historical data combined with statistical modeling, data mining techniques and machine learning. Companies employ predictive analytics to find patterns in this data to identify risks and opportunities.

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I - UNIT TEST, SEPTEMBER 2022

DEPARTMENT OF COMPUTER SCIENCE

Date : 16.09.2022 **Duration : 1 Hr** **Class : I MSc CS**

Subject Name & Code: CLOUD COMPUTING – PSDEJ **Max : 25 Marks**

SECTION – A
Answer any FIVE Questions **(5 x 1 = 5)**

CO	5	**BL**	B4	1. Analyze the Cloud Computing
CO	5	**BL**	B4	2. Categorize the Private Cloud
CO	6	**BL**	B2	3. Classify the cloud service of SaaS.
CO	5	**BL**	B4	4. Categorize the Hypervisor
CO	5	**BL**	B4	5. Differentiate Grid computing and Cloud computing
CO	2	**BL**	B1	6. Identify web conferencing
CO	3	**BL**	B1	7. List the popular Web Mail Services.

SECTION – B
Answer any TWO Questions **(2 x 5 = 10)**

CO	6	**BL**	B4	8. Explain the Cloud service development.
CO	4	**BL**	B2	9. Describe the pros and cons of cloud computing.
CO	4	**BL**	B2	10. Explain in detail about Centralizing email communication.
CO	4	**BL**	B2	11. Explain in detail about collaborating on word processing, spreadsheets and databases.

SECTION – C
Answer any ONE Question **(1 x 10 = 10)**

CO	6	**BL**	B2	12. Classify the various types of clouds
CO	1	**BL**	B5	13. Briefly summarize the history of cloud Computing

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Answer Key

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DEPARTMENT OF COMPUTER SCIENCE

Date : 16.09.2022 **Duration : 1 Hr** **Class : IMSc CS**

Subject Name & Code: CLOUD COMPUTING – PSDEJ **Max : 25 Marks**

PART A – (5 X 1 = 5 Marks)

Answer any FIVE questions

1. Analyze the Cloud Computing

   Ans: Cloud Computing is the delivery of computing services such as servers, storage, databases, networking, software, analytics, intelligence, and more, over the Cloud (Internet).

2. Categorize the Private Cloud

   Ans: A private cloud may physically be located on the company's on-site datacentre or hosted by a third-party service provider.

3. Classify the cloud service of SaaS.

   Ans: SaaS(Software as a Service) is also known as "**On-Demand Software**". It is a software distribution model in which services are hosted by a cloud service provider.

4. Categorize the Hypervisor

   Ans: The **hypervisor** manages shared the physical resources of the hardware between the guest operating systems and host operating system

5. Differentiate Grid computing and Cloud Computing

   Cloud Computing

   - Cloud computing uses a **client-server** architecture to deliver computing resources such as servers, storage, databases, and software over the cloud (Internet) with pay-as-you-go pricing

   Grid Computing

- Grid computing is also called as "**distributed computing.**"
- It links multiple computing resources (PC's, workstations, servers, and storage elements) together and provides a mechanism to access them.

6. Identify web conferencing

   Web conferencing allows users to conduct business meetings and seminars, lead presentations, provide online education and offer direct customer support via remote keyboard mouse control. Control of the session can be passed among users, so any attendee can act as the main presenter.

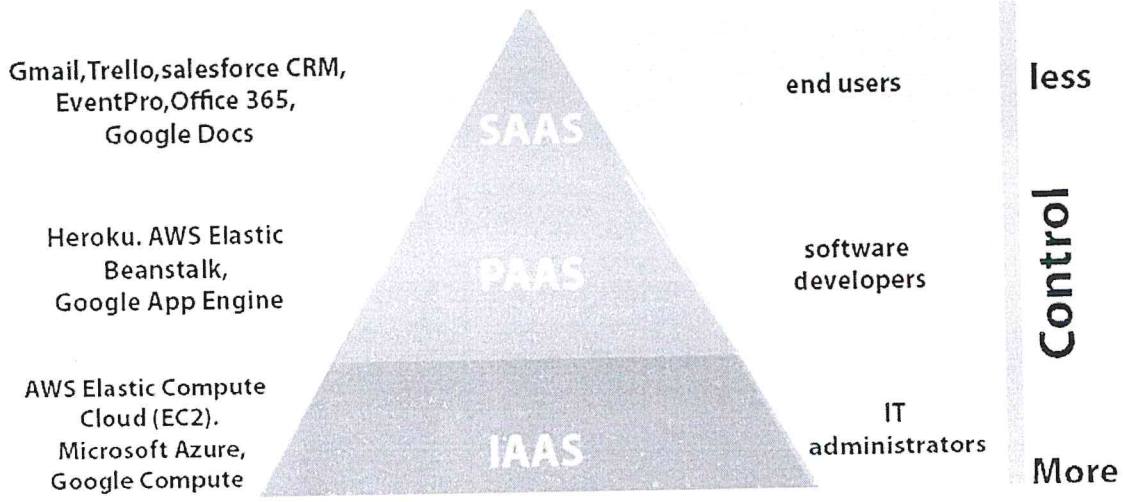
7. List the popular Web Mail Services.
   - Gmail. Gmail is the most used and popular email service provider with over 1.2 billion users all around the world. ...
   - Outlook. Outlook was initially founded as Hotmail by Microsoft. ...
   - AOL Mail. ...
   - 4. Yahoo Mail. ...
   - iCloud Mail. ...
   - ProtonMail. ...
   - Zoho Mail. ...
   - Yandex Mail.

PART B – (2 X 5 = 10 Marks)

Answer any TWO questions

8. Explain the Cloud service development.

Cloud Services



1. **Infrastructure as a Service (IaaS):** In IaaS, we can rent IT infrastructures like servers and virtual machines (VMs), storage, networks, operating systems from a cloud service vendor. We can create VM running Windows or Linux and install anything we want on it. Using IaaS, we don't need to care about the hardware or virtualization software, but other than that, we do have to manage everything else. Using IaaS, we get maximum flexibility, but still, we need to put more effort into maintenance.
2. **Platform as a Service (PaaS):** This service provides an on-demand environment for developing, testing, delivering, and managing software applications. The developer is responsible for the application, and the PaaS vendor provides the ability to deploy and run it. Using PaaS, the flexibility gets reduce, but the management of the environment is taken care of by the cloud vendors.
3. **Software as a Service (SaaS):** It provides a centrally hosted and managed software services to the end-users. It delivers software over the internet, on-demand, and typically on a subscription basis. E.g., Microsoft One Drive, Dropbox, WordPress, Office 365, and Amazon Kindle. SaaS is used to minimize the operational cost to the maximum extent.

9. Describe the pros and cons of cloud computing.

- **Advantages of Cloud Development**
- Instead of purchasing or licensing physical copies of software programs (one for each desktop), cloud applications are typically "rented," priced on a per-user basis.
- It's more of a subscription model than an asset purchase (and subsequent depreciation) model, which means there's less up-front investment and a more predictable monthly expense stream.
- IT departments like cloud applications because all management activities are managed from a central location rather than from individual sites or workstations.
- This enables IT staff to access applications remotely via the web. There's also the advantage of quickly outfitting users with the software they need (known as "rapid provisioning), and adding more computing resources as more users tax the system (automatic scaling).
- When you need more storage space or bandwidth, companies can just add another virtual server from the cloud.

- **Disadvantages of Cloud Development**
- Many businesses prefer to keep their applications, data, and IT operations under their own control.
- That said, there have been few instances of data loss with cloud-hosted applications and storage.
- It could even be argued that a large cloud hosting operation is likely to have better data security and redundancy tools than the average enterprise.
- In any case, however, even the perceived security danger from hosting critical data and services offsite might discourage some companies from going this route.
- Another potential disadvantage is what happens if the cloud computing host goes offline.
- Although most companies say this isn't possible, it has happened. Amazon's EC2 service suffered a massive outage on February 15, 2008, that wiped out some customer application data. (The outage was caused by a software deployment that erroneously terminated an unknown number of user instances.)
- For clients expecting a safe and secure platform, having that platform go down and your data disappear is a somewhat rude awakening.
- And, if a company relies on a third-party cloud platform to host all of its data with no other physical backup, that data can be at risk.

10. Explain in detail about Centralizing email communication.

- The cloud computing is to enable easy access to emails in any part of the world at any given time.
- Email, in one form or another, has been around almost as long as computer networks and long predates the arrival of the Internet. In pre-cloud computing, your email access was via a single computer.
- This computer also stored all your email messages. Microsoft Outlook or Outlook Express and similar programs installed on your home computer were mainly used for this purpose.
- A better approach is to use a Web-based email service, such as Google's Gmail, Yahoo! Mail or Microsoft's Windows Live Hotmail.
- Gmail is the Google approach to email and chat. Practically unlimited free online storage allows you to collect all your messages, and Gmail's simple but very smart interface lets you locate them conveniently.

- Windows Live Hotmail is yet another free email service that gives you unlimited storage, fast search, good security. Windows Live Hotmail has various helpful shortcuts when you need to organize your emails.
- Yahoo! Mail is your ever-present email program on the web. Its free-form labeling and smart folders and a strong spam filter to catch junk effectively make Y! Mail a joy to use.
- These services put your email inbox in the cloud and you can access all emails from any computer with an Internet connection.
- The messages you receive and send are stored on the Web, so nothing depends on a single personal computer and you can access all the messages from any computer that has an internet connection.
- The basic advantage of using Web-based email is that no matter what PC you use, your messages will always remain where they should be and will be in perfect synchronization.

11. Explain in detail about collaborating on word processing, spreadsheets and databases.

Exploring Web-Based Word Processors :

There many web-based word processing applications (led by the ever-popular Google Docs) which are given below :

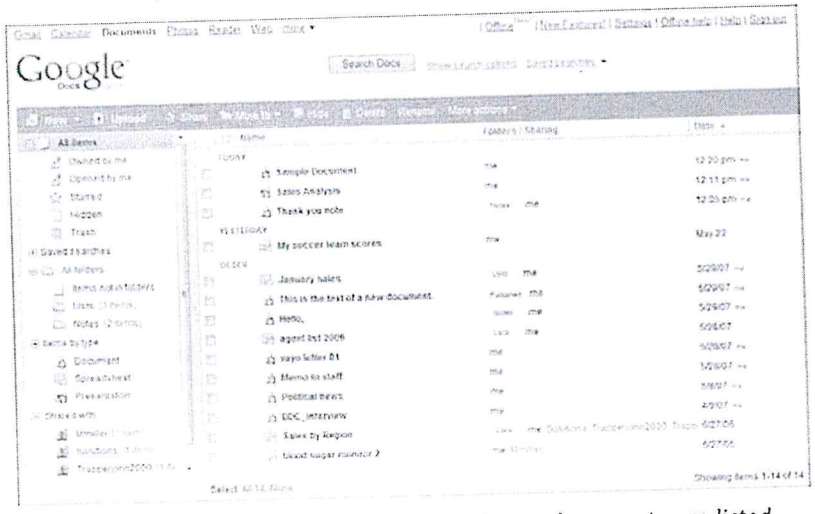
Google Docs, Adobe Buzzword, ajaxWrite, Docly, Glide Write, iNetWord, KBdocs, Peepel WebWriter, ThinkFree Write, WriteBoard, Zoho Writer .

Google Docs :

Google Docs (docs.google.com) is the most popular web-based word processor which is actually a suite of applications that also includes Google Spreadsheets and Google Presentations.

Basic formatting is easy enough to do, storage space for your documents is generous, and sharing/collaboration version control is a snap to do.

When you log in to Google Docs with your Google account, you see the page as shown in figure below. This is the home page for all the Docs applications (word processing, spreadsheets, and presentations); all your previously created documents are listed on this page.



The Google Docs home page—where all your documents are listed.

The leftmost pane helps you organize your documents. You can store files in folders, view documents by type (word processing document or spreadsheet), and display documents shared with specific people.

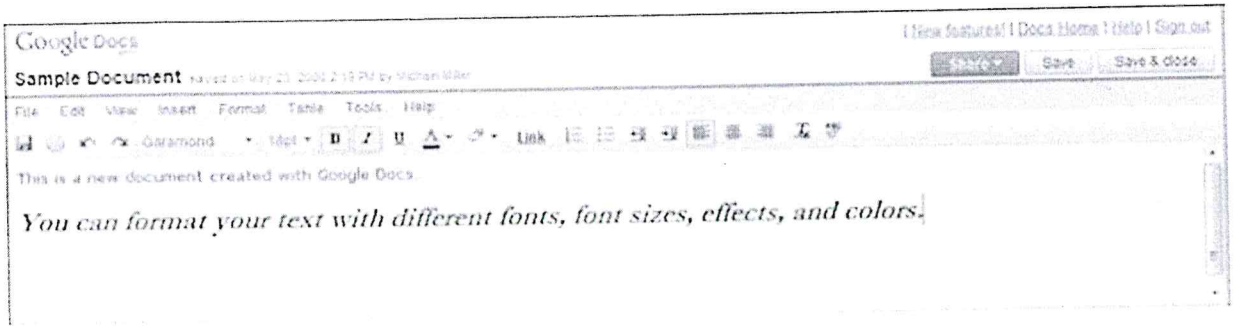
The documents for the selected folder or filter are displayed in the main part of the window.

To open any document, click the item's title. The document will open in a new window. To

delete an item, select it and then click the Delete button.

To create a new word processing document, click the New button and select Document. The new document opens in a new browser window as shown in figure below.

Your document looks like a big blank space in this new browser window, one with a pull-down menu and toolbar at the top. You use the toolbar buttons and the functions on the pull-down menu to edit and format your document.



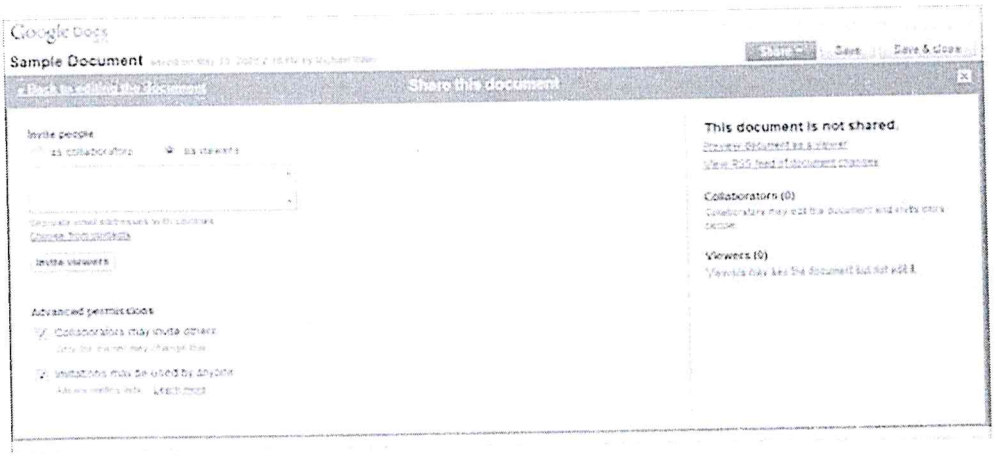
A new Google Docs document.

With all web-based word processors, when you create a Google Docs document, you're actually creating an HTML document—just like a web page.

All HTML-type formatting is available for your documents, through the Google Docsinterface.

One of the most useful features of Google Docs is the capability to share a document with other Google Docs users, either for viewing or for collaborative editing.

To share a document or spreadsheet for viewing or collaboration, click the Share button and select Share with others as shown in figure below .



Setting peody to share a Google Docs document.

In the Invite People box, enter the email addresses of the people you want to share the document (separate multiple addresses with commas).

If you want others to just view the document without being able to edit it, check the As Viewers option.

If you want others to be able to edit the document, check the As Collaborators option.

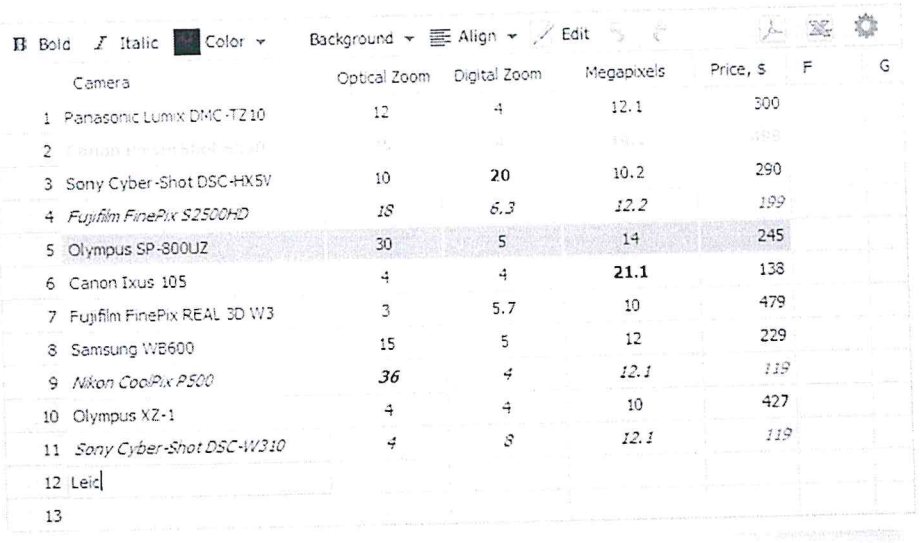
- Click the Invite Viewers or Invite Collaborators button to send out the invitations.

Your recipients now receive an invitation via email. The invitation contains a link to the document; clicking this link opens the document in a new browser window. Multiple users can edit the document at the same time.

Finally, there's a relatively new feature in Google Docs that the ability to work on your documents offline, without an Internet connection. To use Google Docs Offline, click the Offline link to download and install Google Gears, a software tool that converts Google online apps into traditional desktop apps.

Collaborating on Spreadsheets

An online spreadsheet is a spreadsheet document edited through a web-based application that allows multiple persons to edit and share it with the world.



	Camera	Optical Zoom	Digital Zoom	Megapixels	Price, $	F	G
1	Panasonic Lumix DMC-TZ10	12	4	12.1	300		
2							
3	Sony Cyber-Shot DSC-HX5V	10	20	10.2	290		
4	*Fujifilm FinePix S2500HD*	*18*	*6.3*	*12.2*	*199*		
5	Olympus SP-800UZ	30	5	14	245		
6	Canon Ixus 105	4	4	**21.1**	138		
7	Fujifilm FinePix REAL 3D W3	3	5.7	10	479		
8	Samsung WB600	15	5	12	229		
9	*Nikon CoolPix P500*	***36***	*4*	*12.1*	*119*		
10	Olympus XZ-1	4	4	10	427		
11	*Sony Cyber-Shot DSC-W310*	*4*	*8*	*12.1*	*119*		
12	Leic						
13							

Web-Based JavaScript Spreadsheet How Web-Based Spreadsheets Work :

A web-based spreadsheet application is hosted in the cloud, whereas Excel is a traditional desktop software program stored on your computer's hard disk.

If you know how to use Excel, you'll be quite comfortable with most of the web based spreadsheet applications.

Benefits of Web-Based Spreadsheets :

A web-based spreadsheet application carries with all the same benefits as you get with other web-based applications Your spreadsheets can be accessed from any Internet-connected computer, not just the computer you originally created the spreadsheet with.

Your spreadsheets are still accessible if you have a computer problem or hard disk crash. 3- You an easily share your spreadsheets with others—enabling workgroup collaboration with users in other locations.

Most web-based spreadsheets today are free—which is not the case with Microsoft Excel and the Office suite.

Who should use a Web-Based Spreadsheet ? 1- Beginning users :

The slightly limited functionality of these cloud apps actually works to the benefit of beginning users.

Most of these web-based spreadsheets are extremely easy to use; everything you need is right out in the open, not hidden inside layers of menus and dialog boxes.

Casual users :

If all you're doing is totaling a few numbers or creating a simple budget or two, a web-based application gets the job done with ease.

Anyone who wants access to spreadsheets from multiple locations :

you're always accessing the same versions of your spreadsheets, stored in the cloud.

Anyone who needs to share spreadsheets with others :

You can share your spreadsheet with other team members or interested parties over the web; just authorize them to access your spreadsheet in read-only mode.

Anyone who needs to edit spreadsheets in a collaborative environment :

When you're working on a group project (such as a budget for a large organization), you often need multiple users to both access and edit data in a spreadsheet.

Who shouldn't use one of these applications?

Power users :

Most of these cloud applications lack Excel's most advanced features and simply won't get the job done.

Anyone who wants to create sophisticated printouts :

Most of today's web-based spreadsheet applications lack some of the moresophisticated formatting options that Excel users take for granted (no cell borders in spreadsheets, for example).

With these web-based apps, what you see onscreen is typically what prints out—for better or for worse.

Anyone working on sensitive documents :

Web-based applications spreadsheets are not good tools if your company has a lot of trade secrets it wants to protect. Anyone who needs to work when not connected to the Internet :

If you're not connected to the Internet, then you can't connect to and work with a web-based application.

Exploring Web-Based Spreadsheets :

- There are several web-based spreadsheet applications which are worthy competitors to Microsoft Excel.

Here we will be discussing on one of those popular competitor, that is Google Spreadsheet.

Google Spreadsheets :

Google Spreadsheets was Google's first application in the cloud office suite first known as Google Docs & Spreadsheets and now just known as Google Docs.

Google Spreadsheets is Google's most sophisticated web-based application.

You access your existing and create new spreadsheets from the main Google Docs page (docs.google.com).

To create a new spreadsheet, click the New button and select Spreadsheet; the new spreadsheet opens in a new window.

As shown in figure above, the Google Spreadsheets workspace looks a lot like every other PC- based spreadsheet application you've ever used like Excel. You'll quickly



The tabbed interface of Google Spreadsheets.

recognize the familiar rows-and-columns grid. The buttons or links for some specific operations might be in slightly different locations, but pretty much everything you expect to find is somewhere on the page.

Google Spreadsheets uses a tabbed interface and the workspace changes slightly depending on which tab (Edit, Sort, Formulas, or Revisions) you select.

Each tab in a Google spreadsheet has its own toolbar of options, specific to that toolbar's function:

Edit

This tab displays a toolbar full of editing and formatting options, such ascut/copy/paste, number and text formatting, cell alignment, and the like.

There's also a button on the toolbar to add a chart to your spreadsheet, based on selected data.

Sort :

This tab displays an abbreviated toolbar of sort-related options.You can sort the selected cells in normal or inverse order or opt to freeze the header rows for easier sorting.

Formulas:

This tab displays a Range Names button, which you can use to name a range ofcells.

There are also links to insert some of the most common functions (Sum, Count, Average, Min, Max, and Product), as well as a More link that displays all available functions.

Revisions :

This final tab displays a pull-down list of the various versions of the current file. You can also use the Older and Newer buttons to switch to a different version.

Collaborating on Databases

Today in cloud computing technology, the underlying data of a database can be stored in the cloud—on collections of web servers—instead of housed in a single physical location.

This enables users both inside and outside the company to access the same data, day or night, which increases the usefulness of that data.

It's a way to make data universal.

Understanding Database Management:

Before we start looking at web-based database management applications, it helps to know a little about how databases themselves work.

How Databases Work :

A database does many of the same things that a spreadsheet does, but in a different and often more efficient manner. Many small businesses use spreadsheets for database-like functions.

Example :

If a spreadsheet is a giant list, a database is a giant filing cabinet. Each "filing cabinet" is actually a separate database file, and contains individual index cards (called records) filled with specific information (arranged in fields).

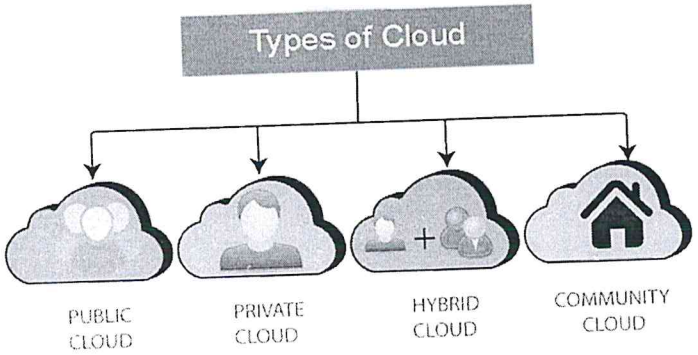
PART C – (1 X 10 = 10 Marks)

Answer any ONE question

12. Classify the various types of clouds

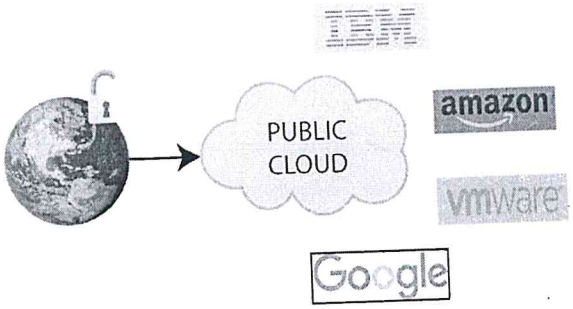
Types of Cloud

- There are the following 4 types of cloud that you can deploy according to the organization's needs-
- **Public Cloud**
- **Private Cloud**
- **Hybrid Cloud**
- **Community Cloud**



Public Cloud

- Public Cloud provides a **shared platform** that is accessible to the **general public** through an Internet connection.
- Public cloud operated on the **pay-as-per-use model** and administrated by the **third party**, i.e., Cloud service provider.
- In the Public cloud, the same storage is being used by multiple users at the same time.
- Public cloud is **owned, managed,** and **operated** by businesses, universities, government organizations, or a combination of them.
- Amazon Elastic Compute Cloud (EC2), Microsoft Azure, IBM's Blue Cloud, Sun Cloud, and Google Cloud are examples of the public cloud.



Advantages of Public Cloud

There are the following advantages of Public Cloud -

- Public cloud is owned at a lower cost than the private and hybrid cloud.
- Public cloud is maintained by the cloud service provider, so do not need to worry about the maintenance.

- Public cloud is easier to integrate. Hence it offers a better flexibility approach to consumers.
- Public cloud is location independent because its services are delivered through the internet.
- Public cloud is highly scalable as per the requirement of computing resources.
- It is accessible by the general public, so there is no limit to the number of user

Disadvantages of Public Cloud

- **Low Security**

  Public Cloud is less secure because resources are shared publicly.

- **Performance**

  In the public cloud, performance depends upon the speed of internet connectivity.

- **Less customizable**

  Public cloud is less customizable than the private cloud.

Private Cloud

- Private cloud is also known as an **internal cloud** or **corporate cloud.**
- Private cloud provides computing services to a **private internal network (within the organization)** and **selected users** instead of the general public.
- Private cloud provides a **high level of security** and **privacy** to data through firewalls and internal hosting. It also ensures that operational and sensitive data are not accessible to third-party providers.
- HP Data Centers, Microsoft, Elastra-private cloud, and Ubuntu are the example of a private cloud.

Advantages of Private cloud

There are the following advantages of Private Cloud -

- **More Control**

  Private clouds have more control over their resources and hardware than public clouds because it is only accessed by selected users.

- **Security & privacy**

  Security & privacy are one of the big advantages of cloud computing. Private cloud improved the security level as compared to the public cloud.

- **Improved performance**

  Private cloud offers better performance with improved speed and space capacity.

Disadvantages of Private Cloud

- **High cost**

  The cost is higher than a public cloud because set up and maintain hardware resources are costly.

- **Restricted area of operations**

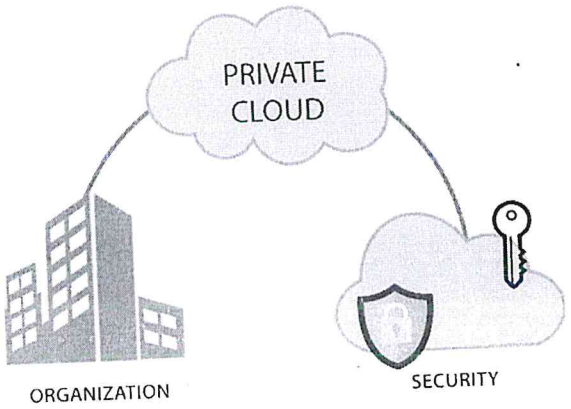
  Private cloud is accessible within the organization, so the area of operations is limited.

- **Limited scalability**

  Private clouds are scaled only within the capacity of internal hosted resources.

- **Skilled people**

  Skilled people are required to manage and operate cloud services.

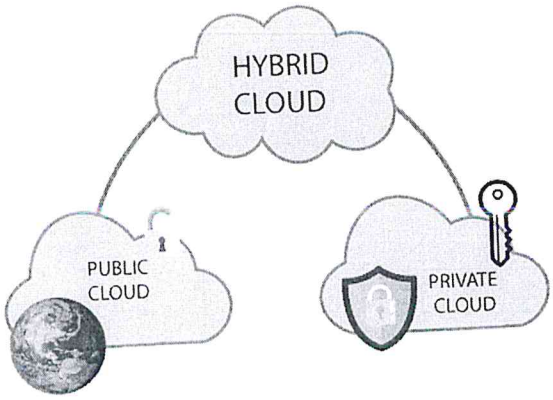


Hybrid Cloud

- Hybrid cloud is a combination of **public and private** clouds.

  Hybrid cloud = public cloud + private cloud

- The main aim to combine these cloud (Public and Private) is to create a unified, automated, and well-managed computing environment.
- In the Hybrid cloud, **non-critical activities** are performed by the **public cloud** and **critical activities** are performed by the **private cloud**.
- Mainly, a hybrid cloud is used in finance, healthcare, and Universities.
- The best hybrid cloud provider companies are **Amazon, Microsoft, Google, Cisco,** and **NetApp**.



Advantages of Hybrid Cloud

There are the following advantages of Hybrid Cloud -

1) Flexible and secure

It provides flexible resources because of the public cloud and secure resources because of the private cloud.

2) Cost effective

Hybrid cloud costs less than the private cloud. It helps organizations to save costs for both infrastructure and application support.

3) Cost effective

It offers the features of both the public as well as the private cloud. A hybrid cloud is capable of adapting to the demands that each company needs for space, memory, and system.

4) Security

Hybrid cloud is secure because critical activities are performed by the private cloud.

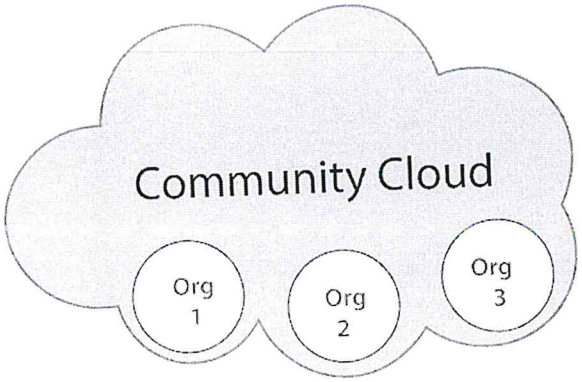
5) Risk Management

Hybrid cloud provides an excellent way for companies to manage the risk.

Community Cloud

- Community cloud is a cloud infrastructure that allows systems and services to be accessible by a group of several organizations to share the information.
- It is owned, managed, and operated by one or more organizations in the community, a third party, or a combination of them.

  Example: Our government organization within India may share computing infrastructure in the cloud to manage data.



13. Briefly summarize the history of cloud Computing.

History of Cloud Computing

Before emerging the cloud computing, there was Client/Server computing which is basically a centralized storage in which all the software applications, all the data and all the controls are resided on the server side.

If a single user wants to access specific data or run a program, he/she need to connect to the server and then gain appropriate access, and then he/she can do his/her business.

Then after, distributed computing came into picture, where all the computers are networked together and share their resources when needed.

On the basis of above computing, there was emerged of cloud computing concepts that later implemented.

1At around in 1961, John MacCharty suggested in a speech at MIT that computing can be sold like a utility, just like a water or electricity. It was a brilliant idea, but like all brilliant ideas, it was ahead if its time, as for the next few decades, despite interest in the model, the technology simply was not ready for it.

But of course time has passed and the technology caught that idea and after few years we mentioned that:

In 1999, **Salesforce.com** *started delivering of applications to users using a simple website.* The applications were delivered to enterprises over the Internet, and this way the dream of computing sold as utility were true.

In 2002, **Amazon** *started Amazon Web Services,* providing services like storage, computation and even human intelligence. However, only starting with the launch of the Elastic Compute Cloud in 2006 a truly commercial service open to everybody existed.

In 2009, **Google Apps** *also started to provide cloud computing enterprise applications.*

Of course, all the big players are present in the cloud computing evolution, some were earlier, some were later. *In 2009,* **Microsoft** *launched Windows Azure,* and companies like Oracle and HP have all joined the game. This proves that today, cloud computing has become mainstream.

Cloud Computing Architecture

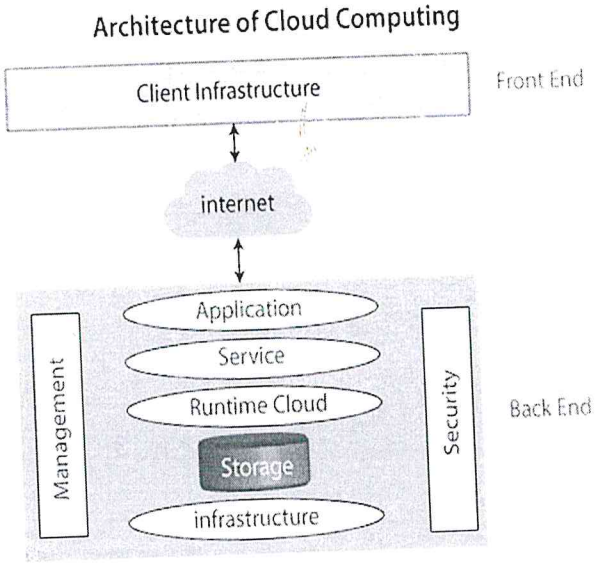
Cloud computing technology is used by both small and large organizations to **store the information** in cloud and **access** it from anywhere at anytime using the internet connection.

Cloud computing architecture is a combination of **service-oriented architecture** and **event-driven architecture**.

Cloud computing architecture is divided into the following two parts -

- Front End
- Back End

The below diagram shows the architecture of cloud computing -



10 SecSega, Microsoft eye cloud gaming alliance

Front End

The front end is used by the client. It contains client-side interfaces and applications that are required to access the cloud computing platforms. The front end includes web servers (including Chrome, Firefox, internet explorer, etc.), thin & fat clients, tablets, and mobile devices.

Back End

The back end is used by the service provider. It manages all the resources that are required to provide cloud computing services. It includes a huge amount of data storage, security mechanism, virtual machines, deploying models, servers, traffic control mechanisms, etc.

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Kattankulathur - 603 203

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I - UNIT TEST, OCTOBER & NOVEMBER 2022

DEPARTMENT OF COMPUTER SCIENCE

Date: 31.10.2022 **Duration: 1 Hr** **Class: I M.Sc CS**

Subject Name & Code: *ADVANCED DATASTRUCTURES AND ALGORITHMS* **Max: 25 Marks**

Section A (5 x 1 = 5)

(Answer any **FIVE** questions)

CO1	BL1	1. Define Algorithms
CO1	BL1	2. Define Time Complexity
CO1	BL1	3. Define Space Complexity
CO2	BL2	4. Interpret the Merging of Binary Search Tree
CO2	BL1	5. State the Divide and Conquer
CO2	BL1	6. State the Graph
CO1	BL1	7. List out the Various Notations used in the Algorithms

Section B (2 x 5 = 10)

(Answer any **TWO** questions)

CO1	BL2	8. Describe Asymptotic Notations in brief
CO2	BL3	9. Construct a Binary search tree
CO1	BL2	10. Describe the pseudocode to express algorithms
CO3	BL2	11. Explain the deletion of Binary search tree concepts

Section C (1 x 10 = 10)

(Answer any **ONE** question)

CO1	BL3	12. Demonstrate the Divide and Conquer approach
CO2	BL2	13. Illustrate the recursive concepts using the Tower of Hanoi approach

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31/10/2022

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I UNIT TEST – NOV 2022
Department of Computer Science

Date : 31.10.2022 **Duration : 1 Hr** **Class :I M.Sc**
Subject Name & Code : **Advanced PYTHON Programming**

Section A (5 x 1 = 5)
(Answer any **FIVE** questions)

CO1,2 BL4 1. Differentiate method overloading and method overriding
CO 2 BL6 2. Write a python program to create an empty class?
CO1 BL1 3. Define Generators.
CO1 BL1 4. Define Iterators.
CO2 BL6 5. Write down the uses of join() method in Thread.
CO1,2 BL1 6. How does the run() method invoked?
CO 2,6 BL4 7. List down the purpose of lock in thread.

Section B (2 x 5 = 10)
(Answer any **TWO** questions)

CO1,6 BL2 8. Illustrate the use of creating a class, constructor, and the self variable with the necessary examples
CO1 BL1 9. Describe about Decorators with example
CO2 BL6 10. Write about Race Condition in thread
CO2,4 BL6 11. Discuss about Semaphore

Section C (1 x 10 = 10)
(Answer any **ONE** question)

CO1,6 BL2 12. Demonstrate implementation of hierarchical inheritance in Python, with a program.
CO4,6 BL2 13. Explain Thread Synchronization with example

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UNIT TEST – Nov 2022
Department of Computer Science
Advanced PYTHON Programming
Answer Key

Section A

CO1,2 BL4 1. Differentiate method overloading and method overriding

Method Overloading	Method Overriding
Method overloading is a compile-time polymorphism.	Method overriding is a run-time polymorphism.
It helps to increase the readability of the program.	It is used to grant the specific implementation of the method which is already provided by its parent class or superclass.
It occurs within the class.	It is performed in two classes with inheritance relationships.

CO 2 BL6 2. Write a python program to create an empty class?

```
Class Person:
    pass
```

CO1 BL1 3. Define Generators.

A generator is a special type of function which does not return a single value, instead, it returns an iterator object with a sequence of values

CO1 BL1 4. Define Iterators.

Iterator in Python is an object that is used to iterate over iterable objects like lists, tuples, dicts, and sets. The iterator object is initialized using the **iter()** method. It uses the **next()** method for iteration.

CO2 BL6 5. Write down the uses of join() method in Thread.

Join method in python makes the calling thread to wait for another thread.

CO1,2 BL1 6. How does the run() method invoked?

The standard run() method **invokes the callable object passed to the object's constructor as the target argument with sequential and keyword arguments taken from the args and kwargs arguments**, respectively.

CO 2,6 BL4 7. List down the purpose of lock in thread.

A lock can be locked using the acquire() method. Once a thread has acquired the lock, all subsequent attempts to acquire the lock are blocked until it is released.

Section B

CO1,6 BL2 8. Illustrate the use of creating a class, constructor, and the self variable with the necessary examples

```
class car():
    # init method or constructor
    def __init__(self, model, color):
        self.model = model
```

```
        self.color = color
    def show(self):
        print("Model is", self.model )
        print("color is", self.color )
audi = car("audi a4", "blue")
audi.show()
```

CO1 BL1 9. Describe about Decorators with example

Decorators are a very powerful and useful tool in Python since it allows programmers to modify the behaviour of a function or class. Decorators allow us to wrap another function in order to extend the behaviour of the wrapped function, without permanently modifying it. But before diving deep into decorators let us understand some concepts that will come in handy in learning the decorators.

```
def create_adder(x):
    def adder(y):
        return x+y
    return adder
add_15 = create_adder(15)
print(add_15(10))
```

CO2 BL6 10. Write about Race Condition in thread

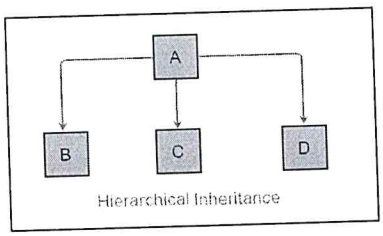
A race condition occurs when two or more threads can access shared data and they try to change it at the same time. As a result, the values of variables may be unpredictable and vary depending on the timings of context switches of the processes.

CO2,4 BL6 11. Discuss about Semaphore

1. A class of the **threading** module is used to implement the concept of semaphore in Python. This class is known as the **Semaphore**
2. The Semaphore class consists of a constructor, and two functions, **acquire()** and **release()**, respectively.
3. The **acquire()** function is used to decrease the count of the semaphore in case the count is greater than zero. Else it blocks till the count is greater than zero.
4. The **release()** function is used for increasing the count of the semaphore and waking up one of the threads waiting on the semaphore.

Section C

CO1,6 BL2 12. Demonstrate implementation of hierarchical inheritance in Python, with a program.




```
class Parent:
```

```
    def func1(self):
        print("This function is in parent class.")
# Derived class1
class Child1(Parent):
    def func2(self):
        print("This function is in child 1.")
# Derivied class2
class Child2(Parent):
    def func3(self):
        print("This function is in child 2.")
# Driver's code
object1 = Child1()
object2 = Child2()
object1.func1()
object1.func2()
object2.func1()
object2.func3()
```

CO4,6 BL2 13. Explain Thread Synchronization with example

Lets see how to synchronize threads to avoid race conditions.

Lock Objects

A Lock object is the most basic synchronization primitive which is not owned by a particular thread when locked. A Lock object does not keep information about which thread has a permit of the lock and any thread can release the lock. The Lock object is in one of the 2 states, "locked" and "unlocked". When the Lock object is created, it is in the "unlocked" state. There are only 3 methods in the lock object:

- ***acquire():*** This method changes the Lock object from an "unlocked" state to a "locked" state and allows the calling thread to continue execution. If the Lock object is already in a "locked" state, the calling thread will be blocked until the lock comes in an "unlocked" state.
- ***release():*** This method changes the Lock object state from "locked" to "unlocked" state. If the Lock object is already in an "unlocked" state, a RuntimeError is raised. The method can be called from any thread, not only the thread which has acquired the lock.
- ***locked():*** This method returns true if the Lock object is acquired.

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SRM ARTS AND SCIENCE COLLEGE
I UNIT TEST- NOV 2022
Department of Computer Science

Date : 02-11-2022 **Duration : One Hour** **Class :I MSC CS**
Subject Name &Code :ARTIFICIAL INTELLIGENCE

Section A (5 x 1 = 5)
(Answer any **FIVE** questions)

CO1	BL1	1.Define AI.
CO1	BL1	2.List down the characteristics of Agent.
CO1	BL1	3.How will you formulate a problem.
CO4	BL4	4. Distinguish between best-first search and greedy best first search.
CO1	BL1	5. What is rationality?
CO1	BL6	6. Write about Performance measure.
CO1	BL1	7. Define path cost.

Section B (2 x 5 = 10)
(Answer any **TWO** questions)

CO2	BL6	8. Discuss 5 properties of nature of environments.
CO2	BL3	9. Discuss Hill – Climbing Algorithm in AI ?
CO3	BL2	10. Describe Heuristic search technique.
CO2	BL2	11. Explain the history of Artificial Intelligence.

Section C (1 x 10 = 10)
(Answer any **ONE** question)

CO4	BL3	11. Discuss about uninformed search in detail.
CO2	BL2	12. Describe the structure of agents.

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Section A (5 x 1 = 5)
(Answer any **FIVE** questions)

CO1 BL1 1.Define AI.

Artificial intelligence (AI) is the ability of a computer or a robot controlled by a computer to do tasks that are usually done by humans because they require human intelligence and discernment.

CO1 BL1 2.List down the characteristics of Agent.

An agent is a computer software system whose main characteristics are situatedness, autonomy, adaptivity, and sociability.

CO1 BL1 3.How will you formulate a problem.

Before an agent can start searching for solutions, it must formulate a goal and then use that goal to formulate a problem. A problem consists of five parts: The state space, an initial situation, actions, a goal test, and path costs. A path from an initial state to a goal state is a solution.

CO4 BL4 4. Distinguish between best-first search and greedy best first search.

The generic best-first search algorithm selects a node for expansion according to an evaluation function. Greedy best-first search expands nodes with minimal h(n). It is not optimal, but is often efficient.

CO1 BL1 5. What is rationality?

Rationality means that an AI agent is assumed to take account of available information and uncertainty, potential costs and benefits, and to act consistently (logically) in choosing the best action.

CO1 BL6 6. Write about Performance measure.

Performance measures are used to evaluate learning algorithms and form an important aspect of machine learning. In some cases, these measures are also used as heuristics to build learning models

CO1 BL1 7. Define path cost.

A path cost function that assigns a numeric cost to each path. The problem-solving agent chooses a cost function that reflects its own performance measure. The cost of a path can be described as the sum of the costs of the individual actions along the path.

Section B (2 x 5 = 10)

(Answer any **TWO** questions)

CO2 BL6 8. Discuss 5 properties of nature of environments.

An environment in artificial intelligence is the surrounding of the agent. The agent takes input from the environment through sensors and delivers the output to the environment through actuators.

1. Fully Observable vs Partially Observable

- When an agent sensor is capable to sense or access the complete state of an agent at each point in time, it is said to be a fully observable environment else it is partially observable.
- Maintaining a fully observable environment is easy as there is no need to keep track of the history of the surrounding.
- An environment is called **unobservable** when the agent has no sensors in all environments.
- **Examples:**
    - **Chess** – the board is fully observable, and so are the opponent's moves.
    - **Driving** – the environment is partially observable because what's around the corner is not known.

2. Deterministic vs Stochastic

- When a uniqueness in the agent's current state completely determines the next state of the agent, the environment is said to be deterministic.
- The stochastic environment is random in nature which is not unique and cannot be completely determined by the agent.
- **Examples:**
    - **Chess** – there would be only a few possible moves for a coin at the current state and these moves can be determined.
    - **Self-Driving Cars-** the actions of a self-driving car are not unique, it varies time to time.

3. Competitive vs Collaborative

- An agent is said to be in a competitive environment when it competes against another agent to optimize the output.
- The game of chess is competitive as the agents compete with each other to win the game which is the output.
- An agent is said to be in a collaborative environment when multiple agents cooperate to produce the desired output.
- When multiple self-driving cars are found on the roads, they cooperate with each other to avoid collisions and reach their destination which is the output desired.

4. Single-agent vs Multi-agent

- An environment consisting of only one agent is said to be a single-agent environment.
- A person left alone in a maze is an example of the single-agent system.
- An environment involving more than one agent is a multi-agent environment.
- The game of football is multi-agent as it involves 11 players in each team.

5. Dynamic vs Static

- An environment that keeps constantly changing itself when the agent is up with some action is said to be dynamic.
- A roller coaster ride is dynamic as it is set in motion and the environment keeps changing every instant.
- An idle environment with no change in its state is called a static environment.
- An empty house is static as there's no change in the surroundings when an agent enters.

CO2 BL3 9. Discuss Hill – Climbing Algorithm in AI.

A hill-climbing algorithm is an Artificial Intelligence (AI) algorithm that increases in value continuously until it achieves a peak solution.

- It is also called greedy local search as it only looks to its good immediate neighbor state and not beyond that.
- A node of hill climbing algorithm has two components which are state and value.
- Hill Climbing is mostly used when a good heuristic is available.

Features of Hill Climbing:

Following are some main features of Hill Climbing Algorithm:

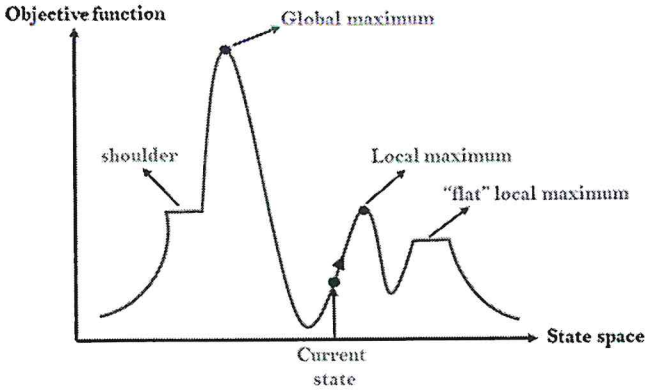
- **Generate and Test variant:** Hill Climbing is the variant of Generate and Test method. The Generate and Test method produce feedback which helps to decide which direction to move in the search space.
- **Greedy approach:** Hill-climbing algorithm search moves in the direction which optimizes the cost.
- **No backtracking:** It does not backtrack the search space, as it does not remember the previous states.

State-space Diagram for Hill Climbing:

The state-space landscape is a graphical representation of the hill-climbing algorithm which is showing a graph between various states of algorithm and Objective function/Cost.

On Y-axis we have taken the function which can be an objective function or cost function, and state-space on the x-axis. If the function on Y-axis is cost then, the goal of search is to find the global minimum and local minimum. If the function of Y-axis is Objective function,

then the goal of the search is to find the global maximum and local maximum.



Different regions in the state space landscape:

Local Maximum: Local maximum is a state which is better than its neighbor states, but there is also another state which is higher than it.

CO3 BL2 10. Describe Heuristic search technique.

Best-First Search (BFS) Heuristic Search

Often dubbed BFS, Best First Search is an informed search that uses an evaluation function to decide which adjacent is the most promising before it can continue to explore. Breadth- and Depth- First Searches blindly explore paths without keeping a cost function in mind.
Things aren't the same with BFS, though. Here, we use a priority queue to store node costs.
Let's understand BFS Heuristic Search through pseudocode.

- Define list OPEN with single node *s*– the start node.
- IF list is empty, return failure.
- Remove node *n* (node with best score) from list, move it to list CLOSED.
- Expand node *n*.
- IF any successor to *n* is the goal node, return success and trace path from goal node to *s* to return the solution.
- FOR each successor node:
- Apply evaluation function *f*.
- IF the node isn't in either list, add it to list OPEN.
- Loop to step 2.
- So, this was all in Heuristic Search Techniques in AI. Hope you like our explanation.

CO2 BL2 11. Explain the history of Artificial Intelligence.

Intelligence: The ability to learn and solve problems. This definition is taken from webster's Dictionary.

The most common answer that one expects is **"to make computers intelligent so that they can act intelligently!"**, but the question is how much intelligent? How can one judge intelligence?

...as intelligent as humans. If the computers can, somehow, solve real-world problems, by improving on their own from past experiences, they would be called "intelligent".
Thus, the AI systems are more generic(rather than specific), can "think" and are more flexible.

Intelligence, as we know, is the ability to acquire and apply knowledge. Knowledge is the information acquired through experience. Experience is the knowledge gained through exposure(training). Summing the terms up, we get **artificial intelligence** as the "copy of something natural(i.e., human beings) 'WHO' is capable of acquiring and applying the information it has gained through exposure."

Intelligence is composed of:

- Reasoning
- Learning
- Problem Solving
- Perception
- Linguistic Intelligence

Many tools are used in AI, including versions of search and mathematical optimization, logic, and methods based on probability and economics. The AI field draws upon computer science, mathematics, psychology, linguistics, philosophy, neuroscience, artificial psychology, and many others.

Need for Artificial Intelligence

1. To create expert systems that exhibit intelligent behavior with the capability to learn, demonstrate, explain, and advise its users.
2. Helping machines find solutions to complex problems like humans do and applying them as algorithms in a computer-friendly manner.

Approaches of AI

There are a total of four approaches of AI and that are as follows:

- **Acting humanly (The Turing Test approach):** This approach was designed by Alan Turing. The ideology behind this approach is that a computer passes the test if a human interrogator, after asking some written questions, cannot identify whether the written responses come from a human or from a computer.
- **Thinking humanly (The cognitive modeling approach):** The idea behind this approach is to determine whether the computer thinks like a human.
- **Thinking rationally (The "laws of thought" approach):** The idea behind this approach is to determine whether the computer thinks rationally i.e. with logical reasoning.
- **Acting rationally (The rational agent approach):** The idea behind this approach is to determine whether the computer acts rationally i.e. with logical reasoning.

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Section C (1 x 10 = 10)

(Answer any **ONE** question)

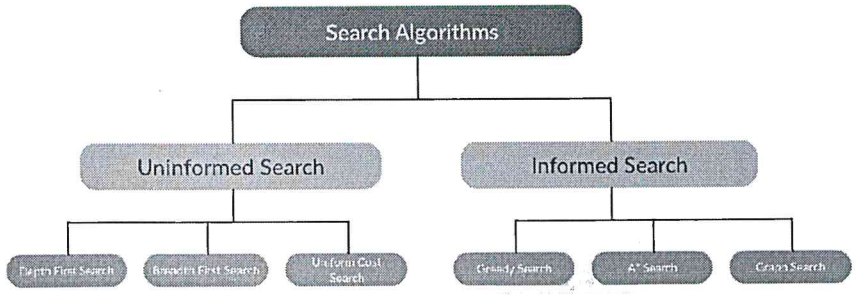
CO4 BL3 11. Discuss about uninformed search in detail.

Artificial Intelligence is the study of building agents that act rationally. Most of the time, these agents perform some kind of search algorithm in the background in order to achieve their tasks.

- A search problem consists of:
    - **A State Space.** Set of all possible states where you can be.
    - **A Start State.** The state from where the search begins.
    - **A Goal Test.** A function that looks at the current state returns whether or not it is the goal state.
- The **Solution** to a search problem is a sequence of actions, called the **plan** that transforms the start state to the goal state.
- This plan is achieved through search algorithms.

Types of search algorithms:

There are far too many powerful search algorithms out there to fit in a single article. Instead, this article will discuss *six* of the fundamental search algorithms, divided into *two* categories, as shown below.



Note that there is much more to search algorithms than the chart I have provided above. However, this article will mostly stick to the above chart, exploring the algorithms given there.

Uninformed Search Algorithms:

The search algorithms in this section have no additional information on the goal node other than the one provided in the problem definition. The plans to reach the goal state from the start state differ only by the order and/or length of actions. Uninformed search is also called **Blind search**. These algorithms can only generate the successors and differentiate between the goal state and non goal state.

The following uninformed search algorithms are discussed in this section.

1. Depth First Search
2. Breadth First Search
3. Uniform Cost Search

Each of these algorithms will have:

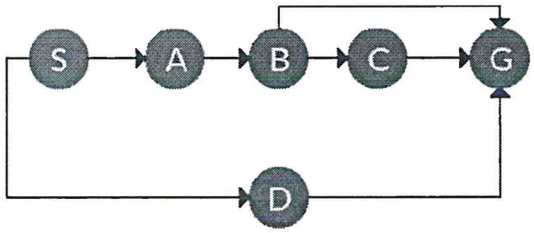
- A problem **graph,** containing the start node S and the goal node G.
- A **strategy,** describing the manner in which the graph will be traversed to get to G.
- A **fringe,** which is a data structure used to store all the possible states (nodes) that you can go from the current states.
- A **tree,** that results while traversing to the goal node.
- A solution **plan,** which the sequence of nodes from S to G.

Depth First Search**:**

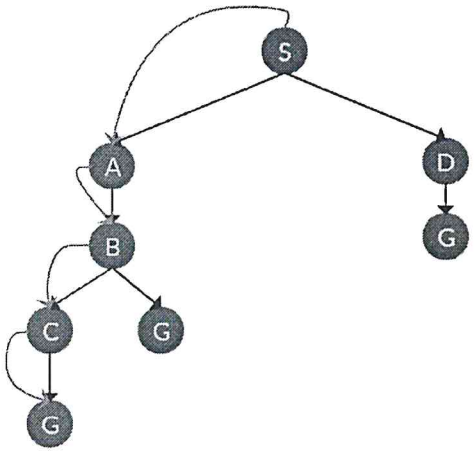
Depth-first search (DFS) is an algorithm for traversing or searching tree or graph data structures. The algorithm starts at the root node (selecting some arbitrary node as the root node in the case of a graph) and explores as far as possible along each branch before backtracking. It uses last in- first-out strategy and hence it is implemented using a stack.

Example:

Question. *Which solution would DFS find to move from node S to node G if run on the graph below?*



Solution. The equivalent search tree for the above graph is as follows. As DFS traverses the tree "deepest node first", it would always pick the deeper branch until it reaches the solution (or it runs out of nodes, and goes to the next branch). The traversal is shown in blue arrows.



Path: S -> A -> B -> C -> G

= *the depth of the search tree = the number of levels of the search tree.*

= *number of nodes in level* .

Time complexity: *Equivalent to the number of nodes traversed in*

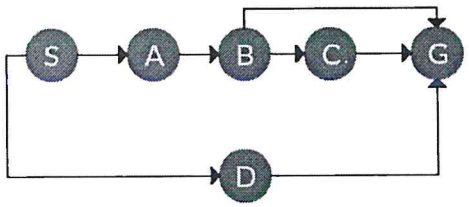
DFS.

Space complexity: *Equivalent to how large can the fringe get.*
Completeness: *DFS is complete if the search tree is finite, meaning for a given finite search tree, DFS will come up with a solution if it exists.*
Optimality: *DFS is not optimal, meaning the number of steps in reaching the solution, or the cost spent in reaching it is high.*

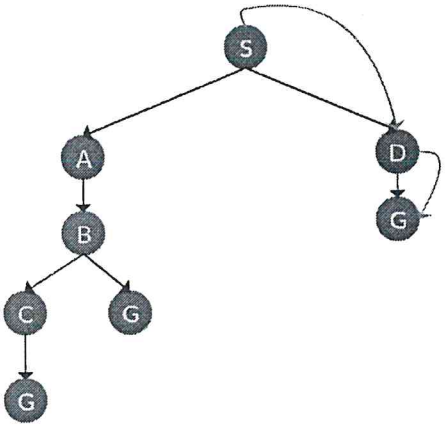
Breadth First Search:

Breadth-first search (BFS) is an algorithm for traversing or searching tree or graph data structures. It starts at the tree root (or some arbitrary node of a graph, sometimes referred to as a 'search key'), and explores all of the neighbor nodes at the present depth prior to moving on to the nodes at the next depth level. It is implemented using a queue.

Example:
Question. Which solution would BFS find to move from node S to node G if run on the graph below?



Solution. The equivalent search tree for the above graph is as follows. As BFS traverses the tree "shallowest node first", it would always pick the shallower branch until it reaches the solution (or it runs out of nodes, and goes to the next branch). The traversal is shown in blue arrows.



Path: S -> D -> G
= the depth of the shallowest solution.

= number of nodes in level .
Time complexity: Equivalent to the number of nodes traversed in BFS until the shallowest solution.

Space complexity: Equivalent to how large can the fringe get.
Completeness: BFS is complete, meaning for a given search tree, BFS will come up with a solution if it exists.
Optimality: BFS is optimal as long as the costs of all edges are equal.

CO2 BL2 12. Describe the structure of agents.

Artificial intelligence is defined as the study of rational agents. A rational agent could be anything that makes decisions, as a person, firm, machine, or software. It carries out an action with the best outcome after considering past and current percepts(agent's perceptual inputs at a given instance). An AI system is composed of an **agent and its environment**. The agents act in their environment. The environment may contain other agents.
An agent is anything that can be viewed as :

- perceiving its environment through **sensors** and
- acting upon that environment through **actuators**

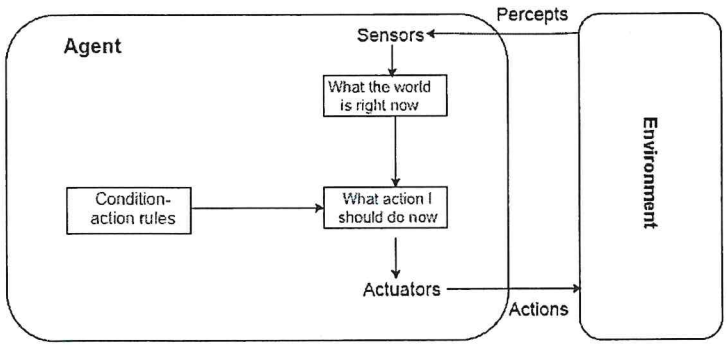
Types of Agents
Agents can be grouped into five classes based on their degree of perceived intelligence and capability :

- Simple Reflex Agents
- Model-Based Reflex Agents
- Goal-Based Agents
- Utility-Based Agents
- Learning Agent

Simple reflex agents

Simple reflex agents ignore the rest of the percept history and act only on the basis of the **current percept**. Percept history is the history of all that an agent has perceived to date. The agent function is based on the **condition-action rule**. A condition-action rule is a rule that maps a state i.e, condition to an action. If the condition is true, then the action is taken, else not. This agent function only succeeds when the environment is fully observable. For simple reflex agents operating in partially observable environments, infinite loops are often unavoidable. It may be possible to escape from infinite loops if the agent can randomize its actions.
Problems with Simple reflex agents are :

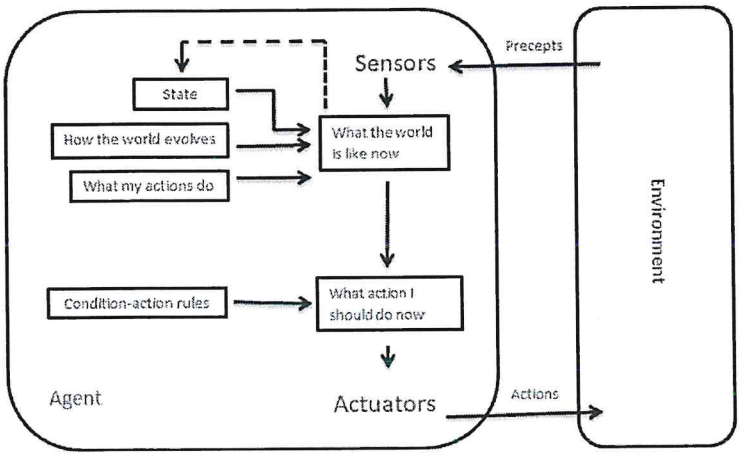
- Very limited intelligence.
- No knowledge of non-perceptual parts of the state.
- Usually too big to generate and store.
- If there occurs any change in the environment, then the collection of rules need to be updated.



Model-based reflex agents

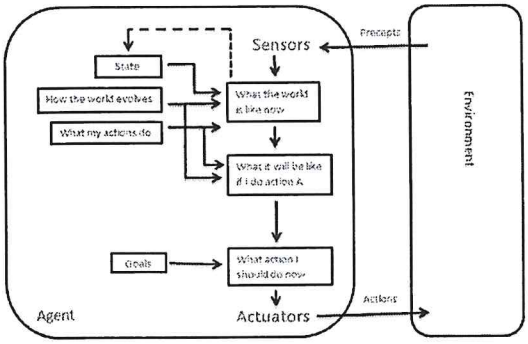
It works by finding a rule whose condition matches the current situation. A model-based agent can handle **partially observable environments** by the use of a model about the world. The agent has to keep track of the **internal state** which is adjusted by each percept and that depends on the percept history. The current state is stored inside the agent which maintains some kind of structure describing the part of the world which cannot be seen. Updating the state requires information about :

- how the world evolves independently from the agent, and
- how the agent's actions affect the world.



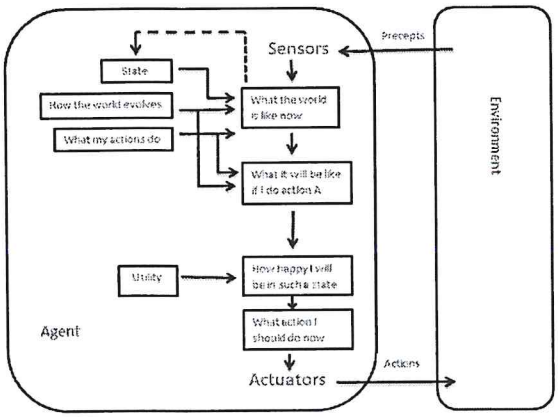
Goal-based agents

These kinds of agents take decisions based on how far they are currently from their **goal**(description of desirable situations). Their every action is intended to reduce its distance from the goal. This allows the agent a way to choose among multiple possibilities, selecting the one which reaches a goal state. The knowledge that supports its decisions is represented explicitly and can be modified, which makes these agents more flexible. They usually require search and planning. The goal-based agent's behavior can easily be changed.



Utility-based agents

The agents which are developed having their end uses as building blocks are called utility-based agents. When there are multiple possible alternatives, then to decide which one is best, utility-based agents are used. They choose actions based on a **preference (utility)** for each state. Sometimes achieving the desired goal is not enough. We may look for a quicker, safer, cheaper trip to reach a destination. Agent happiness should be taken into consideration. Utility describes how **"happy"** the agent is. Because of the uncertainty in the world, a utility agent chooses the action that maximizes the expected utility. A utility function maps a state onto a real number which describes the associated degree of happiness.

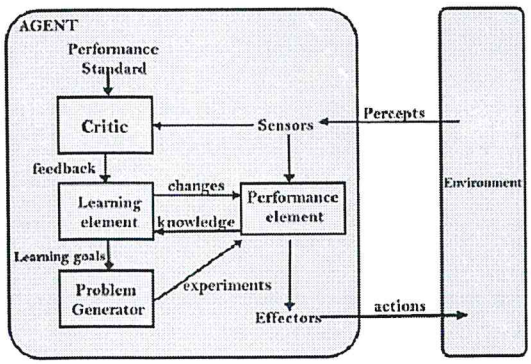


Learning Agent :

A learning agent in AI is the type of agent that can learn from its past experiences or it has learning capabilities. It starts to act with basic knowledge and then is able to act and adapt automatically through learning.

A learning agent has mainly four conceptual components, which are:

1. **Learning element:** It is responsible for making improvements by learning from the environment
2. **Critic:** The learning element takes feedback from critics which describes how well the agent is doing with respect to a fixed performance standard.
3. **Performance element:** It is responsible for selecting external action
4. **Problem Generator:** This component is responsible for suggesting actions that will lead to new and informative experiences.



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Department of Computer Science

Date : 31-11-2022 Duration : One Hour Class :I MSC CS Marks : 25

Subject Name &Code :ADVANCED DATASTRUCTURES AND ALGORITHMS

Section A (5 x 1 = 5)

(Answer any **FIVE** questions)

CO1	BL1	1.Define Algorithms
CO1	BL1	2.Define Time Complexity
CO1	BL1	3.Define Space Complexity
CO2	BL2	4. Interpret the Merging of Binary Search Tree
CO2	BL1	5. State the Divide and Conquer
CO2	BL1	6. State the Graph
CO1	BL1	7. List out the Various Notations used in the Algorithms

Section B (2 x 5 = 10)

(Answer any **TWO** questions)

CO1	BL2	8.Describe Asymptotic Notations in brief
CO2	BL3	9.Construct a Binary search tree
CO1	BL2	10.Describe the pseudocode to express algorithms
CO3	BL2	11.Explain the deletion of Binary search tree concepts

Section C (1 x 10 = 10)

(Answer any **ONE** question)

CO1	BL3	11.Demonstrate the Divide and Conquer approach
CO2	BL2	12. Illustrate the recursive concepts using the Tower of Hanoi approach

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Date : 31-11-2022 **Duration : One Hour** **Class :I MSC CS**
Subject Name &Code :ADVANCED DATASTRUCTURES AND ALGORITHMS(key)

Section A(5 x 1 = 5)

1. An algorithm is a procedure used for solving a problem or performing a computation. Algorithms act as an exact list of instructions that conduct specified actions step by step in either hardware- or software-based routines.

2. Time complexity is defined as the amount of time taken by an algorithm to run, as a function of the length of the input. It measures the time taken to execute each statement of code in an algorithm. It is not going to examine the total execution time of an algorithm. Rather, it is going to give information about the variation (increase or decrease) in execution time when the number of operations (increase or decrease) in an algorithm. Yes, as the definition says, the amount of time taken is a function of the length of input only.

3. Space complexity refers to the total amount of memory space used by an algorithm/program, including the space of input values for execution. Calculate the space occupied by variables in an algorithm/program to determine space complexity. The best algorithm/program should have a low level of space complexity.

4. A binary search tree (BST) is a fundamental data structure and is a type of binary tree where the value of a left node is less than the parent and the value of a right node is greater than the parent.

In this tutorial, we're going to learn about two algorithms that can be used to merge two binary search trees. Also, we'll discuss the complexity a.k.a Big O of these algorithms. The complexity of an algorithm is extremely important as it measures the amount of time and space required to run the algorithm.

5. The divide-and-conquer paradigm is often used to find an optimal solution of a problem. Its basic idea is to decompose a given problem into two or more similar, but simpler, subproblems, to solve them in turn, and to compose their solutions to solve the given problem.

6. Graph algorithms are a set of instructions that traverse (visits nodes of a) graph. Some algorithms are used to find a specific node or the path between two given nodes.

7. There are three different notations: big O, big Theta (Θ), and big Omega (Ω). big-Θ is used when the running time is the same for all cases, big-O for the worst case running time, and big-Ω for the best case running time.

Section B(2 x 5 = 10)
(Answer any **TWO** questions)

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8. Asymptotic notations are the mathematical notations used to describe the running time of an algorithm when the input tends towards a particular value or a limiting value. For example: In bubble sort, when the input array is already sorted, the time taken by the algorithm is linear i.e. the best case.

9. A tree contains nodes and edges and starts with a root node. The root node is connected via branches to other nodes, called child nodes. Every node except the root node has exactly one parent node. A tree has no cycles: any two nodes can be connected by a unique path through the tree.A binary tree is a tree in which every node has at most two child nodes. A binary search tree (BST) is a binary tree in which each node has a value (called a key), a link to a left child node, and a link to a right child node. Either or both child nodes might be null. By starting at the root node, you can quickly determine whether a value is in the tree. If not, you can insert the value into the tree by modifying one of the null left or right child nodes of an existing node.

10. Pseudo code: It's simply an implementation of an algorithm in the form of annotations and informative text written in plain English. It has no syntax like any of the programming language and thus can't be compiled or interpreted by the computer.3

11. When we delete a node, three possibilities arise. 1) Node to be deleted is the leaf: Simply remove it from the tree. 3) Node to be deleted has two children: Find inorder successor of the node. Copy contents of the inorder successor to the node and delete the inorder successor.

Section C(1 x 10 = 10)
(Answer any **ONE** question)

12. The divide and conquer approach divides a problem into smaller subproblems; these subproblems are further solved recursively. The result of each subproblem is not stored for future reference, whereas, in a dynamic approach, the result of each subproblem is stored for future reference.

13. Tower of Hanoi is a mathematical puzzle where we have three rods (A, B, and C) and N disks. Initially, all the disks are stacked in decreasing value of diameter i.e., the smallest disk is placed on the top and they are on rod A. The objective of the puzzle is to move the entire stack to another rod (here considered C), obeying the following simple rules:

- Only one disk can be moved at a time.
- Each move consists of taking the upper disk from one of the stacks and placing it on top of another stack i.e. a disk can only be moved if it is the uppermost disk on a stack.
- No disk may be placed on top of a smaller disk.

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UNIT EXAM - II SCHEDULE					
DATE	I BSC CS	II BSC CS	III BSC CS	I MSC CS	II MSC CS
31-10-2022	LANGUAGE	LANGUAGE	Computer Network	Advanced Data Structure and Algorithms	PRINCIPLES OF COMPILER DESIGN
01-11-2022	ENGLISH	ENGLISH	Operating System	Advanced PYTHON Programming	INFORMATION SECURITY
02-11-2022	Problem Solving using Python	Java and Data Structures	Relational Database Management System	Artificial Intelligence	ARTIFICIAL INTELLIGENCE
03-11-2022	Mathematics-I	Statistics I	AIES	Theory of Computations	BIG DATA ANALYTICS
04-11-2022	Problem Solving using Python Lab	Data Structures using Java Lab	Operating System Lab	Data Structure and Algorithms Lab	CLOUD COMPUTING
04-11-2022 02.00 PM TO 03.30 PM	NME - TRENDS IN PERSONAL COMPUTERS	-	PL/SQL Lab	Advanced PYTHON Programming Lab	MINIPROJECT MODEL VIVAVOCE

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DEPARTMENT OF COMPUTER SCIENCE

SEATING ARRANGEMENT

ODD SEM - UNIT TEST - II EXAMINATIONS, OCT & NOV 2022

DATE: 31.10.2022 - 04.11.2022 TIME : 12.00 PM- 1.00 PM

S.NO	ROLL NO / REGISTER NO	CLASS	STRENGTH	HALL NO
01	S01(Adithya R) - S20(Jackson Edwin Prem Kumar J) PGS01(Abinash A) - PGS20(Sathiya Priyan R)	I B.SC(CS) I BATCH I M.SC(CS)	20 20	102 (MAIN BLOCK)
02	S21(Jai Aakash M) - S40(Bhavani K) PGS21(Sathya Prakash R)- PGS29(Iyyappan S) S01(Parthiban G) - S11(Sankar L)	I B.SC(CS) I BATCH I M.SC(CS) I B.SC(CS) II BATCH	20 09 11	103 (MAIN BLOCK)
03	UCS200501(*222005935*) -UCS200515(*222005949*) S41(Devadharshini M) - S55(Dhanush Krishnan K)	III B.SC(CS) I BATCH I B.SC(CS) I BATCH	15 15	302 (MBA BLOCK)

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S.NO	ROLL NO / REGISTER NO	CLASS	STRENGTH	HALL NO
04	UCS200516 (*222005950*) - UCS200532(*222005967*) S56(Lokesh R) - S57(Jerin R) S12(Santhosh E) - S26(Sugavanesh M)	III B.SC(CS) I BATCH I B.SC(CS) I BATCH I B.SC(CS) II BATCH	17 02 15	303 (MBA BLOCK)
05	UCS200533(*222005969*) - UCS200549(*222005932*) S27(Sujaridhan M) - S43(Pramila A)	III B.SC(CS) I BATCH I B.SC(CS) II BATCH	17 17	304 (MBA BLOCK)
06	UCS200550(*222005972*) - UCS200553(*222005933*) UCS200554(*222005958*) - UCS200569(*222005988*) S44(Priya Dharshini R) - S52(Sandhiya R) 222106389 – 222106402 832100422 - 832100431	III B.SC(CS) I BATCH III B.SC(CS) II BATCH I B.SC(CS) II BATCH II B.SC(CS) I BATCH II M.SC(CS)	04 16 09 11 10	202 (MBA BLOCK)
07	222106403 – 222106425 UCS200570(*222005989*) - UCS200592(*222006025*)	II B.SC(CS) I BATCH III B.SC(CS) I BATCH	23 23	JAMES GOSLING LAB – I (MBA BLOCK)
08	222106390 - 222106445 UCS200594 - UCS200606 832100402 - 832100411	II B.SC(CS) II BATCH III B.SC(CS) II BATCH II M.SC(CS)	23 13 10	RASMUS LERDORF LAB – II (MBA BLOCK)

S.NO	ROLL NO / REGISTER NO	CLASS	STRENGTH	HALL NO
09	222106458 – 222106464 832100412 – 832100421 222106446 - 222106448	II B.SC(CS) I BATCH II M.SC(CS) II B.SC(CS) I BATCH	07 10 03	110 (MBA BLOCK)
10	222106449 - 222106470, M. Naveen Kumr, U. Ajith Kumar	II B.SC(CS) II BATCH	17	111 (MBA BLOCK)

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II UNIT TEST – INVIGILATION DUTY SCHEDULE (ODD SEM – OCT & NOV 2022)

HALL NO	31/10/22 III	Staff sign
302 (MBA BLOCK)	TAM	
303 (MBA BLOCK)	MS	
304 (MBA BLOCK)	VSH	
202 (MBA BLOCK)	TAM	
LAB – I (MBA BLOCK)	VS	
RASMUS LERDORF LAB – II (MBA BLOCK)	VPN	
102	DG	
103	RM	
110	TP	
111	DB	

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II UNIT TEST – INVIGILATION DUTY SCHEDULE (ODD SEM – OCT & NOV 2022)

HALL NO	01/11/22 IV	Staff sign
302 (MBA BLOCK)	TAM	
303 (MBA BLOCK)	VS	
304 (MBA BLOCK)	MS	
202 (MBA BLOCK)	TAM	
LAB – I (MBA BLOCK)	DRJ	
RASMUS LERDORF LAB – II (MBA BLOCK)	RM	
102	DG	
103	VPN	
110	KN	
111	DB	

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II UNIT TEST – INVIGILATION DUTY SCHEDULE (ODD SEM – OCT & NOV 2022)

HALL NO	02/11/22 V	Staff sign
302 (MBA BLOCK)	TAM	
303 (MBA BLOCK)	~~TP~~ DRJ	
304 (MBA BLOCK)	KN	
202 (MBA BLOCK)	TAM	
LAB – I (MBA BLOCK)	MS	
RASMUS LERDORF LAB – II (MBA BLOCK)	~~VS~~ DB	
102	DG	
103	RM	
110	VPN	
111	VSH	

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II UNIT TEST – INVIGILATION DUTY SCHEDULE (ODD SEM – OCT & NOV 2022)

HALL NO	03/11/22 VI	Staff sign
302 (MBA BLOCK)	DRJ	
303 (MBA BLOCK)	VS	
304 (MBA BLOCK)	VSH	
202 (MBA BLOCK)	TP	
LAB – I (MBA BLOCK)	KN	
RASMUS LERDORF LAB – II (MBA BLOCK)	DB RM	
102	ENG	
103	ENG	
110	MS	
111	DG	

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II UNITTEST–INVIGILATION DUTY SCHEDULE (ODDSEM–OCT&NOV2022)

HALLNO	04/11/22	Staffsign
302 (MBABLOCK)	VSH	
303 (MBABLOCK)	DRJ	
304 (MBABLOCK)	TP	
202 (MBABLOCK)	VS	
LAB – I(MBABLOCK)	MS	
RASMUS LERDORFLAB –II (MBABLOCK)	DG	
102	ENG	
103	ENG	
110	KN	
111	DB	

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II - UNIT TEST, OCTOBER & NOVEMBER 2022

DEPARTMENT OF COMPUTER SCIENCE

Date: 02.11.2022 **Duration: 1 Hr** **Class: I B.Sc CS - I BATCH**

Subject Name & Code : ***Problem Solving using Python & SE21A*** **Max: 25 Marks**

Section A (5 x 2 = 10)

(Answer any **FIVE** questions)

CO3	BL1	1. Define top-down design.
CO1	BL1	2. List the control statements in python.
CO1	BL4	3. Explain operators in python.
CO3	BL6	4. Write about value-returning function.
CO1	BL3	5. Illustrate sequence in python with example.
CO3	BL2	6. Compare positional arguments and keyword arguments.
CO4	BL1	7. Define garbage collection.

Section B (1 x 5 = 5)

(Answer any **ONE** question)

CO1	BL2	8. Explain selection control statement with an example.
CO3	BL6	9. Write about default arguments in python.

Section C (1 x 10 = 10)

(Answer any **ONE** question)

CO1	BL2	10.Explain about operators and expressions in python with example.
CO2	BL5	11. Summarize about iterating over list with suitable two examples.

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II UNIT TEST – NOV 2022
Department of Computer Science

Date: 2-11-2022 **Duration: 1 hour** **Class: I BSc CS (I-Batch)**

Subject Name & Code: Problem Solving using Python & SE21A

Answer Key

Section A (5 x 2 = 10)

(Answer any **FIVE** questions)

1. **Define top-down design.**

Top-down design is the technique of breaking down a problem into various major tasks needed to be performed. Each of these tasks is further broken down into separate subtasks, and so on till each sub-task is sufficiently simple to be written as a self-contained or procedure module.

2. **List the control statements in python.**

1) Break

2) Continue

3) Pass

3. **Explain operators in python.**

In Python, operators are special symbols that designate that some sort of computation should be performed. The values that an operator acts on are called operands.

4. **Write about value-returning function.**

The Python return statement is a key component of functions and methods. We can use the return statement to make the functions send Python objects back to the caller code. These objects are known as the function's return value.

```
def my_function(x):
  return 5 * x
print(my_function(3))
print(my_function(5))
print(my_function(9))
```

5. **Illustrate sequence in python with example.**

A sequence is a positionally ordered collection of items. And we can refer to any item in the sequence by using its index number e.g., s[0] and s[1].

```
cities = ['San Francisco', 'New York', 'Washington DC']

print(len(cities))
```

6. **Compare positional arguments and keyword arguments.**

   Python functions can contain two types of arguments: positional arguments and keyword arguments. Positional arguments must be included in the correct order. Keyword arguments are included with a keyword and equals sign.

7. **Define garbage collection.**

   The process by which Python periodically frees and reclaims blocks of memory that no longer are in use is called Garbage Collection. Python's garbage collector runs during program execution and is triggered when an object's reference count reaches zero.

Section B (1 x 5 = 5)

(Answer any **ONE** question)

8. **Explain selection control statement with an example.**

In Python, the selection statements are also known as *Decision control statements* or *branching statements*. The selection statement allows a program to test several conditions and execute instructions based on which condition is true. Some Decision Control Statements are:

- Simple if
- if-else
- nested if
- if-elif-else

9. **Write about default arguments in python.**

   Python has a different way of representing syntax and default values for function arguments. Default values indicate that the function argument will take that value if no argument value is passed during the function call. The default value is assigned by using the assignment(=) operator of the form *keywordname*=value.

```
def student(firstname, lastname ='Mark', standard ='Fifth'):

    print(firstname, lastname, 'studies in', standard, 'Standard')
```

Section C (1 x 10 = 10)

(Answer any **ONE** question)

10. **Explain about operators and expressions in python with example.**

Python Operators in general are used to perform operations on values and variables. These are standard symbols used for the purpose of logical and arithmetic operations. In this article, we will look into different types of Python operators.

- OPERATORS: Are the special symbols. Eg- + , * , /, etc.
- OPERAND: It is the value on which the operator is applied.
  - ✓ Arithmetic Operators
  - ✓ Comparison **Operators**
  - ✓ **Logical Operators**
  - ✓ **Bitwise Operators**
  - ✓ **Assignment Operators**
  - ✓ **Identity Operators**
  - ✓ **Membership Operators**

11. **Summarize about iterating over list with suitable two examples.**

List is equivalent to arrays in other languages, with the extra benefit of being dynamic in size. In Python, the list is a type of container in Data Structures, which is used to store multiple data at the same time. Unlike Sets, lists in Python are ordered and have a definite count.

```
# Python3 code to iterate over a list
list = [1, 3, 5, 7, 9]

# Using for loop
for i in list:
    print(i)
```

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II UNIT TEST – NOV 2022
Department of Computer Science

Date : 02.11.22 **Duration : 1 hour** **Class : I BSc CS(Batch II)**

Subject Name & Code : Problem Solving using Python & SE21A

Section A
(5 x 2 = 10)

(Answer any **FIVE** questions)

CO2	BL2	1. What is conditional statement? Give example.
CO3	BL2	2. What are keyword arguments?
CO3	BL1	3. Define function. Give small example.
CO5	BL2	4. What is an object?
CO1	BL6	5. Write about garbage collection in python.
CO2	BL6	6. Write the syntax and usage of for loop?
CO6	BL2	7. What is Python turtle? List the turtle attributes.

Section B
(1 x 5 = 5)

(Answer any **ONE** question)

CO6	BL2	8. Explain fundamental features of turtle graphics.
CO3	BL4	9. Compare definite and in-definite loops in python.

Section C
(1 x 10 = 10)

(Answer any **ONE** question)

CO3	BL2	10.Describe the concept of parameter passing in python.
CO4	BL4	11. Explain in detail iterating over list in python.

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DEPARTMENT OF COMPUTER SCIENCE - II UNIT TEST, NOV 2022

CLASS: **I BSc CS (Batch II)** TIME : 1 Hour

SUB: ***Problem Solving using Python & SE21A*** Max : 25 Marks

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ANSWER KEY

PART A – (5 X 2 = 10 Marks)
Answer any FIVE questions

1. **What are conditional statements? Give example.**

Conditional statements are also called **decision-making statements**. Conditional Statement in Python perform different computations or actions depending on whether a specific Boolean constraint evaluates to true or false. Conditional statements are handled by IF statements in Python. Example:

```
a = 33
b = 200
if b > a:
print("b is greater than a")
```

2. **What are keyword arguments?**

Keyword arguments (or named arguments) are **values that, when passed into a function, are identifiable by specific parameter names**. A keyword argument is preceded by a parameter and the assignment operator, = .

3. **Define function. Give small example.**

In Python, a function is **a group of related statements that performs a specific task**. Functions help break our program into smaller and modular chunks. As our program grows larger and larger, functions make it more organized and manageable. Furthermore, it avoids repetition and makes the code reusable.

4. **What is an object?**

An object is simply a collection of data (variables) and methods (functions) that act on those data. All objects have certain attributes and behaviour.

5. **Write about garbage collection in python.**

Garbage collection is a method of automatically determining which locations in memory are no longer in use and deallocating them. The garbage collection process is ongoing during the execution of a python program.

6. **Write the syntax and usage of for loop?**

A for loop is used for iterating over a sequence (that is either a list, a tuple, a dictionary, a set, or a string).

Syntax:

```
for value in sequence:
  {loop body}
```

7. What is Python turtle? List the turtle attributes.

Turtle is a pre-installed library in Python that is similar to the virtual canvas that we can draw pictures and attractive shapes. It provides the onscreen pen that we can use for drawing. The turtle has three attributes: **a location, an orientation (or direction), and a pen.**

PART B – (1 X 5 = 5 Marks)

Answer any ONE question

8. Explain fundamental features of turtle graphics

Moving the Turtle

The turtle moves .forward() or .backward() in the direction that it's facing. You can change this direction by turning it .left() or .right() by a certain degree.

Drawing a Shape

```
>>> t.fd(100)
>>> t.rt(90)
>>> t.fd(100)
>>> t.rt(90)
>>> t.fd(100)
>>> t.rt(90)
>>> t.fd(100)
```

Changing the Screen Color

By default, turtle always opens up a screen with a white background. However, you can change the **color** of the screen at any time using the following command:

```
>>> turtle.bgcolor("blue")
```

Changing the Turtle Size

You can increase or decrease the size of the onscreen turtle to make it bigger or smaller. This changes only the size of the shape without affecting the output of the pen as it draws on the screen.

Changing the Pen Size

The previous command changed the size of the turtle's shape only. However, sometimes, you may need to increase or decrease the **thickness** of your pen. You can do this using the following command:

```
>>> t.pensize(5)
>>> t.forward(100)
```

9. Compare definite and in-definite loops in python with example.

Definite loop

A definite loop is a loop in which the number of times it is going to execute is known in advance before entering the loop. The number of iterations it is going to repeat will be typically provided through an integer variable. In general, for loops are considered to be definite loops.

Following is an example of a definite loop implemented using a for loop (in Java programming language).

```
for (int i = 0; i < num; i++)
{
//body of the for loop
}
```

Indefinite loop

In an indefinite loop, the number of times it is going to execute is not known in advance. Typically, an indefinite loop is going to be executed until some condition is satisfied. While loops and do-while loops are commonly used to implement indefinite loops. Even though there is no specific reason for not using for loops for constructing indefinite loops, indefinite loops could be organized neatly using while loops. Some of common examples that you would need to implement indefinite loops are prompting for reading an input until user inserts a positive integer, reading a password until the user inserts the same password twice in a row, etc.

```
while <condition>: <statements>
```

PART C – (1 X 10 = 10 Marks)
Answer any ONE question

10. Describe the concept of parameter passing in python.

- Parameter Passing is the process of passing arguments to a function.
- The terms *parameter* and *argument* can be used for the same thing: information that are passed into a function.
- A parameter is the variable listed inside the parentheses in the function definition.
- An argument is the value that is sent to the function when it is called.
- Information can be passed into functions as arguments.
- Arguments are specified after the function name, inside the parentheses. We can add as many arguments as we want, just separate them with a comma.

Actual Arguments vs. Formal Parameters

Actual Arguments

- Actual arguments are the values (or variables) / expressions that are used inside the parentheses of a function call.

Example:

```
#Program program to find the square of a number
def Square(n): #  Here, n in the function definition is the Formal Parameter.
    return n*n

x=int(input("Enter the number : "))
```

S = Square(x) # Here, x in the function call is the Actual Argument
print(S)

Formal Parameters

- **The Parameters defined as part of the function definition are called Formal Parameters.**
- These are the variables *declared in function definition*, and receive their values when a call to that function is made.
- The value(s) of the actual parameters are *copied* to formal parameters when the call to that function is made.
- The correspondence of actual arguments and formal parameters is determined by the *order* of the arguments passed, and not their names (Figure 5-9).

Example:

```
def cube(x):
    return x*x*x
```

Here, x in the function definition is the Formal Parameter.

11. Describe in detail iterating over list in python.

- The loop variable of the for loop must iterate over the index values of the list,

```
for k in range(len(grades)):
    grades[k] = grades[k] + 1
```

- In such cases, the loop variable k is also functioning as an *index variable.*
- An Index Variable is a variable whose *changing value is used to access elements of an indexed data structure.*
- However, there are times when the loop variable must iterate over the *index values* of a list instead.
- A comparison of the two approaches is:

Loop variable iterating over the elements of a sequence

```
nums = [10, 20, 30, 40, 50, 60]

for k in nums:
    sum = sum + k
```

Loop variable iterating over the index values of a sequence

```
nums = [10, 20, 30, 40, 50, 60]

for k in range(len(nums)):
    sum = sum + nums[k]
```

- The **range** function may be given only one argument. In that case, the starting value of the range defaults to 0.
- Thus, range(len(grades)) is equivalent to range(0,len(grades)).

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II - UNIT TEST, OCTOBER & NOVEMBER 2022

DEPARTMENT OF COMPUTER SCIENCE

Date: 02.11.2022 **Duration: 1 Hr** **Class: II B.Sc CS - I & II BATCH**

Subject Name & Code: ***Java with Data Structures*** **& SE23A** **Max: 25 Marks**

Section A (5 x 2 = 10)

(Answer any **FIVE** questions)

CO4	BL1	1. List the uses of this keyword with example.
CO4	BL6	2. Write about Constructors.
CO5	BL1	3. List the types of Graph Traversals.
CO5	BL1	4. Define Binary Tree.
CO5	BL6	5. Write about Finalize() method.
CO6	BL2	6. Discuss about Applet.
CO6	BL1	7. List the operations of Binary Tree.

Section B (1 x 5 = 5)

(Answer any **ONE** question)

CO4	BL2	8. Explain Exception Handling in java with examples.
CO5	BL2	9. Summarize the importance of Threads in Java.

Section C (1 x 10 = 10)

(Answer any **ONE** question)

CO6	BL2	10. Explain about the packages, its types, and its creation.
CO4	BL2	11. Demonstrate about the Binary Tree Traversals.

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Answer Key **Class: II B.Sc. (CS)**

Subject Name & Code: Java with Data Structures

Section A (5 x 2 = 10)

(Answer any **FIVE** questions)

CO4 BL1 1. List the uses of this keyword with example.

The this keyword refers to the current object in a method or constructor. The most common use of the this keyword is to eliminate the confusion between class attributes and parameters with the same name

CO4 BL6 2. Write about Constructors.

Constructor in java is used to create the instance of the class. Constructors are almost similar to methods except for two things - its name is the same as the class name and it has no return type. Sometimes constructors are also referred to as special methods to initialize an object.

CO5 BL1 3. List the types of Graph Traversals.

There are two standard (and simple) ways of traversing all vertices/edges in a graph in a systematic way: BFS and DFS.

CO5 BL1 4. Define Binary Tree.

A binary tree is a rooted tree that is also an ordered tree (a.k.a. plane tree) in which every node has at most two children. A rooted tree naturally imparts a notion of levels (distance from the root), thus for every node a notion of children may be defined as the nodes connected to it a level below.

CO5 BL6 5. Write about Finalize() method.

The Finalize method is used to perform cleanup operations on unmanaged resources held by the current object before the object is destroyed. The method is protected and therefore is accessible only through this class or through a derived class.

CO6 BL2 6. Discuss about Applet.

An applet is a Java program that can be embedded into a web page. It runs inside the web browser and works at client side. An applet is embedded in an HTML page using the APPLET or OBJECT tag and hosted on a web server. Applets are used to make the website more dynamic and entertaining.

CO6 BL1 7. List the operations of Binary Tree.

Three common operations are performed in a binary tree- they are insertion, deletion and traversal.

Section B (1 x 5 = 5)

(Answer any **ONE** question)

CO4 BL2 8. Explain Exception Handling in java with examples.

The **Exception Handling in Java** is one of the powerful *mechanism to handle the runtime errors* so that the normal flow of the application can be maintained.

Advantage of Exception Handling

The core advantage of exception handling is **to maintain the normal flow of the application**. An exception normally disrupts the normal flow of the application; that is why we need to handle exceptions. Java provides five keywords that are used to handle the exception. The following table describes each.

Keyword	Description
try	The "try" keyword is used to specify a block where we should place an exception code. It means we can't use try block alone. The try block must be followed by either catch or finally.
catch	The "catch" block is used to handle the exception. It must be preceded by try block which means we can't use catch block alone. It can be followed by finally block later.
finally	The "finally" block is used to execute the necessary code of the program. It is executed whether an exception is handled or not.
throw	The "throw" keyword is used to throw an exception.
throws	The "throws" keyword is used to declare exceptions. It specifies that there may occur an exception in the method. It doesn't throw an exception. It is always used with method signature.

Java Exception Handling Example

Let's see an example of Java Exception Handling in which we are using a try-catch statement to handle the exception.

JavaExceptionExample.java

```
1.  public class JavaExceptionExample{
2.    public static void main(String args[]){
3.     try{
4.       //code that may raise exception
5.       int data=100/0;
6.     }catch(ArithmeticException e){System.out.println(e);}
7.     //rest code of the program
8.     System.out.println("rest of the code...");
9.    } }
```

CO5 BL2 9. Summarize the importance of Threads in Java.

Threads allows a program to operate more efficiently by doing multiple things at the same time. Threads are very useful in modern programming whenever a process has multiple tasks to perform independently of the others. This is particularly true when one of the tasks may block, and it is desired to allow the other tasks to proceed without blocking.

Threads can be used to perform complicated tasks in the background without interrupting the main program.

Creating a Thread

There are two ways to create a thread.

It can be created by extending the Thread class and overriding its run() method:

Extend Syntax

```
public class Main extends Thread {
  public void run() {
    System.out.println("This code is running in a thread");
  }
}
```

Another way to create a thread is to implement the `Runnable` interface:

Implement Syntax

```
public class Main implements Runnable {
  public void run() {
    System.out.println("This code is running in a thread");
  }
}
```

Section C

(1 x 10 = 10)

(Answer any **ONE** question)

CO6 BL2 10. Explain about the packages, its types, and its creation.

The package keyword is used in Java to create Java packages. Many in-built packages are available in Java, including util, lang, awt, javax, swing, net, io, sql, etc. We can import all members of a package using packagename.

In Java, there are two types of packages:

Built-in packages: The Java API is a library of prewritten classes, that are free to use, included in the Java Development Environment.

User-defined packages. To create your own package, you need to understand that Java uses a file system directory to store them. Just like folders on your computer:

Example

```
└── root
    └── mypack
        └── MyPackageClass.java
```

To create a package, use the package keyword:

MyPackageClass.java

```
package mypack;

class MyPackageClass {

  public static void main(String[] args) {

    System.out.println("This is my package!");

  }

}
```

Save the file as **MyPackageClass.java**, and compile it:

CO4 BL2 11. Demonstrate about the Binary Tree Traversals.

In any data structure, traversal is an important operation. In the traversal operation, we walk through the data structure visiting each element of the data structure at least once.

There are three types of traversal of a binary tree.

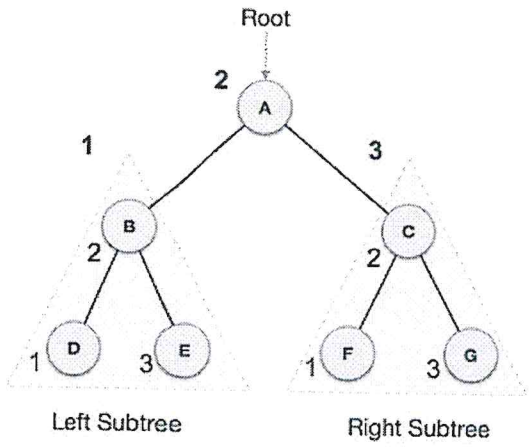
1. Inorder tree traversal

2. Preorder tree traversal
3. Postorder tree traversal

In-order Traversal

In this traversal method, the left subtree is visited first, then the root and later the right sub-tree. We should always remember that every node may represent a subtree itself.

If a binary tree is traversed **in-order**, the output will produce sorted key values in an ascending order.



We start from **A**, and following in-order traversal, we move to its left subtree **B**. **B** is also traversed in-order. The process goes on until all the nodes are visited. The output of inorder traversal of this tree will be –

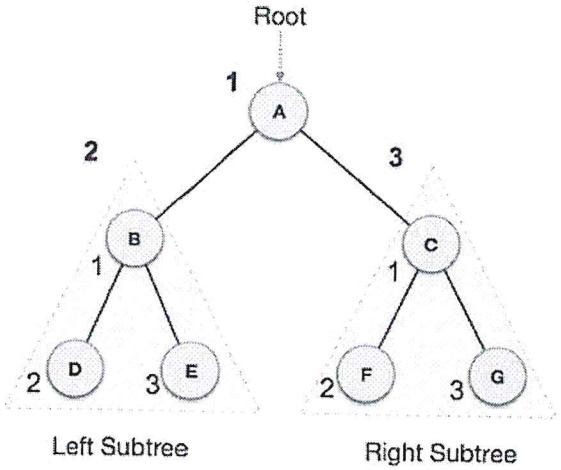
$$D \rightarrow B \rightarrow E \rightarrow A \rightarrow F \rightarrow C \rightarrow G$$

Algorithm

Until all nodes are traversed –
Step 1 – Recursively traverse left subtree.
Step 2 – Visit root node.
Step 3 – Recursively traverse right subtree.

Pre-order Traversal

In this traversal method, the root node is visited first, then the left subtree and finally the right subtree.



We start from **A**, and following pre-order traversal, we first visit **A** itself and then move to its left subtree **B**. **B** is also traversed pre-order. The process goes on until all the nodes are visited. The output of pre-order traversal of this tree will be –

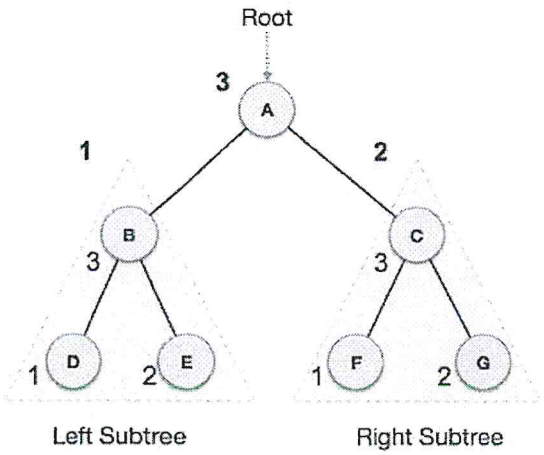
$$A \rightarrow B \rightarrow D \rightarrow E \rightarrow C \rightarrow F \rightarrow G$$

Algorithm

Until all nodes are traversed –
Step 1 – Visit root node.
Step 2 – Recursively traverse left subtree.
Step 3 – Recursively traverse right subtree.

Post-order Traversal

In this traversal method, the root node is visited last, hence the name. First we traverse the left subtree, then the right subtree and finally the root node.



We start from **A**, and following Post-order traversal, we first visit the left subtree **B**. **B** is also traversed post-order. The process goes on until all the nodes are visited. The output of post-order traversal of this tree will be –

$$D \rightarrow E \rightarrow B \rightarrow F \rightarrow G \rightarrow C \rightarrow A$$

Algorithm

Until all nodes are traversed –
Step 1 – Recursively traverse left subtree.
Step 2 – Recursively traverse right subtree.
Step 3 – Visit root node.

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II - UNIT TEST, OCTOBER & NOVEMBER 2022

DEPARTMENT OF COMPUTER SCIENCE

Date: 31.10.2022 **Duration: 1 Hr** **Class: III B.Sc CS - I BATCH**

Subject Name & Code: COMPUTER NETWORK & SE25A **Max: 25 Marks**

Section A (5 x 2 = 10)
(Answer any FIVE questions)

CO1 BL1 1. Define full duplex?

CO1 BL2 2. Explain Broadcast network.

CO2 BL1 3. Define local loop.

CO2 BL2 4. Explain Hamming distance?

CO4 BL1 5. List out the various fields of frame.

CO4 BL1 6. Define Piggy backing?

CO2 BL1 7. List out the various internet control protocols.

Section B (1 x 5 = 5)

(Answer any ONE questions)

CO4 BL2 8. Explain about LAN and WAN

CO4 BL6 9. Write a note on Frequency Division Multiplexing

Section C (1 x 10 = 10)

(Answer any ONE question)

CO1 BL4 10. Compare OSI and TCP/IP reference models

CO2 BL4 11. Explain how detection and correction of errors take place

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Department of Computer Science

Answer Keys

Date : 31 .10.2022 **Duration : 1 Hour** **Class : III BSc CS I Batch**

Subject Name & Code : Computer Networks

Section A (5 x 2 = 10)

(Answer any FIVE questions)

CO1 BL1 1. Define full duplex

Full-duplex data transmission means that **data can be transmitted in both directions on a signal carrier at the same time**. For example, on a local area network with a technology that has full-duplex transmission, one workstation can be sending data on the line while another workstation is receiving data.

CO1 BL2 2. Define Broadcast network.

In computer networking, broadcasting refers to transmitting a packet that will be received by every device on the network. In practice, the scope of the broadcast is limited to a broadcast domain. In general, to broadcast information is to transmit it to many receivers. For example, a radio station broadcasts a signal to many listeners, and digital TV subscribers receive a signal that is broadcast by their TV provider

CO2 BL1 3. Define local loop.

A local loop is the wired connection from a telephone company's central office. The system was originally designed for voice transmission only using analog transmission technology on a single voice channel. computer modems make the conversion between analog signals and digital signals. With Integrated Services Digital Network (ISDN) or Digital Subscriber Line (DSL), the local loop can carry digital signals directly and at a much higher bandwidth than they do for voice only.

CO2 BL2 4. Explain Hamming distance

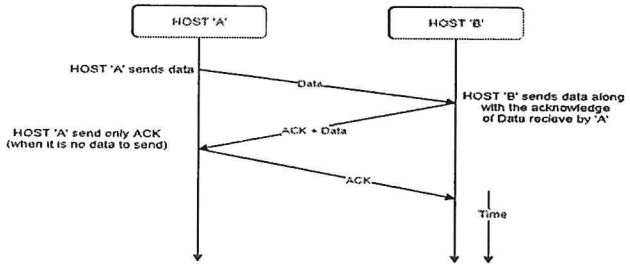
Hamming distance is a metric for comparing two binary data strings. While comparing two binary strings of equal length, Hamming distance is the number of bit positions in which the two bits are different. The Hamming distance between two strings, a and b is denoted as d(a,b).

CO4 BL1 5. List out the various fields of frame.

The frame consists of the following parts:
Frame Header: It consists of the frame's source and destination address.
Payload Field: It contains the message to be delivered.

Flag: It points to the starting and the ending of the frame.
Trailer: It contains the error detection and correction bits.
CO4 BL1 6. Define Piggy backing

This technique in which the outgoing acknowledgement is delayed temporarily is called piggybacking.



CO2 BL1 7. List out the various internet control protocols.

Types of Protocols

Transmission Control Protocol (TCP)
Internet Protocol (IP)
User Datagram Protocol (UDP)
Post office Protocol (POP)
Simple mail transport Protocol (SMTP)
File Transfer Protocol (FTP)
Hyper Text Transfer Protocol (HTTP)
Hyper Text Transfer Protocol Secure (HTTPS)

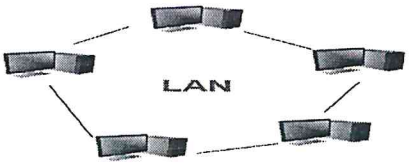
Section B (1 x 5 = 5)

(Answer any **ONE** questions)

CO4 BL2 8. Explain about LAN and WAN

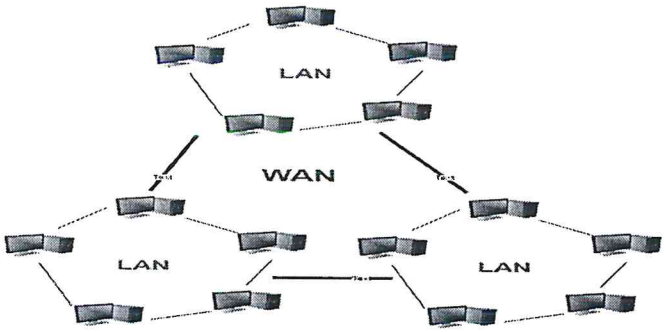
LAN (Local Area Network)
LAN refers to a group of computer and peripheral devices that are connected together in one single limited location. LAN can be small or large. It could be a home network with one user or an enterprise network with thousands of devices and users in an office. Private ownership controls the local area network.A LAN consists of switches, routers, cables, access points, etc. that enable network devices to connect to internal servers, web servers, and other LANs through

wide area networks. It is best suitable for sharing resources such as printers, files, games, and other applications. We can implement LAN using Ethernet LAN (Wired connection) and WLAN (Wireless).



WAN (Wide Area Network)

A WAN is a group of LANs or other networks that communicate with one another. It is a network of networks that enables communication and information sharing between devices from anywhere in the world.It enables organizations to create networks that enable employees, customers, and other stakeholders to work together online, irrespective of their location. A WAN is not confined to a geographical location. However, it might be confined within a state or country.WANs are usually high speed and expensive. The Internet is the largest public WAN.

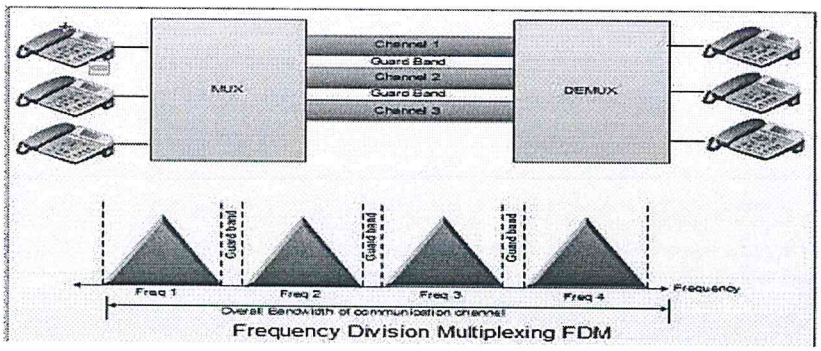


CO4 BL6 9. Write a note on Frequency Division Multiplexing

Frequency Division Multiplexing (FDM) is a networking technique in which multiple data signals are combined for simultaneous transmission via a shared communication medium. FDM uses a carrier signal at a discrete frequency for each data stream and then combines many modulated signals

Frequency-Division Multiplexing (FDM) is a scheme in which **numerous signals are combined for transmission on a single communications line or channel.** It is analog multiplexing technique. Each signal is assigned a different frequency (sub channel) within the main channel. its requires channel synchronization. FDM multiplexing technique is based on orthogonality of sinusoids.FDM requires that the bandwidth of a link should be greater than the combined bandwidths of the various signals to be transmitted. Thus each signal having different frequency forms a particular logical channel on the link and follows this channel only. These

channels are then separated by the strips of unused bandwidth called guard bands. These guard bands prevent the signals from overlapping as shown in Fig.



Frequency Division Multiplexing FDM

In FDM, signals to be transmitted must be analog signals. Thus digital signals need to be converted to analog form, if they are to use FDM.Twisted-pair lines are common in households and small businesses. But major telephone cables, operating between large businesses, government agencies, and municipalities, are capable of much larger bandwidths.

Section C (1 x 10 = 10)

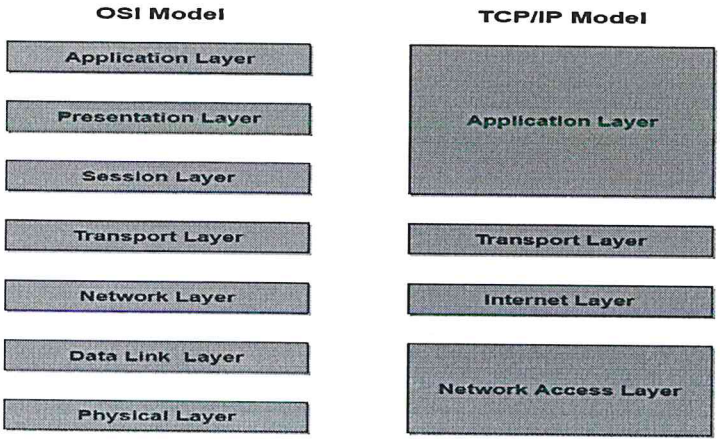
(Answer any ONE question)

CO1 BL4 10. Compare OSI and TCP/IP reference models

Following are some major differences between OSI Reference Model and TCP/IP Reference Model, with diagrammatic comparison below.

OSI(Open System Interconnection)	**TCP/IP(Transmission Control Protocol / Internet Protocol)**
1. OSI is a generic, protocol independent standard, acting as a communication gateway between the network and end user.	1. TCP/IP model is based on standard protocols around which the Internet has developed. It is a communication protocol, which allows connection of hosts over a network.
2. In OSI model the transport layer guarantees the delivery of packets.	2. In TCP/IP model the transport layer does not guarantees delivery of packets. Still the TCP/IP model

	is more reliable.
3. Follows vertical approach.	3. Follows horizontal approach.
4. OSI model has a separate Presentation layer and Session layer.	4. TCP/IP does not have a separate Presentation layer or Session layer.
5. Transport Layer is Connection Oriented.	5. Transport Layer is both Connection Oriented and Connection less.
6. Network Layer is both Connection Oriented and Connection less.	6. Network Layer is Connection less.
7. OSI is a reference model around which the networks are built. Generally it is used as a guidance tool.	7. TCP/IP model is, in a way implementation of the OSI model.
8. Network layer of OSI model provides both connection oriented and connectionless service.	8. The Network layer in TCP/IP model provides connectionless service.
9. OSI model has a problem of fitting the protocols into the model.	9. TCP/IP model does not fit any protocol



CO2 BL4 11. Explain how detection and correction of errors take place

The error to locate the bit in error, **redundant bits are used as parity bits for error detection.** For example, we take ASCII words (7 bits data), then there could be 8 kind of information we need: first seven bits to tell us which bit is error and one more bit to tell that there is no error.

Hamming Code
Parity bits: The bit which is appended to the original data of binary bits so that the total number of 1s is even or odd.
Even parity: To check for even parity, if the total number of 1s is even, then the value of the parity bit is 0. If the total number of 1s occurrences is odd, then the value of the parity bit is 1.
Odd Parity: To check for odd parity, if the total number of 1s is even, then the value of parity bit is 1. If the total number of 1s is odd, then the value of parity bit is 0.

Algorithm of Hamming code:
An information of 'd' bits are added to the redundant bits 'r' to form d+r.
The location of each of the (d+r) digits is assigned a decimal value.
The 'r' bits are placed in the positions 1,2,.....2k-1.
At the receiving end, the parity bits are recalculated. The decimal value of the parity bits determines the position of an error.
Relationship b/w Error position & binary number.

Error Position	Binary Number
0	000
1	001
2	010
3	011
4	100
5	101
6	110
7	111

Let's understand the concept of Hamming code through an example:

Suppose the original data is 1010 which is to be sent.

Total number of data bits 'd' = 4

Number of redundant bits r : $2^r >= d+r+1$

$2^r >= 4+r+1$

Therefore, the value of r is 3 that satisfies the above relation.

Total number of bits = d+r = 4+3 = 7;

Determining the position of the redundant bits

The number of redundant bits is 3. The three bits are represented by r1, r2, r4. The position of the redundant bits is calculated with corresponds to the raised power of 2. Therefore, their corresponding positions are **1, 2^1, 2^2.**

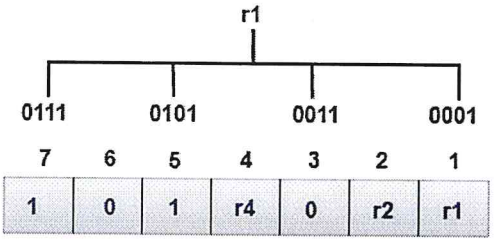
1. The position of r1 = 1
2. The position of r2 = 2
3. The position of r4 = 4

Representation of Data on the addition of parity bits:

7	6	5	4	3	2	1
1	0	1	r4	0	r2	r1

Determining the Parity bits
Determining the r1 bit

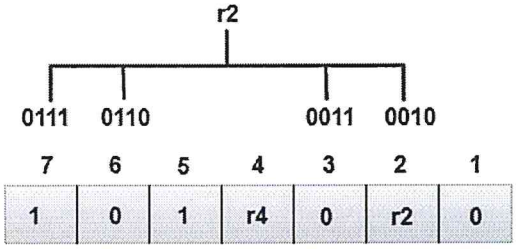
The r1 bit is calculated by performing a parity check on the bit positions whose binary representation includes 1 in the first position.



We observe from the above figure that the bit positions that includes 1 in the first position are 1, 3, 5, 7. Now, we perform the even-parity check at these bit positions. The total number of 1 at these bit positions corresponding to r1 is **even, therefore, the value of the r1 bit is 0.**

Determining r2 bit

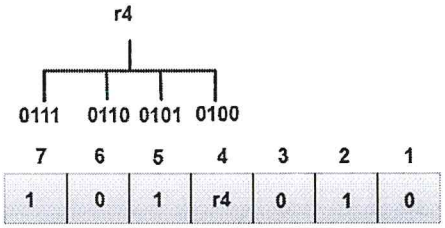
The r2 bit is calculated by performing a parity check on the bit positions whose binary representation includes 1 in the second position.



We observe from the above figure that the bit positions that includes 1 in the second position are **2, 3, 6, 7**. Now, we perform the even-parity check at these bit positions. The total number of 1 at these bit positions corresponding to r2 is **odd, therefore, the value of the r2 bit is 1**.

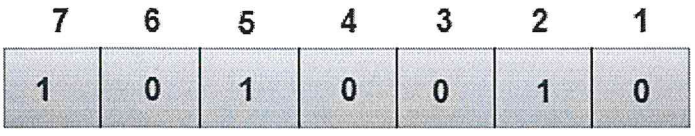
Determining r4 bit

The r4 bit is calculated by performing a parity check on the bit positions whose binary representation includes 1 in the third position.



We observe from the above figure that the bit positions that includes 1 in the third position are **4, 5, 6, 7**. Now, we perform the even-parity check at these bit positions. The total number of 1 at these bit positions corresponding to r4 is **even, therefore, the value of the r4 bit is 0**.

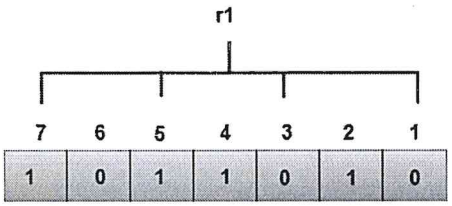
Data transferred is given below:



Suppose the 4th bit is changed from 0 to 1 at the receiving end, then parity bits are recalculated.

R1 bit

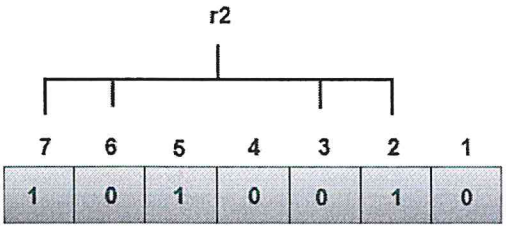
The bit positions of the r1 bit are 1,3,5,7



We observe from the above figure that the binary representation of r1 is 1100. Now, we perform the even-parity check, the total number of 1s appearing in the r1 bit is an even number. Therefore, the value of r1 is 0.

R2 bit

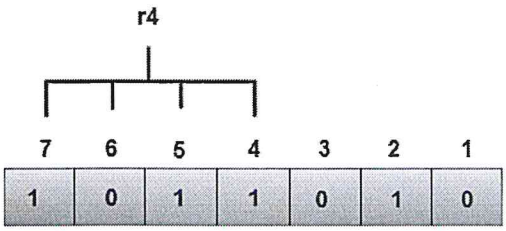
The bit positions of r2 bit are 2,3,6,7.



We observe from the above figure that the binary representation of r2 is 1001. Now, we perform the even-parity check, the total number of 1s appearing in the r2 bit is an even number. Therefore, the value of r2 is 0.

R4 bit

The bit positions of r4 bit are 4,5,6,7.



We observe from the above figure that the binary representation of r4 is 1011. Now, we perform the even-parity check, the total number of 1s appearing in the r4 bit is an odd number. Therefore, the value of r4 is 1.

The binary representation of redundant bits, i.e., r4r2r1 is 100, and its corresponding decimal value is 4. Therefore, the error occurs in a 4th bit position. The bit value must be changed from 1 to 0 to correct the error.

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II - UNIT TEST, OCTOBER & NOVEMBER 2022

DEPARTMENT OF COMPUTER SCIENCE

Date: 31.10.2022 **Duration: 1 Hr** **Class: III B.Sc CS - II BATCH**

Subject Name & Code: COMPUTER NETWORK **Max: 25 Marks**

SECTION – A

Answer any FIVE Questions **(5 x 2 = 10)**

CO	1	BL	1	**1.**	List the different network topologies?
CO	5	BL	1	**2.**	Identify CSMA/CD.
CO	1	BL	2	**3.**	Difference between circuit switching and Packet switching.
CO	3	BL	1	**4.**	Examine Ethernet is said to be a I-persistent protocol?
CO	2	BL	2	**5.**	Discuss the use of computer networks.
CO	6	BL	2	**6.**	Describe the features of LAN
CO	1	BL	1	**7.**	List the features of internetworking.

SECTION – B

Answer any ONE Question **(1 x 5 = 5)**

CO	2	BL	2	**8.**	Explain UDP & TCP
CO	6	BL	1	**9.**	Describe the Microwave transmission.

SECTION – C

Answer any ONE Question **(1 x 10 = 10)**

CO	3	BL	2	**10.**	Briefly explain Tcp/ip reference model
CO	2	BL	2	**11.**	Discuss the functions of Carrier sense multiple access protocols

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Answer Key

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I - UNIT TEST, SEPTEMBER 2022
DEPARTMENT OF COMPUTER SCIENCE

Date : **Duration : 1 Hr** **Class : III B.Sc CS - II BATCH**
Subject Name & Code: **COMPUTER NETWORK** **Max : 25 Marks**

PART A – (5 X 1 = 5 Marks)

Answer any FIVE questions

1. List the different network topologies?

   - A Ring network. ...
   - Mesh network. ...
   - Tree network. ...
   - Hybrid network.

2. Identify CSMA/CD.

   Ans: CSMA/CD stands for **Carrier Sense Multiple Access/Collision Detection**, with collision detection being an extension of the CSMA protocol. This creates a procedure that regulates how communication must take place in a network with a shared transmission medium.

3. Difference between circuit switching and Packet switching

Circuit Switching	Packet Switching
Each packet follows the same route	A packet can follow any route
Call setup is required	No call setup is required

4. Examine Ethernet is said to be a I-persistent protocol?

1-Persistent: In the 1-Persistent mode of CSMA that defines each node, first sense the shared channel and if the channel is idle, it immediately sends the data. Else it must wait and keep track of the status of the channel to be idle and broadcast the frame unconditionally as soon as the channel is idle.

5. Discuss the use of computer networks.

1. **Information and Resource Sharing** – Computer networks allow organizations having units which are placed apart from each other, to share information in a very effective manner. Programs and software in any computer can be accessed by other computers linked to the

network. It also allows sharing of hardware equipment, like printers and scanners among varied users.

2. **Retrieving Remote Information** – Through computer networks, users can retrieve remote information on a variety of topics. The information is stored in remote databases to which the user gains access through information systems like the World Wide Web.
3. **Speedy Interpersonal Communication** – Computer networks have increased the speed and volume of communication like never before. Electronic Mail (email) is extensively used for sending texts, documents, images, and videos across the globe. Online communications have increased by manifold times through social networking services.
4. **E-Commerce** – Computer networks have paved way for a variety of business and commercial transactions online, popularly called e-commerce. Users and organizations can pool funds, buy or sell items, pay bills, manage bank accounts, pay taxes, transfer funds and handle investments electronically.
5. **Highly Reliable Systems** – Computer networks allow systems to be distributed in nature, by the virtue of which data is stored in multiple sources. This makes the system highly reliable. If a failure occurs in one source, then the system will still continue to function and data will still be available from the other sources.
6. **Cost-Effective Systems** – Computer networks have reduced the cost of establishment of computer systems in organizations. Previously, it was imperative for organizations to set up expensive mainframes for computation and storage. With the advent of networks, it is sufficient to set up interconnected personal computers (PCs) for the same purpose.
7. **VoIP** – VoIP or Voice over Internet protocol has revolutionized telecommunication systems. Through this, telephone calls are made digitally using Internet Protocols instead of the regular analog phone lines.

6. Describe the features of LAN

Network size is limited to a small geographical area, presently to a few kilometers. Data transfer rate is generally high. They range from 100 Mbps to 1000 Mbps. In general, a LAN uses only one type of transmission medium, commonly category 5 coaxial cables.

7. List the features of internetworking.

- Accessibility. An Internet is a global service and accessible to all. ...
- Easy to Use. ...
- Interaction with Other Media. ...
- Low Cost. ...
- Extension of Existing IT Technology. ...
- Flexibility of Communication. ...
- Security.

PART B – (2 X 5 = 10 Marks)

Answer any TWO questions

8. Explain UDP & TCP

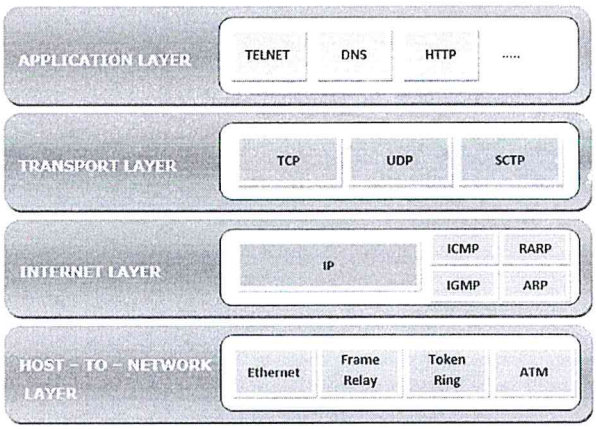
Basis	Transmission control protocol (TCP)	User datagram protocol (UDP)
Type of Service	TCP is a connection-oriented protocol. Connection-orientation means that the communicating devices should establish a connection before transmitting data and should close the connection after transmitting the data.	UDP is the Datagram-oriented protocol. This is because there is no overhead for opening a connection, maintaining a connection, and terminating a connection. UDP is efficient for broadcast and multicast types of network transmission.
Reliability	TCP is reliable as it guarantees the delivery of data to the destination router.	The delivery of data to the destination cannot be guaranteed in UDP.
Error checking mechanism	TCP provides extensive error-checking mechanisms. It is because it provides flow control and acknowledgment of data.	UDP has only the basic error checking mechanism using checksums.
Acknowledgment	An acknowledgment segment is present.	No acknowledgment segment.
Sequence	Sequencing of data is a feature of Transmission Control Protocol (TCP). this means that packets arrive in order at the receiver.	There is no sequencing of data in UDP. If the order is required, it has to be managed by the application layer.
Speed	TCP is comparatively slower than UDP.	UDP is faster, simpler, and more efficient than TCP.
Retransmission	Retransmission of lost packets is possible in TCP, but not in UDP.	There is no retransmission of lost packets in the User Datagram Protocol (UDP).

	variable length header.	header.
Weight	TCP is heavy-weight.	UDP is lightweight.
Handshaking Techniques	Uses handshakes such as SYN, ACK, SYN-ACK	It's a connectionless protocol i.e. No handshake
Broadcasting	TCP doesn't support Broadcasting.	UDP supports Broadcasting.
Protocols	TCP is used by HTTP, HTTPs, FTP, SMTP and Telnet.	UDP is used by DNS, DHCP, TFTP, SNMP, RIP, and VoIP.
Stream Type	The TCP connection is a byte stream.	UDP connection is message stream.
Overhead	Low but higher than UDP.	Very low.

PART C – (1 X 10 = 10 Marks)

Answer any ONE question

9. Briefly explain TCP/IP reference model



TCP/IP Reference Model is a four-layered suite of communica DoD (Department of Defence) in the 1960s. It is named after the model, namely, TCP and IP. TCP stands for Transmission Cont Protocol.

The four layers in the TCP/IP protocol suite are –

- **Host-to- Network Layer –**It is the lowest layer that is concerned with the physical transmission of data. TCP/IP does not specifically define any protocol here but supports all the standard protocols.
- **Internet Layer –**It defines the protocols for logical transmission of data over the network. The main protocol in this layer is Internet Protocol (IP) and it is supported by the protocols ICMP, IGMP, RARP, and ARP.
- **Transport Layer –** It is responsible for error-free end-to-end delivery of data. The protocols defined here are Transmission Control Protocol (TCP) and User Datagram Protocol (UDP).
- **Application Layer –** This is the topmost layer and defines the interface of host programs with the transport layer services. This layer includes all high-level protocols like Telnet, DNS, HTTP, FTP, SMTP, etc.

10. Discuss the functions of Carrier sense multiple access protocols

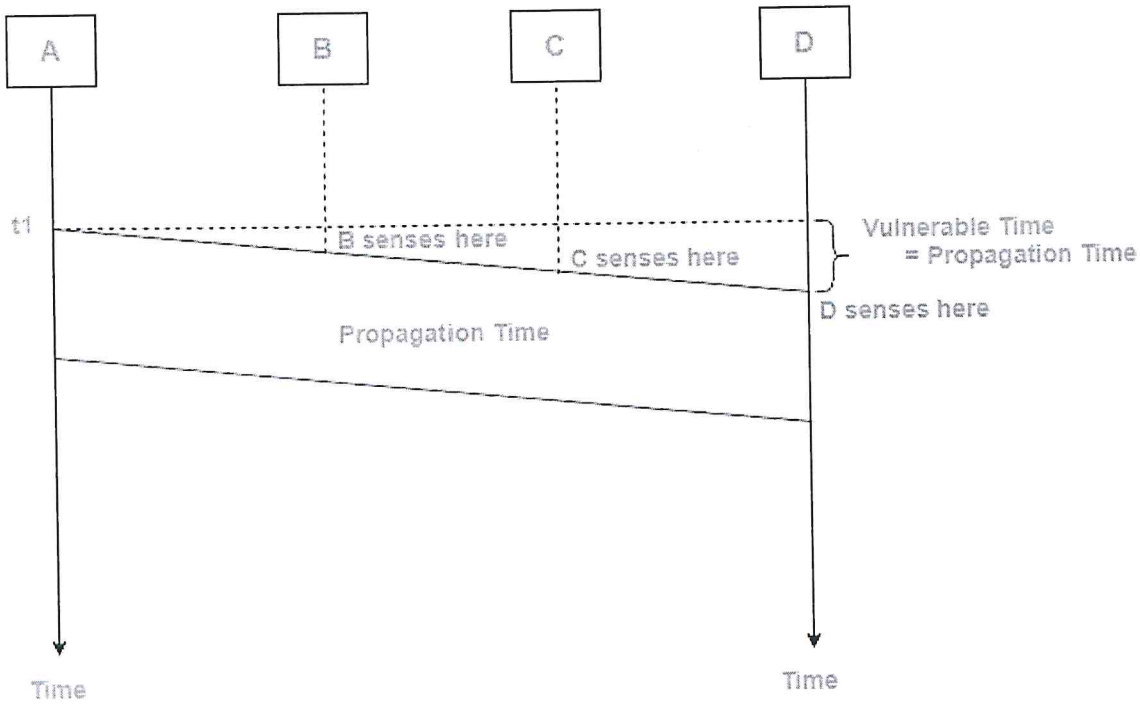
Carrier Sense Multiple Access (CSMA)

This method was developed to decrease the chances of collisions when two or more stations start sending their signals over the data link layer. Carrier Sense multiple access requires that each station **first check the state of the medium** before sending.

Prerequisite - Multiple Access Protocols

Vulnerable Time:

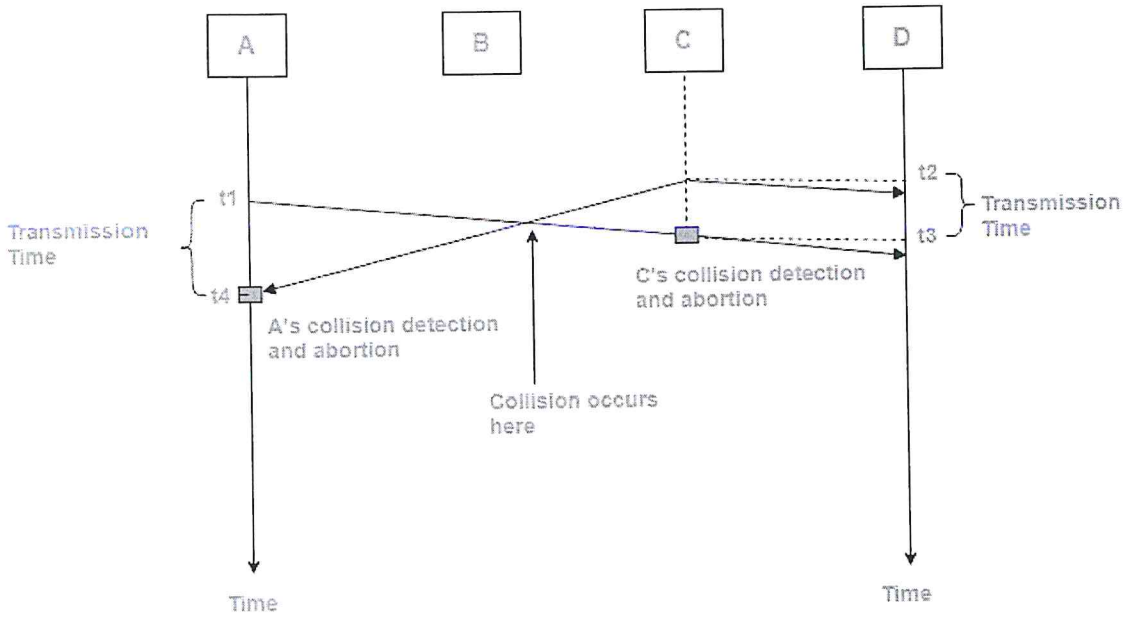
Vulnerable time = Propagation time (Tp)



The persistence methods can be applied to help the station take action when the channel is busy/idle.

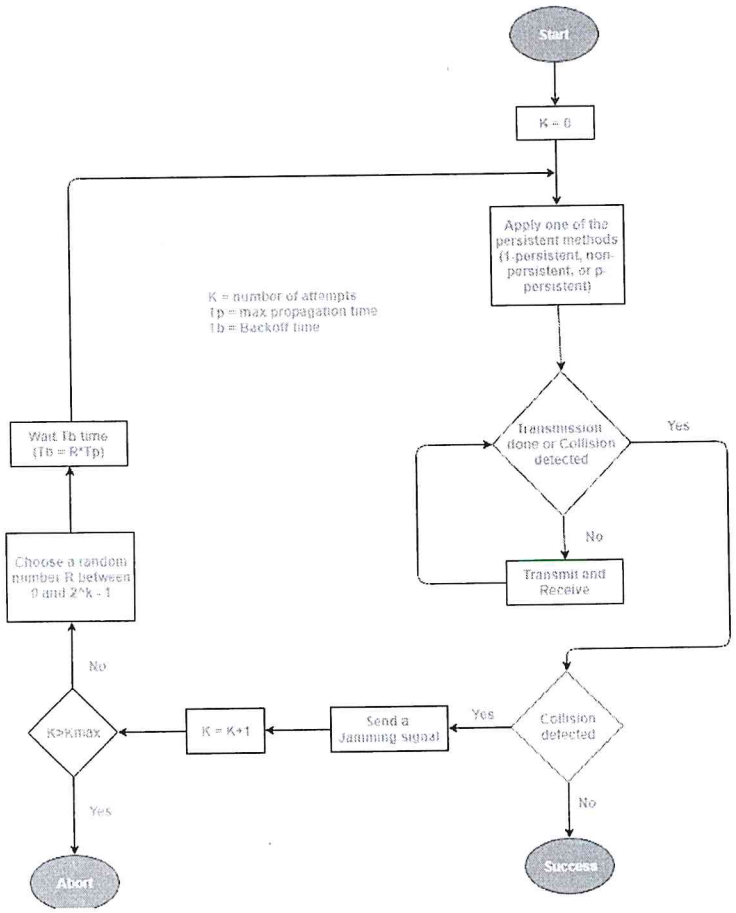
11. Carrier Sense Multiple Access with Collision Detection (CSMA/CD):

In this method, a station monitors the medium after it sends a frame to see if the transmission was successful. If successful, the transmission is finished, if not, the frame is sent again.



In the diagram, *starts* sending the first bit of its frame at t1 and since C sees the channel idle at t2, starts sending its frame at t2. C detects A's frame at t3 and aborts transmission. A detects C's frame at t4 and aborts its transmission. Transmission time for C's frame is, therefore, t3-t2 and for A's frame is t4-t1

So, the **frame transmission time (Tfr) should be at least twice the maximum propagation time (Tp)**. This can be deduced when the two stations involved in a collision are a maximum distance apart.



Process: The entire process of collision detection can be explained as follows:
Throughput and Efficiency: The throughput of CSMA/CD is much greater than pure or slotted ALOHA.

- For the 1-persistent method, throughput is 50% when G=1.
- For the non-persistent method, throughput can go up to 90%.

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SRM ARTS AND SCIENCE COLLEGE
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Date : 01 .11.2022 **Duration : 1 Hour** **Class : III BSc CS I & II Batch**
Subject Name & Code : Operating System

Section A **(5 x 2 = 10)**
(Answer any FIVE questions)

CO5	BL1	1. Define Segmentation in os .
CO3	BL6	2. Write short notes on Paging.
CO3	BL1	3. Identify the Structure of the Page Table.
CO4	BL1	4. Define Swapping in os.
CO5	BL1	5. List out the Memory Allocation Methods.
CO4	BL1	6. State the File Concept in os.
CO3	BL4	7. Separate the various System call.

Section B **(1 x 5 = 5)**
(Answer any ONE question)

CO5	BL2	8. Explain Dynamic Loading and Linking in Memory management.
CO4	BL6	9. Formulate the I/O Systems and explain it.

Section C (1 x 10 = 10)
(Answer any ONE question)

CO4	BL4	10. Discriminate the page Replacement Algorithms.
CO 5	BL4	11. Distinguish between Address Binding and Address Space.

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Department of Computer Science

Date : 01 .11.2022 **Duration : 1 Hour** **Class : III BSc CS I & II Batch**
Subject Name & Code : Operating System

Section A **(5 x 2 = 10)**
(Answer any FIVE questions)

CO5 BL1 1. Define Segmentation in os.
In Operating Systems, Segmentation is a memory management technique in which the memory is divided into the variable size parts. Each part is known as a segment which can be allocated to a process. The details about each segment are stored in a table called a segment table.

CO3 BL6 2. Write short notes on Paging.
Paging is a function of memory management where a computer will store and retrieve data from a device's secondary storage to the primary storage. Memory management is a crucial aspect of any computing device, and paging specifically is important to the implementation of virtual memory.

CO3 BL1 3. Identify the Structure of the Page Table.
Page Table is a data structure used by the virtual memory system to store the mapping between logical addresses and physical addresses. Logical addresses are generated by the CPU for the pages of the processes therefore they are generally used by the processes.

CO4 BL1 4. Define Swapping in os.
swapping is a memory management technique for swapping data between main memory and secondary memory for better memory utilization. This article explains swapping concept in detail with real-life example. Swapping is a memory management technique that can be used to increase the operating system's performance.

CO5 BL1 5. List out the Memory Allocation Methods.
Strategies for the Allocation of Memory

- Dynamic allocation.
- Stack allocation.
- Static allocation.
- Memory pool.

CO4 BL1 6. State the File Concept in os.
A file is a container that holds information. Most of the files you use contain information (data) in some particular format--a document, a spreadsheet, a chart. The format is the particular way the data is arranged inside the file. The format of a file is known as its data type.

CO3 BL4 7. Separate the various types System calls.
Types of System Calls

- Process Control. These system calls deal with processes such as process creation, process termination etc.
- File Management.
- Device Management.
- Information Maintenance.
- Communication.

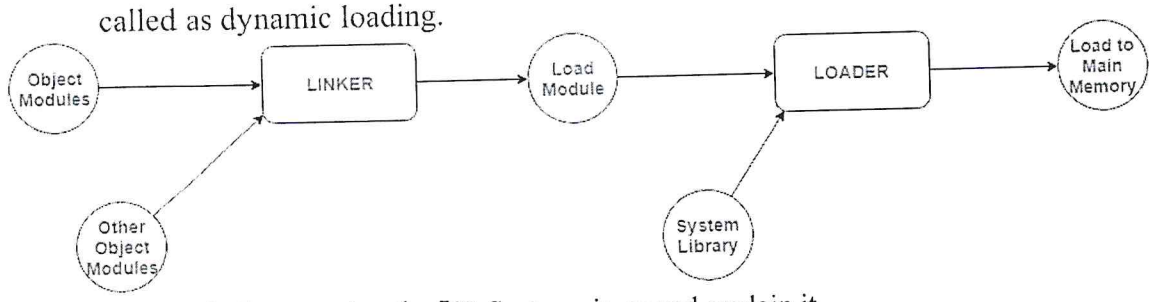
Section B

(Answer any ONE question) **(1 x 5 = 5)**

CO5 BL2 8. Explain Dynamic Loading and Linking in Memory management.

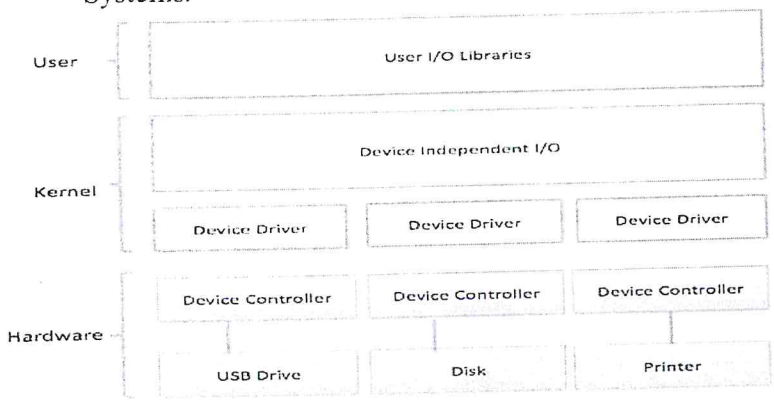
Loading and Linking are further categorized into 2 types:

Loading the entire program into the main memory before start of the program execution is called as static loading. Loading the program into the main memory on demand is called as dynamic loading.



CO4 BL6 9. Summarize the I/O Systems in os and explain it.

I/O units (Keyboard, mouse, printer, etc.) typically consist of a mechanical component and an electronic component where electronic component is called the device controller. There is always a device controller and a device driver for each device to communicate with the Operating Systems.



Section C

(Answer any ONE question) **(1 x 10 = 10)**

CO4 BL4 10. Discriminate the page Replacement Algorithms.

The various page replacement algorithms like FIFO, Optimal page replacement, LRU, LIFO, and Random page replacement help the operating system to decide which page to replace.

CO 5 BL4 11. Distinguish between Address Binding and Address Space.

Address binding is the process of mapping from one address space to another address space. Logical addresses are generated by CPU during execution whereas physical address refers to location in a physical memory unit (the one that is loaded into memory). Note that users deal only with logical address (virtual address).

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II - UNIT TEST, OCTOBER & NOVEMBER 2022

DEPARTMENT OF COMPUTER SCIENCE

Date: 02.11.2022 **Duration: 1 Hr** **Class: III B.Sc CS - I BATCH**

Subject Name & Code: Relational Database Management System & SE25C

Max: 25 Marks

Section A (5 x 2 = 10)

(Answer any **FIVE** questions)

CO4	BL1	1. Define entity with example.
CO4	BL6	2. Write about inheritance in generalization hierarchies.
CO5	BL1	3. List the facilities available for iterating the statements in PL/SQL.
CO5	BL1	4. Define cursor and mention its types in Oracle.
CO5	BL2	5. Explain about parameters.
CO6	BL4	6. Select out the reasons, why relational model became more popular?
CO6	BL1	7. Define join operation.

Section B (1 x 5 = 5)

(Answer any **ONE** question)

CO4	BL2	8. Classify the Entity Sets.
CO5	BL3	9. Complete Benefits of Procedures and Functions.

Section C (1 x 10 = 10)

(Answer any **ONE** question)

CO6	BL2	10. Explain the CODD'S Rules.
CO4	BL1	11. Tell how to Reducing ER Diagram to Tables?

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DEPARTMENT OF COMPUTER SCIENCE - II UNIT TEST, October 2022

Answer Key

CLASS: III B.Sc. (Computer Science) I – Batch TIME: 1 Hour

SUB: Relational Database Management System Max: 25 Marks

PART A – (5 X 2 = 10 Marks)

Answer any FIVE questions

1. Define entity with example

   An entity is an object with a physical existence. Examples of entity is a person, a car, an organization, a house, etc.

2. Define inheritance in generalization hierarchies

   Inheritance is a data modeling feature that supports sharing of attributes between a supertype and a subtype. Subtype inherits attributes from their supertype.

3. Mention the facilities available for iterating the statements in PL/SQL.

   (a) For-loop

   (b) While-loop

   (c) Loop-Exit.

4. What is cursor and mention its types in Oracle.

   A cursor is a mechanism that can be used to process the multiple row result sets one row at a time. In other words, cursors are constructs that enable the user to name a private memory area to hold a specific statement for access at a later time. Cursors are an inherent structure in PL/SQL. Cursors allow users to easily store and process sets of information in PL/SQL program.

   There are two types of cursors in Oracle (a) Implicit and (b) Explicit cursors.

5. What are parameters?

   Parameters are the link between a subprogram code and the code calling the subprogram. Lot depends on how the parameters are passed to a subprogram.

6. Bring out the reasons, why relational model became more popular?

   1. Relational model was based on strong mathematical background. 2. Relational model used the power of mathematical abstraction. Operations do not require user to know storage structures used. 3. Strong mathematical theory provides tool for improving design. 4. Basic structure of the relation is simple, easy to understand and implement.

7. Define join operation.

Join operation combines two relations to form a new relation. The tables should be joined based on a common column. The common column should be compatible in terms of domain.

PART B – (1 X 5 = 5 Marks)

Answer any ONE question

8. Classification of Entity Sets

Entity sets can be broadly classified into: 1. Strong entity. 2. Weak entity. 3. Associative entity

Strong entity is one whose existence does not depend on other entity. Example Consider the example, student takes course. Here student is a strong entity.
In this example, course is considered as weak entity because, if there are no students to take a particular course, then that course cannot be offered. The COURSE entity depends on the STUDENT entity.

Weak Entity Weak entity is one whose existence depends on other entity. In many cases, weak entity does not have primary key. Example Consider the example, customer borrows loan. Here loan is a weak entity. For every loan, there should be at least one customer. Here the entity loan depends on the entity customer hence loan is a weak entity.

9. Benefits of Procedures and Functions
Stored procedures and functions have many benefits in addition to modularizing application development. 1. It modifies one routine to affect multiple applications. 2. It modifies one routine to eliminate duplicate testing. 3. It ensures that related actions are performed together, or not at all, by doing the activity through a single path. 4. It avoids PL/SQL parsing at runtime by parsing at compile time. 5. It reduces the number of calls to the database and database network traffic by bundling the commands.

PART C – (1 X 10 = 10 Marks)

Answer any ONE question

10. Explain the CODD'S Rules

1. The Information Rule. All information in a relational database is represented explicitly at the logical level and in exactly one way-by values in tables: • Data should be presented to the user in the tabular form. 2. Guaranteed Access Rule. Each and every datum (atomic value) in a relational database is guaranteed to be logically accessible by resorting to a combination of table name, primary key value, and column name: • Every data element should be unambiguously accessible. 3. Systematic Treatment of Null Values. Null values (distinct from the empty character string or a string of blank characters and distinct from zero or any other number) are supported in fully relational DBMS for representing missing information and inapplicable information in a systematic way, independent of data type. 4. Dynamic On-line

Catalog Based on the Relational Model. The database description is represented at the logical level in the same way as ordinary data, so that authorized users can apply the same relational language to its interrogation as they apply to the regular data: • The database description should be accessible to the users. 5. Comprehensive Data Sublanguage Rule. A relational system may support several languages and various modes of terminal use (for example the fill-in-the-blanks mode). However, there must be at least one language whose statements are expressible, per some well-defined syntax, as character strings and whose ability to support all the following is comprehensive: data definition, view definition, data manipulation (interactive and by program), integrity constraints, and transaction boundaries: • A database supports a clearly defined language to define the database, view the definition, manipulate the data, and restrict some data values to maintain integrity. 6. View Updating Rule. All views that are theoretically updatable are also updatable by the system: • Data should be able to be changed through any view available to the user. 7. High-level Insert, Update, and Delete. The capacity of handling a base relation or a derived relation as a single operand applies not only to the retrieval of data but also to the insertion, update, and deletion of data: • All records in a file must be able to be added, deleted, or updated with singular commands 8. Physical Data Independence. Application programs and terminal activities remain logically unimpaired whenever any changes are made in either storage representations or access methods:

Changes in how data are stored or retrieved should not affect how a user accesses the data. 9. Logical Data Independence. Application programs and terminal activities remain logically unimpaired whenever information-preserving changes of any kind that theoretically permit unimpairment are made to the base tables: • A user's view of data should be unaffected by its actual form in files. 10. Integrity Independence. Integrity constraints specific to a particular relational database must be definable in a relational data sublanguage and storable in the catalog, not in the application programs. • Constraints on user input should exist to maintain data integrity. 11. Distribution Independence. A relational DBMS has distribution independence. Distribution independence implies that users should not have to be aware of whether a database is distributed. • A database design should allow for distribution of data over several computer sites. 12. Nonsubversion Rule. If a relational system has a low-level (single-recordat-a-time) language, that low level cannot be used to subvert or bypass the integrity rules and constraints expressed in the higher level relational language (multiple-records-at-a-time): • Data fields that affect the organization of the database cannot be changed. There is one more rule called Rule Zero which states that "For

any system that is claimed to be a relational database management system, that system must be able to manage data entirely through capabilities."

11. Reducing ER Diagram to Tables

Mapping Algorithm:

The mapping algorithm gives the procedure to map ER diagram to tables. The rules in mapping algorithm are given as: – For each strong entity type say E, create a new table. The columns of the table are the attribute of the entity type E. – For each weak entity W that is associated with only one 1–1 identifying owner relationship, identify the table T of the owner entity type. Include as columns of T, all the simple attributes and simple components of the composite attributes of W. – For each weak entity W that is associated with a 1–N or M–N identifying relationship, or participates in more than one relationship, create a new table T and include as its columns, all the simple attributes and simple components of the composite attributes of W. Also form its primary key by including as a foreign key in R, the primary key of its owner entity.

For each binary 1–1 relationship type R, identify the tables S and T of the participating entity types. Choose S, preferably the one with total participation. Include as foreign key in S, the primary key of T. Include as columns of S, all the simple attributes and simple components of the composite attributes of R. – For each binary 1–N relationship type R, identify the table S, which is at N side and T of the participating entities. Include as a foreign key in S, the primary key of T. Also include as columns of S, all the simple attributes and simple components of composite attributes of R. – For each M-N relationship type R, create a new table T and include as columns of T, all the simple attributes and simple components of composite attributes of R. Include as foreign keys, the primary keys of the participating entity types. Specify as the primary key of T, the list of foreign keys. – For each multivalued attribute, create a new table T and include as columns of T, the simple attribute or simple components of the attribute A. Include as foreign key, the primary key of the entity or relationship type that has A. Specify as the primary key of T, the foreign key and the columns corresponding to A.

Mapping Regular Entities, Converting Composite Attribute in an ER Diagram to Tables, Mapping Multivalued Attributes in ER Diagram to Tables, Converting "Weak Entities" in ER Diagram to Tables, Converting Binary Relationship to Table, Mapping Associative Entity to Tables, Converting Unary Relationship to Tables, Converting Ternary Relationship to Tables.

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II - UNIT TEST, OCTOBER & NOVEMBER 2022

DEPARTMENT OF COMPUTER SCIENCE

Date: 02.11.2022 **Duration: 1 Hr** **Class: III B.Sc CS - II BATCH**

Subject Name & Code: Relational Database Management System & SE25C

Max: 25 Marks

Section A (5 x 2 = 10)

(Answer any **FIVE** questions)

CO1	BL1	1. Define Entity
CO2	BL1	2. List down the advantages of RDBMS
CO2	BL1	3. Define DML.
CO2	BL2	4. Explain composite key
CO4	BL1	5. Define Relational Algebra.
CO4	BL1	6. Define SQL.
CO2	BL1	7. State and three SQL aggregate functions

Section B (1 x 5 = 5)

(Answer any **ONE** questions)

CO4	BL4	8. Explain about Joins types with examples.
CO4	BL4	9. Explain Functional dependency

Section C (1 x 10 = 10)

(Answer any ONE question)

CO1	BL4	10. Explain the types of normalization
CO3	BL4	11. Explain the Relational data base design.

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Answer keys

Date : 02.11.2022 **Duration : 1 Hour** **Class : III BSc CS II Batch**

Subject Name & Code : RDBMS &

Section A (5 x 2 = 10)

(Answer any **FIVE** questions)

CO1 BL1 1. Define Entity

Entity. **A single unique object in the real world that is being mastered.** Examples of an entity are a single person, single product, or single organization. Entity type. A person, organization, object type, or concept about which information is stored.
Entity type: A person, organization, object type,
Attribute: A characteristic or trait of an entity type
Member record: The representation of the entity
Entity: A single unique object in the real world t.

CO2 BL1 2. List down the advantages of RDBMS

Number of allowed users.
Hardware and software requirements less
Database structure
ACID implementation.
Distributed databases.
Support of database normalization

CO2 BL1 3. Define DML.

Data Manipulation Language (**DML**) **commands in SQL** deals with manipulation of data records ...

Command:

Command	Description
SELECT	Used to query or fetch selecte ...
INSERT	Used to insert new data record ...
UPDATE	Used to set the value of a fie ..

CO2 BL2 4. Explain composite key

A primary key having two or more attributes is called composite key. It is a combination of two or more columns. An example can be – Here our composite key is OrderID and ProductID – {OrderID, ProductID}

CO4 BL1 5. Define Relational Algebra.

RELATIONAL ALGEBRA is a widely used procedural query language. It collects instances of relations as input and gives occurrences of relations as output. It uses various operations to perform this action. SQL Relational algebra query operations are performed

recursively on a relation. The output of these operations is a new relation, which might be formed from one or more input relations.
Five basic operations in relational algebra: **Selection, Projection, Cartesian product, Union, and Set Difference**. These perform most of the data retrieval operations needed.

CO4 BL1 6. Define SQL.

SQL stands for **Structured Query Language**. It is a standard programming language for accessing a relational database. It has been designed for managing data in Relational Database Management Systems (RDBMS) like Oracle, MySQL, MS SQL Server, IBM DB2. SQL is one of the first commercial languages used .

CO2 BL1 7. State and three SQL aggregate functions.

An aggregate function in SQL returns one value after calculating multiple values of a column. We often use aggregate functions with the GROUP BY and HAVING clauses of the SELECT statement.**Various types of SQL aggregate functions are:**

- Count()
- Sum()
- Avg()
- Min()
- Max()

Section B (1 x 5 = 5)

(Answer any **ONE** questions)

CO4 BL4 8. Explain about Joins types with examples.

Types of Join
There are mainly two types of joins in DBMS:
Inner Joins: Theta, Natural, EQUI
Outer Join: Left, Right, Full

Inner Join
Inner Join is used to return rows from both tables which satisfy the given condition. It is the most widely used join operation and can be considered as a default join-type
An Inner join or equijoin is a comparator-based join which uses equality comparisons in the join-predicate. However, if you use other comparison operators like ">" it can't be called equijoin.
Inner Join further divided into three subtypes:
Theta join
Natural join
EQUI join
Theta Join
Theta Join allows you to merge two tables based on the condition represented by theta. Theta joins work for all comparison operators. It is denoted by symbol **θ**. The general case of JOIN operation is called a Theta join.
Syntax:

$A \bowtie_\theta B$

Theta join can use any conditions in the selection criteria.

Consider the following tables.

Table A		Table B	
column 1	**column 2**	**column 1**	**column 2**
1	1	1	1
1	2	1	3

For example:

$A \bowtie_{A.column\ 2 > B.column\ 2} (B)$

A ⋈ A.column 2 > B.column 2 (B)

column 1	**column 2**
1	2

EQUI Join

EQUI Join is done when a Theta join uses only the equivalence condition. EQUI join is the most difficult operation to implement efficiently in an RDBMS, and one reason why RDBMS have essential performance problems.

For example:

$A \bowtie_{A.column\ 2 = B.column\ 2} (B)$

A ⋈ A.column 2 = B.column 2 (B)

column 1	**column 2**
1	1

Natural Join (⋈)

Natural Join does not utilize any of the comparison operators. In this type of join, the attributes should have the same name and domain. In Natural Join, there should be at least one common attribute between two relations. It performs selection forming equality on those attributes which appear in both relations and eliminates the duplicate attributes.

Example:

Consider the following two tables

C

Num	**Square**
2	4

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II UNIT TEST – Nov 2022
Department of Computer Science

Date : 31.10.2022 **Duration : 1 Hr** **Class :II M.Sc**
Subject Name & Code : **Principles of Compiler Design, PSD3A**

Section A (5 x 1 = 5)
(Answer any **FIVE** questions)

CO 3	BL1	1. Define Syntax tree.
CO 2	BL1	2. Define Handle pruning.
CO6	BL1	3. List out the problems in code generation.
CO3	BL3	4. What is a semantic action?
CO5,6	BL1	5. Define DAG
CO3	BL3	6. What is known as reduction in strength?
CO 3	BL3	7. What is code optimization?

Section B (2 x 5 = 10)
(Answer any **TWO** questions)

CO1,4	BL2	8. Discuss about error recovery in operator precedence parsing
CO1,6	BL2	9. Describe the peephole optimization.
CO5	BL6	10. Write about DAG Construction.
CO5	BL6	11. Write down the procedure for Quadruple and Triples of a given statement.

Section C (1 x 10 = 10)
(Answer any **ONE** question)

CO1,6	BL2	12. Explain the register allocation and assignment with example.
CO1,6	BL2	13. Explain the principle sources of optimization.

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3	9

D

Num	Cube
2	8
3	18

C ⋈ D

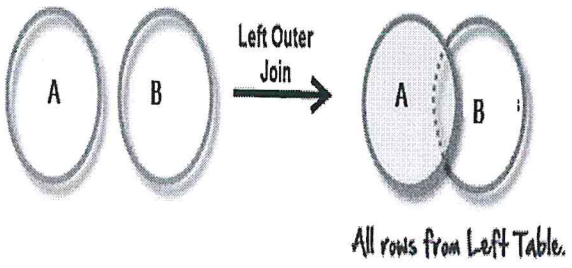
C ⋈ D

Num	Square	Cube
2	4	8
3	9	18

Outer Join
An **Outer Join** doesn't require each record in the two join tables to have a matching record. In this type of join, the table retains each record even if no other matching record exists.

Outer Join

An **Outer Join** doesn't require each record in the two join tables to have a matching record. In this type of join, the table retains each record even if no other matching record exists.
Three types of Outer Joins are:
Left Outer Join
Right Outer Join
Full Outer Join
Left Outer Join (A ⟕ B)
Left Outer Join returns all the rows from the table on the left even if no matching rows have been found in the table on the right. When no matching record is found in the table on the right, NULL is returned.



Consider the following 2 Tables

A

Num	Square

2	4
3	9
4	16

B

Num	Cube
2	8
3	18
5	75

A ⋈ B

⋈ B

Num	Square	Cube
2	4	8
3	9	18
4	16	–
5	–	75

CO4 BL4 9. Explain Functional dependency

Functional Dependency (FD) is a constraint that determines the relation of one attribute to another attribute in a Database Management System (DBMS). Functional Dependency helps to maintain the quality of data in the database. It plays a vital role to find the difference between good and bad database design.
A functional dependency is denoted by an arrow "→". The functional dependency of X on Y is represented by X → Y. Let's understand Functional Dependency in DBMS with example.
Example:

Employee number	Employee Name	Salary	City
1	Dana	50000	San Francisco
2	Francis	38000	London
3	Andrew	25000	Tokyo

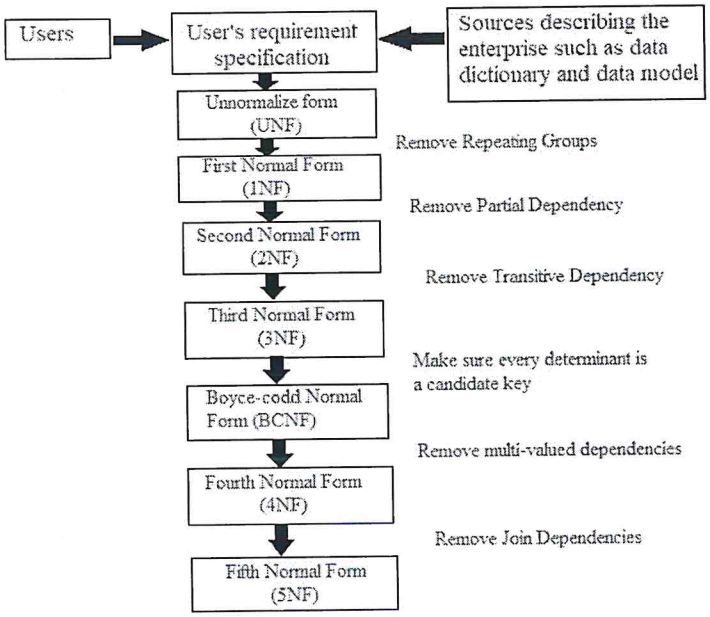
The city, Employee Name, and salary are functionally depended on Employee number.

Section C (1 x 10 = 10)

(Answer any ONE question)

CO1 BL4 10. Explain the types of normalization

Normalization works through a series of stages called Normal forms. The normal forms apply to individual relations. The relation is said to be in particular normal form if it satisfies constraints.



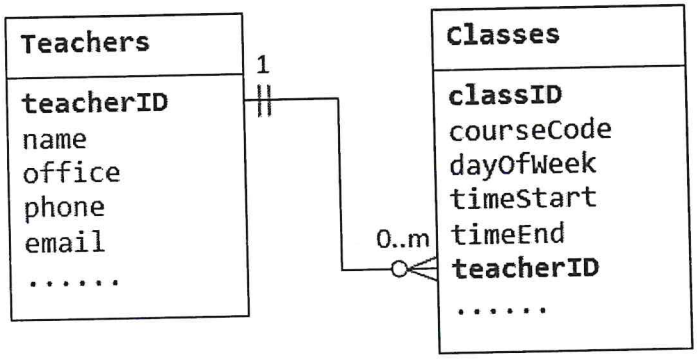
Normal Form	Description
1NF	A relation is in 1NF if it contains an atomic value.
2NF	A relation will be in 2NF if it is in 1NF and all non-key attributes are fully functional dependent on the primary key.
3NF	A relation will be in 3NF if it is in 2NF and no transition dependency exists.
BCNF	A stronger definition of 3NF is known as Boyce Codd's normal form.
4NF	A relation will be in 4NF if it is in Boyce Codd's normal form and has no multi-valued dependency.
5NF	A relation is in 5NF. If it is in 4NF and does not contain any join dependency, joining should be lossless.

CO3 BL4 11. Explain the Relational data base design.

Relational database design (RDD) models information and data into a set of tables with rows and columns. Each row of a relation/table represents a record, and each column represents an

attribute of data. The Structured Query Language (SQL) is used to manipulate relational databases

Relational database was proposed by Edgar Codd (of IBM Research) around 1969. It has since become the dominant database model for commercial applications (in comparison with other database models such as hierarchical, network and object models). Today, there are many commercial *Relational Database Management System* (RDBMS), such as Oracle, IBM DB2 and Microsoft SQL Server. There are also many free and open-source RDBMS, such as MySQL, mSQL (mini-SQL) and the embedded JavaDB (Apache Derby).A relational database organizes data in *tables* (or *relations*). A table is made up of rows and columns. A row is also called a *record* (or *tuple*). A column is also called a *field* (or *attribute*). A database table is similar to a spreadsheet. However, the relationships that can be created among the tables enable a relational database to efficiently store huge amount of data, and effectively retrieve selected data.A language called SQL (Structured Query Language) was developed to work with relational databases.
Example:



- Entities with one-to-one relationships can (and often should) be merged into a single entity
- Each remaining entity is modeled by a table with a primary key and attributes, some of which may be foreign keys
- One-to-many relationships are modeled by a foreign key attribute in the table representing the entity on the "many" side of the relationship (e.g., the FIRES table has a foreign key that refers to the PARCELS table)
- Many-to-many relationships among two entities are modeled by defining a **third** table that has foreign keys that refer to the entities in each original table. These foreign keys should be included in the third table's primary key, if appropriate
- Commercially available tools can automate the process of converting a E-R model to a database schema

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SRM ARTS AND SCIENCE COLLEGE
II UNIT TEST – NOV 2022
Department of Computer Science

Date : 03.11.22 **Duration : 1 hour** **Class :III B.Sc CS(I Batch)**

Subject Name & Code : Artificial Intelligence and Expert System

Section A (5 x 2 = 10)

(Answer any **FIVE** questions)

CO5	BL1	1. Define FOL.
CO5	BL2	2. What is meant by Inferential Adequacy?
CO4	BL1	3. Define Quantifier and it's types.
CO4	BL2	4. What is Single-valued attributes? Give example.
CO5	BL6	5. Write the following statements in predicate logic: a. All Pompeians were Roman b. Everyone is loyal to someone
CO1	BL1	6. List the kinds of knowledge needs to represent in AI system.
CO4	BL4	7. Differentiate procedural and declarative knowledge.

Section B (1 x 5 = 5)

(Answer any **ONE** question)

CO3	BL2	8. Explain in detail about inheritable and inferential knowledge
CO5	BL4	9. Explain in detail about representing simple facts in logic.

Section C (1 x 10 = 10)

(Answer any **ONE** question)

CO4	BL4	10.Explain in detail about issues in knowledge representaion.
CO5	BL2	11. Discuss briefly resolution in predicate logic with suitable example.

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DEPARTMENT OF COMPUTER SCIENCE - II UNIT TEST, NOV 2022

CLASS: **III BSc CS (I Batch)** TIME : 1 Hour

SUB: ***Artificial Intelligence and Expert System*** Max : 25 Marks

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ANSWER KEY

PART A – (5 X 2 = 10 Marks)
Answer any FIVE questions

1. **Define FOL.**

. FOL is a first order logic. It is a representational language of knowledge which is powerful than propositional logic (i.e.) Boolean Logic. It is an expressive, declarative, compositional language.

2. **What is meant by Inferential Adequacy?**

The ability to manipulate the representational structures in such a way as to derive new structures corresponding to new knowledge inferred from old.

3. **Define Quantifier and it's types**

Quantifiers are used to express properties of entire collection of objects rather than representing the objects by name.

Types: i. Universal Quantifier ii. Existential Quantifier

4. **What is Single-valued attributes? Give example**

A specific but very useful kind of attribute is one that is guraranteed to take a unique value. Example: height,age etc

5. **Write the following statements in predicate logic:**

(i) All Pompeians were Romans.

$\forall x$: Pompeian(x) $\rightarrow$ Roman(x)

(ii) Everyone is loyal to someone.

$\forall x$: $\exists y$: loyalto(x, y)

6. **List the kinds of knowledge needs to represent in AI system.**

Object , Events, Performance, Meta-Knowledge, Facts and Knowledge base

7. **Differentiate procedural and declarative knowledge**

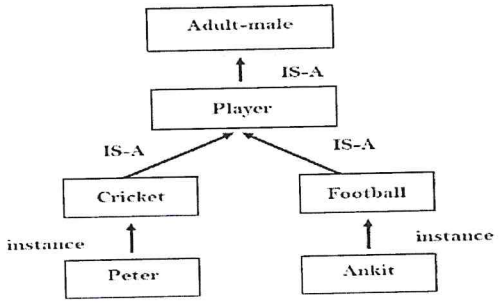
Sr. No.	Key	Procedural Knowledge	Declarative Knowledge
1	Name	Procedural knowledge is also termed as imperative knowledge.	Declarative knowledge is also termed as functional knowledge
2	Basis	Procedural knowledge revolves around **How to** the concept.	Declarative knowledge revolves around **What to** the concept.
3	Communication	Procedural knowledge is difficult to communicate.	Declarative knowledge is easily communicable.
4	Orientation	Procedural knowledge is process-oriented.	Declarative knowledge is data-oriented.

PART B – (1 X 5 = 5 Marks)
Answer any ONE question

8. Explain in detail about inheritable and inferential knowledge

Inheritable knowledge:

- In the inheritable knowledge approach, all data must be stored into a hierarchy of classes.
- All classes should be arranged in a generalized form or a hierarchal manner.
- In this approach, we apply inheritance property.
- Elements inherit values from other members of a class.
- This approach contains inheritable knowledge which shows a relation between instance and class, and it is called instance relation.



Inferential knowledge:

- Inferential knowledge approach represents knowledge in the form of formal logics.
- This approach can be used to derive more facts.
- It guaranteed correctness.
- **Example:** Let's suppose there are two statements:

  a. Marcus is a man
  b. All men are mortal
  Then it can represent as;
  man(Marcus)
  ∀x = man (x) ----------> mortal (x)s

9. Explain in detail about representing simple facts in logic

- Propositional logic is also called Boolean logic as it works on 0 and 1.
- In propositional logic, we use symbolic variables to represent the logic, and we can use any symbol for a representing a proposition, such A, B, C, P, Q, R, etc.
- Propositions can be either true or false, but it cannot be both.
- Propositional logic consists of an object, relations or function, and **logical connectives**.
- These connectives are also called logical operators.
- The propositions and connectives are the basic elements of the propositional logic.

First-Order logic:

- First-order logic is another way of knowledge representation in artificial intelligence. It is an extension to propositional logic.

- FOL is sufficiently expressive to represent the natural language statements in a concise way.
- First-order logic is also known as **Predicate logic or First-order predicate logic**. First-order logic is a powerful language that develops information about the objects in a more easy way and can also express the relationship between those objects.
- First-order logic (like natural language) does not only assume that the world contains facts like propositional logic but also assumes the following things in the world:
  - **Objects:** A, B, people, numbers, colors, wars, theories, squares, pits, wumpus, ...
  - **Relations: It can be unary relation such as:** red, round, is adjacent, **or n-any relation such as:** the sister of, brother of, has color, comes between
  - **Function:** Father of, best friend, third inning of, end of, ...
- As a natural language, first-order logic also has two main parts:

  a. **Syntax**
  b. **Semantics**

PART C – (1 X 10 = 10 Marks)
Answer any ONE question

10. Explain in detail about issues in knowledge representation.

The issues that arise while using KR techniques are many. Some of these are explained below.

Important Attributed:

Any attribute of objects so basic that they occur in almost every problem domain?
There are two attributed "instance" and "isa", that are general significance. These attributes are important because they support property inheritance.

Relationship among attributes:

Any important relationship that exists among object attributed?
The attributes we use to describe objects are themselves entities that we represent.
The relationship between the attributes of an object, independent of specific knowledge they encode, may hold properties like:

1. Inverse
2. Existence in an isa hierarchy
3. Technique for reasoning about values
4. Single valued attributes

Choosing Granularity:

At what level of detail should the knowledge be represented?
Regardless of the KR formalism, it is necessary to know:

- At what level should the knowledge be represented and what are the primitives?
- Should there be a small number or should there be a large number of low-level primitives or High-level facts.
- High-level facts may not be adequate for inference while Low-level primitives may require a lot of storage.

Set of objects:

How should sets of objects be represented?
There are certain properties of objects that are true as member of a set but not as individual;

Finding Right structure:

Given a large amount of knowledge stored in a database, how can relevant parts are accessed when they are needed?

This is about access to right structure for describing a particular situation. This requires, selecting an initial structure and then revising the choice.

11. Discuss briefly resolution in predicate logic with suitable example

Resolution

Resolution is a theorem proving technique that proceeds by building refutation proofs, i.e., proofs by contradictions. It was invented by a Mathematician John Alan Robinson in the year 1965.

Resolution is used, if there are various statements are given, and we need to prove a conclusion of those statements. Unification is a key concept in proofs by resolutions. Resolution is a single inference rule which can efficiently operate on the **conjunctive normal form or clausal form**.

Clause: Disjunction of literals (an atomic sentence) is called a **clause**. It is also known as a unit clause.

Conjunctive Normal Form: A sentence represented as a conjunction of clauses is said to be **conjunctive normal form** or **CNF**.

Steps for Resolution:

1. Conversion of facts into first-order logic.
2. Convert FOL statements into CNF
3. Negate the statement which needs to prove (proof by contradiction)
4. Draw resolution graph (unification).

Example:

a. **John likes all kind of food.**

b. **Apple and vegetable are food**

c. **Anything anyone eats and not killed is food.**

d. **Anil eats peanuts and still alive**

e. **Harry eats everything that Anil eats.**

Prove by resolution that:

f. **John likes peanuts.**

Step-1: Conversion of Facts into FOL

In the first step we will convert all the given statements into its first order logic.

a. $\forall x: food(x) \rightarrow likes(John, x)$

b. $food(Apple) \wedge food(vegetables)$

c. $\forall x \forall y: eats(x, y) \wedge \neg killed(x) \rightarrow food(y)$

d. $eats(Anil, Peanuts) \wedge alive(Anil)$.

e. $\forall x : eats(Anil, x) \rightarrow eats(Harry, x)$

f. $\forall x: \neg killed(x) \rightarrow alive(x)$ } added predicates.

g. $\forall x: alive(x) \rightarrow \neg killed(x)$ }

h. $likes(John, Peanuts)$

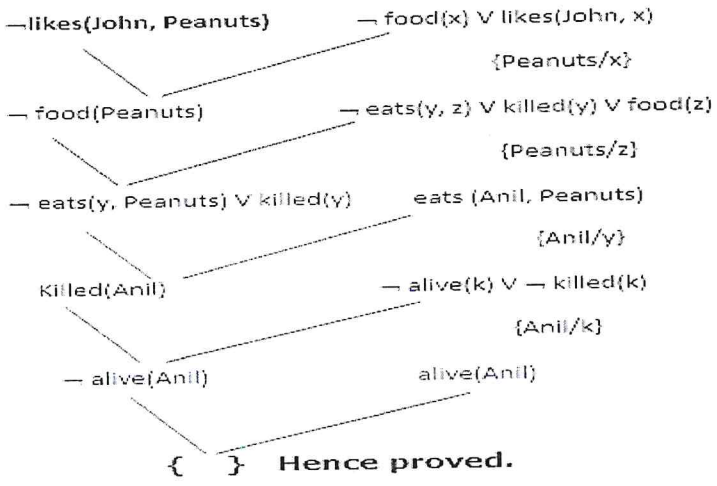
Step-2: Conversion of FOL into CNF

- Eliminate all implication (→) and rewrite
- Rename variables or standardize variables
- Eliminate existential instantiation quantifier by elimination.

Step-3: Negate the statement to be proved

In this statement, we will apply negation to the conclusion statements, which will be written as ¬likes(John, Peanuts)

Step-4: Draw Resolution graph:



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Answer Key

Section A

CO 3 BL1 1. Define Syntax tree.

The syntax tree is shortened form of the Parse Tree.

CO 2 BL1 2. Define Handle pruning.

Removing the children of the left-hand side non-terminal from the parse tree is called Handle Pruning. A rightmost derivation in reverse can be obtained by handle pruning.

CO6 BL1 3. List out the problems in code generation.

1. Input to code generator
2. Target program
3. Memory management
4. Instruction selection
5. Register allocation
6. Evaluation order

CO3 BL3 4. What is a semantic action?

A semantic action defines additional processing on abstract tree nodes.

CO5,6 BL1 5. Define DAG

Directed Acyclic Graph (DAG) is a tool that depicts the structure of basic blocks, helps to see the flow of values flowing among the basic blocks, and offers optimization too.

CO3 BL3 6. What is known as reduction in strength?

Strength reduction is a compiler optimization where expensive operations are replaced with equivalent but less expensive operations.

CO 3 BL3 7. What is code optimization?

The code optimization in the synthesis phase is a program transformation technique, which tries to improve the intermediate code by making it consume fewer resources (i.e. CPU, Memory) so that faster-running machine code will result.

Section B

CO1,4 BL2 8. Discuss about error recovery in operator precedence parsing

1. **Error Cases –**
   1. No relation holds between the terminal on the top of the stack and the next input symbol.
   2. A handle is found (reduction step), but there is no production with this handle as a right side.
2. **Error recovery –**
   1. Each empty entry is filled with a pointer to an error routine.
   2. Decides the popped handle "looks like" which right-hand side. And tries to recover from that situation.
3. **Handling shift/ reduce errors –**
   To take care of such types of errors we must modify the following.
   1. Stack
   2. Input
   3. or Both

CO1,6 BL2 9. Describe the peephole optimization.

1. To improve performance
2. To reduce memory footprint
3. To reduce code size

CO5 BL6 10. Write about DAG Construction.

The Directed Acyclic Graph (DAG) is used to represent the structure of basic blocks, to visualize the flow of values between basic blocks, and to provide optimization techniques in the basic block. To apply an optimization technique to a basic block, a DAG is a three-address code that is generated as the result of an intermediate code generation.

- Directed acyclic graphs are a type of data structure and they are used to apply transformations to basic blocks.
- The Directed Acyclic Graph (DAG) facilitates the transformation of basic blocks.
- DAG is an efficient method for identifying common sub-expressions.
- It demonstrates how the statement's computed value is used in subsequent statements.

CO5 BL6 11. Write down the procedure for Quadruple and Triples of a given statement.

In quadruples representation, each instruction is splitted into the following 4 different fields-

op, arg1, arg2, result

In triples representation,

- References to the instructions are made.
- Temporary variables are not used.

Section C

CO1,6 BL2 12. Explain the register allocation and assignment with example.

Register allocation depends on:

- Size of live range
- Number of uses/definitions
- Frequency of execution
- Number of loads/stores needed.
- Cost of loads/stores needed.

CO1,6 BL2 13. Explain the principle sources of optimization.

There are a number of ways in which a compiler can improve a program without changing the function it computes. Function preserving transformations examples:

- Common sub expression elimination
- Copy propagation,
- Dead-code elimination
- Constant folding

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II - UNIT TEST, OCTOBER & NOVEMBER 2022

DEPARTMENT OF COMPUTER SCIENCE

Date: 01 .11.2022 **Duration: 1 Hour** **Class: II M.Sc. (CS)**

Subject Name & Code: Information Security, PSD3B

Section A (5 x 1 = 5)

(Answer any **FIVE** questions)

CO3	BL1	1. Define the term – Auditability in database security.
CO2	BL2	2. Explain Tracker attack in database security
CO1	BL1	3. Define inference.
CO4	BL2	4. Explain Application proxy.
CO2	BL6	5. Write about intrusion system.
CO5	BL1	6. Define traceability.
CO6	BL1	7. Define the term – Risk analysis.

Section B (2 x 5 = 10)

(Answer any **TWO** questions)

CO1	BL2	8. Describe reliability and integrity.
CO5	BL2	9. Explain the practical issues in multilevel security.
CO4	BL6	10. Write note on Firewall.
CO6	BL1	11. List the issues addressed by security plan. Explain it.

Section C (1 x 10 = 10)

(Answer any **ONE** question)

CO5	BL2	12. Explain the types of disclosures.
CO6	BL2	13. Explain about intrusion detection systems.

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DEPARTMENT OF COMPUTER SCIENCE - II UNIT TEST, October 2022

Answer Key

CLASS: II M.Sc. (CS) TIME: 1 Hour

SUB: Information Security (PSD3B) Max: 25 Marks

PART A – (5 X 1 = 5 Marks)

Answer any FIVE questions

1. Auditability in database security

   It is possible to track who or what has accessed (or modified) the elements in the database

2. Tracker attack in database security

   A tracker attack can fool the database manager into locating the desired data by using additional queries that produce small results.

3. Inference

   Inference is a way to infer or derive sensitive data from nonsensitive data. The inference problem is a subtle vulnerability in database security.

4. application proxy

   An application proxy gateway, also called a bastion host, is a firewall that simulates the (proper) effects of an application so that the application receives only requests to act properly.

5. intrusion system

   An intrusion detection system (IDS) is a device, typically another separate computer, that monitors activity to identify malicious or suspicious events.

6. Traceability

   Can each requirement be traced to the functions and data related to it so that changes in a requirement can lead to easy reevaluation?

7. Risk analysis

   Risk analysis is the process of examining a system and its operational context to determine possible exposures and the potential harm they can cause

PART B – (2 X 5 = 10 Marks)

Answer any TWO questions

8. reliability and integrity

Databases amalgamate data from many sources, and users expect a DBMS to provide access to the data in a reliable way. When software engineers say that software has reliability, they mean that the software runs for very long periods of time without failing. Users certainly expect a DBMS to be reliable, since the data usually are key to business or organizational needs. Moreover, users entrust their data to a DBMS and rightly expect it to protect the data from loss or damage. Concerns for reliability and integrity are general security issues, but they are more apparent with databases. A DBMS guards against loss or damage in several ways that we study them in this section. However, the controls we consider are not absolute: No control can prevent an authorized user from inadvertently entering an acceptable but incorrect value.

Database concerns about reliability and integrity can be viewed from three dimensions:

- Database integrity: concern that the database as a whole is protected against damage, as from the failure of a disk drive or the corruption of the master database index. These concerns are addressed by operating system integrity controls and recovery procedures.
- Element integrity: concern that the value of a specific data element is written or changed only by authorized users. Proper access controls protect a database from corruption by unauthorized users.
- Element accuracy: concern that only correct values are written into the elements of a database. Checks on the values of elements can help prevent insertion of improper values. Also, constraint conditions can detect incorrect values.

9. practical issues in multilevel security

The multilevel security problem for databases has been studied since the 1970s. Several promising research results have been identified, as we have seen in this chapter. However, as with trusted operating systems, the consumer demand has not been sufficient to support many products. Civilian users have not liked the inflexibility of the military multilevel security model, and there have been too few military users. Consequently, multilevel secure databases are primarily of research and historical interest. The general concepts of multilevel databases are important. We do need to be able to separate data according to their degree of sensitivity. Similarly, we need ways of combining data of different sensitivities into one database (or at least into one virtual database or federation of databases). And these needs will only increase over time as larger databases contain more sensitive information, especially for privacy concerns.

10. Firewall

A firewall is a device that filters all traffic between a protected or "inside" network and a less trustworthy or "outside" network.

Types of firewalls

- packet filtering gateways or screening routers
- stateful inspection firewalls
- application proxies
- guards
- personal firewalls

11. issues addressed by security plan

Every security plan must address seven issues. 1. policy, indicating the goals of a computer security effort and the willingness of the people involved to work to achieve those goals 2. current state, describing the status of security at the time of the plan 3. requirements, recommending ways to meet the security goals 4. recommended controls, mapping controls to the vulnerabilities identified in the policy and requirements 5. accountability, describing who is responsible for each security activity 6. timetable, identifying when different security functions are to be done 7. continuing attention, specifying a structure for periodically updating the security plan.

PART C – (1 X 10 = 10 Marks)

Answer any ONE question

12. Explain the types of disclosures

Data can be sensitive, but so can their characteristics. In this section, we see that even descriptive information about data (such as their existence or whether they have an element that is zero) is a form of disclosure.

Exact Data

The most serious disclosure is the exact value of a sensitive data item itself. The user may know that sensitive data are being requested, or the user may request general data without knowing that some of it is sensitive. A faulty database manager may even deliver sensitive data by accident, without the user's having requested it. In all of these cases the result is the same: The security of the sensitive data has been breached.

Bounds

Another exposure is disclosing bounds on a sensitive value; that is, indicating that a sensitive value, y, is between two values, L and H. Sometimes, by using a narrowing technique not unlike the binary search, the user may first determine that L y H and then see whether L y H/2, and so forth, thereby permitting the user to determine y to any desired precision. In

another case, merely revealing that a value such as the athletic scholarship budget or the number of CIA agents exceeds a certain amount may be a serious breach of security. Sometimes, however, bounds are a useful way to present sensitive data. It is common to release upper and lower bounds for data without identifying the specific records. For example, a company may announce that its salaries for programmers range from $50,000 to $82,000. If you are a programmer earning $79,700, you can presume that you are fairly well off, so you have the information you want; however, the announcement does not disclose who are the highest- and lowest-paid programmers.

Negative Result

Sometimes we can word a query to determine a negative result. That is, we can learn that z is not the value of y. For example, knowing that 0 is not the total number of felony convictions for a person reveals that the person was convicted of a felony. The distinction between 1 and 2 or 46 and 47 felonies is not as sensitive as the distinction between 0 and 1. Therefore, disclosing that a value is not 0 can be a significant disclosure. Similarly, if a student does not appear on the honors list, you can infer that the person's grade point average is below 3.50. This information is not too revealing, however, because the range of grade point averages from 0.0 to 3.49 is rather wide.

Existence

In some cases, the existence of data is itself a sensitive piece of data, regardless of the actual value. For example, an employer may not want employees to know that their use of long distance telephone lines is being monitored. In this case, discovering a LONG DISTANCE field in a personnel file would reveal sensitive data.

Probable Value

Finally, it may be possible to determine the probability that a certain element has a certain value. To see how, suppose you want to find out whether the president of the United States is registered in the Tory party. Knowing that the president is in the database, you submit two queries to the database: How many people have 1600 Pennsylvania Avenue as their official residence? (Response: 4) How many people have 1600 Pennsylvania Avenue as their official residence and have YES as the value of TORY? (Response: 1) From these queries you conclude there is a 25 percent likelihood that the president is a registered Tory.

Summary of Partial Disclosure

We have seen several examples of how a security problem can result if characteristics of sensitive data are revealed. Notice that some of the techniques we presented used information about the data, rather than direct access to the data, to infer

sensitive results. A successful security strategy must protect from both direct and indirect disclosure.

13. intrusion detection systems

An intrusion detection system (IDS) is a device, typically another separate computer, that monitors activity to identify malicious or suspicious events.

IDSs perform a variety of functions:

- monitoring users and system activity
- auditing system configuration for vulnerabilities and misconfigurations
- assessing the integrity of critical system and data files
- recognizing known attack patterns in system activity
- identifying abnormal activity through statistical analysis
- managing audit trails and highlighting user violation of policy or normal activity
- correcting system configuration errors
- installing and operating traps to record information about intruders

Types of IDSs

The two general types of intrusion detection systems are signature based and heuristic. Signature-based intrusion detection systems perform simple pattern-matching and report situations that match a pattern corresponding to a known attack type. Heuristic intrusion detection systems, also known as anomaly based, build a model of acceptable behavior and flag exceptions to that model; for the future, the administrator can mark a flagged behavior as acceptable so that the heuristic IDS will now treat that previously unclassified behavior as acceptable. Intrusion detection devices can be network based or host based. A network-based IDS is a stand-alone device attached to the network to monitor traffic throughout that network; a host-based IDS runs on a single workstation or client or host, to protect that one host.

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Date : 03.11.2022 **Duration : 1 Hr** **Class :II M.Sc**
Subject Name & Code : Big Data Analytics

Section A (5 x 1 = 5)
(Answer any **FIVE** questions)

CO 3 BL1 1. Define segmentation example?

CO 2 BL4 2. Differentiate the main social media metrics?

CO 6 BL1 3. Identify the social network and examples?

CO 5 BL3 4. Complete notes on the design and documentation?

CO 5 BL6 5. Write different types of frauds?

CO 4 BL3 6. How to prepare the survival analysis calculation?

CO 6 BL5 7. Summarize the Credit Risk Modelling.

Section B (2 x 5 = 10)
(Answer any **ONE** question)

CO 4 BL4 8. Explain Association Rules.

CO 5 BL4 9. Briefly explain the Descriptive Analytics

CO 3 BL2 10. Discuss the Parametric Survival Analysis.

CO 6 BL5 11. Explain to predict the Relational logistic Regression.

Section C (1 x 10 = 10)
(Answer any **ONE** question)

CO 5 BL2 12. Briefly explain about Social Network Analytics

CO 4 BL2 13. Explain Data Quality, software, and privacy.

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Answer Key

Date : 03.11.2022 **Duration : 1 Hr** **Class :II M.Sc**

Subject Name & Code : Big Data Analytics

Section A **(5 x 1 = 5)**

(Answer any FIVE questions)

CO 3 BL1 1. Define segmentation example?

Segmentation means to divide the marketplace into parts, or segments, which are definable, accessible, actionable, and profitable and have a growth potential. In other words, a company would find it impossible to target the entire market, because of time, cost and effort restrictions.

CO 2 BL4 2. Differentiate the main social media metrics?

The most common and often important metrics to pay attention to are engagement, impressions and reach, share of voice, referrals and conversions and response rate and time. These combined will give you a 360° view of your social media performance.

CO 6 BL1 3. Identify the social network and examples?

Popular examples include Facebook, Instagram, Twitter, Yelp and Myspace. Professional connections. Geared toward professionals, these social networking sites may include a general forum where professionals can connect with co-workers or offer an exclusive platform based on specific occupations or interest levels.

CO 5 BL3 4. Complete notes on the design and documentation?

Design documentation is a collection of documents and resources that covers all aspects of your product design. Documentation should include information about users, product features, and project deadlines; all essential implementation details; and design decisions that your team and stakeholders have agreed on.

CO 5 BL6 5. Write different types of frauds?

Types of fraud include tax fraud, credit card fraud, wire fraud, securities fraud, and bankruptcy fraud. Fraudulent activity can be carried out by one individual, multiple individuals or a business firm as a whole.

CO 4 BL3 6. How to prepare the survival analysis calculation?

The probability that a participant survives past interval 2 means that they had to survive past interval 1 and through interval 2: S_2 = P(survive past interval 2) = P(survive through interval 2)*P(survive past interval 1), or $S_2 = p_2 * S_1$. In general, $S_{t+1} = p_{t+1} * S_t$.

CO 6 BL5 7. Summarize the Credit Risk Modelling.

A credit risk model is used by a bank to estimate a credit portfolio's PDF. In this regard, credit risk models can be divided into two main classes: structural and reduced form models. Structural models are used to calculate the probability of default for a firm based on the value of its assets and liabilities.

Section B **(2 x 5 = 10)**

(Answer any ONE question)

CO 4 BL4 8. Explain Association Rules.

Association rule mining finds interesting associations and relationships among large sets of data items. This rule shows how frequently a itemset occurs in a transaction. A typical example is a Market Based Analysis.

Market Based Analysis is one of the key techniques used by large relations to show associations between items. It allows retailers to identify relationships between the items that people buy together frequently.

Given a set of transactions, we can find rules that will predict the occurrence of an item based on the occurrences of other items in the transaction.

CO 5 BL4 9. Briefly explain the Descriptive Analytic.

Descriptive analytics is the process of using current and historical data to identify trends and relationships. It's sometimes called the simplest form of data analysis because it describes trends and relationships but doesn't dig deeper.

CO 3 BL2 10. Discuss the Parametric Survival Analysis.

In analyses of survival data, parametric models, such as the Weibull and log-normal, can interpret the survival time based on a specific distribution, irrespective of the proportional hazard. If the survival times use a Weibull or exponential distribution, the analysis with parametric models will be stronger.

CO 6 BL5 11. Explain to predict the Relational logistic Regression.

Logistic regression is a statistical analysis method to predict a binary outcome, such as yes or no, based on prior observations of a data set. A logistic regression model predicts a dependent data variable by analyzing the relationship between one or more existing independent variables.

Section C **(1 x 10 = 10)**

(Answer any ONE question)

CO 5 BL2 12. Briefly explain about Social Network Analytics

Social Network analysis is the study of structure, and how it influences health, and it is based on theoretical constructs of sociology and mathematical foundations of graph theory. Structure refers to the regularities in the patterning of relationships among individuals, groups and/or organizations.

CO 4 BL2 13. Explain Data Quality, software, and privacy.

Data quality software tools are used by businesses to improve the consistency, accuracy, and overall completion of their data by analyzing sets of information and identifying any inaccuracies or gaps. These tools will usually be categorized as either data cleansing, data auditing, or data migration.

Data privacy is the ability of individuals to control their personal information. Read about challenges users face to protect their online privacy.

Software is a set of instructions, data or programs used to operate computers and execute specific tasks. It is the opposite of hardware, which describes the physical aspects of a computer. Software is a generic term used to refer to applications, scripts and programs that run on a device.

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Department of Computer Science

Date: 2-11-2022 **Duration: 1 Hour** **Class: II M.Sc CS**

Subject Name & Code: Artificial Intelligence & **PSD3C**

Section A (5 x 1 = 5)
(Answer any **FIVE** questions)

CO1	BL2	1. Define rationality
CO2	BL2	2. State about relaxed problem
CO1	BL1	3. Explain atomic sentence
CO1	BL2	4. Discuss about supervised learning
CO3	BL2	5. Define state space search
CO2	BL6	6. Compare active and passive learning
CO4	BL4	7. Write the formula for Modus Ponens

Section B (2 x 5 = 10)
(Answer any **ONE** question)

CO1	BL2	8. Discuss the type of Agents in Artificial Intelligence.
CO3	BL4	9. Differentiate between propositional and first order inference.
CO2	BL2	10. Discuss about heuristics search technique.
CO3	BL2	11. Explain backward chaining with example.

Section C (1 x 10 = 10)
(Answer any **ONE** question)

CO2	BL2	12. Describe the basic representation of planning with example.
CO4	BL2	13. Write about decision network in detail.

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Date: 2-11-2022 **Duration: 1 Hour** **Class: II M.Sc CS**

Subject Name & Code: Artificial Intelligence & **PSD3C**

Answer Key

Section A (5 x 1 = 5)
(Answer any **FIVE** questions)

1. **Define rationality**

   Rationality means that an AI agent is assumed to take account of available information and uncertainty, potential costs and benefits, and to act consistently (logically) in choosing the best action.

2. **State about relaxed problem**

   A relaxed problem is one where we drop constraints (e.g., on move execution). This can lead to inserting additional edges in the problem graph, or to a merging of nodes, or both.

3. **Explain atomic sentence**

   Atomic sentences are the most basic sentences of first-order logic. These sentences are formed from a predicate symbol followed by a parenthesis with a sequence of terms. We can represent atomic sentences as Predicate (term1, term2, ..., term n).

4. **Discuss about supervised learning**

   Supervised learning, also known as supervised machine learning, is a subcategory of machine learning and artificial intelligence. It is defined by its use of labelled datasets to train algorithms that to classify data or predict outcomes accurately.

5. **Define state space search**

   State: AI problems can be represented as a set of well-formed states. A state can be an Initial State, a Goal State, and several other possible states generated by applying rules between them. In an Al problem, space refers to the exhaustive collection of all conceivable states.

6. **Compare active and passive learning**

   The term Active Learning is generally used to refer to a learning problem or system where the learner has some role in determining on what data it will be trained. This is in contrast to Passive Learning, where the learner is simply presented with a training set over which it has no control.

7. **Write the formula for Modus Ponens.**

   A rule of inference used to draw logical conclusions, which states that if p is true, and if p implies q (p. q), then q is true.

Modus Ponens: "If A is true, then B is true. A is true. Therefore, B is true."

Section B (2 x 5 = 10)

(Answer any **ONE** question)

8. **Discuss the type of Agents in Artificial Intelligence.**

Agents can be grouped into five classes based on their degree of perceived intelligence and capability :

- Simple Reflex Agents
- Model-Based Reflex Agents
- Goal-Based Agents
- Utility-Based Agents
- Learning Agent

9. **Differentiate between propositional and first order inference.**

Propositional Logic converts a complete sentence into a symbol and makes it logical whereas in First-Order Logic relation of a particular sentence will be made that involves relations, constants, functions, and constants.

The limitation of PL is that it does not represent any individual entities whereas FOL can easily represent the individual establishment that means if you are writing a single sentence then it can be easily represented in FOL.

PL does not signify or express the generalization, specialization or pattern for example 'QUANTIFIERS' cannot be used in PL but in FOL users can easily use quantifiers as it does express the generalization, specialization, and pattern.

10. **Discuss about heuristics search technique.**

Heuristic search is class of method which is used in order to search a solution space for an optimal solution for a problem. The heuristic here uses some method to search the solution space while assessing where in the space the solution is most likely to be and focusing the search on that area.

11. **Explain backward chaining with example.**

Backward-chaining is also known as a backward deduction or backward reasoning method when using an inference engine. A backward chaining algorithm is a form of reasoning, which starts with the goal and works backward, chaining through rules to find known facts that support the goal.

Properties of backward chaining:

- It is known as a top-down approach.
- Backward-chaining is based on modus ponens inference rule.
- In backward chaining, the goal is broken into sub-goal or sub-goals to prove the facts true.

- It is called a goal-driven approach, as a list of goals decides which rules are selected and used.
- Backward -chaining algorithm is used in game theory, automated theorem proving tools, inference engines, proof assistants, and various AI applications.
- The backward-chaining method mostly used a depth-first search strategy for proof.

Section C (1 x 10 = 10)

(Answer any **ONE** question)

12. **Describe the basic representation of planning with example.**

Artificial Intelligence is a critical technology in the future. To create any such AI project, Planning is very important.

For any planning system, we need the domain description, action specification, and goal description. A plan is assumed to be a sequence of actions and each action has its own set of preconditions to be satisfied before performing the action and also some effects which can be positive or negative.

13. **Write about decision network in detail.**

Decision networks are generalized Bayes Belief Networks with chance nodes, decision nodes, and a utility node. These networks are used to make decisions under uncertainty.

A Bayes Belief Network is a graphical model that describes the conditional dependencies between different random variables through a directed acyclic graph (DAG). DAG is a graph that is directed and without cycles connecting the other edges. The nodes in DAG represent the random variables, and edges represent the conditional dependency between the random variables.

For example, a Bayesian network may represent the probabilistic relationships between diseases and symptoms. The network can use known symptoms to compute the probabilities of the presence of various diseases.

In decision networks, utility of a decision, maximum expected utility, value of information and perfect value of information are important computations that affect the decision making process.

- Utility of a decision is a function of random variables of the decision problem.
- Expected utility of each decision is calculated as a sum of probabilities of the decision multiplied by the utility value of that decision.
- Maximum expected utility (MEU) is a decision with high expected utility from the available decisions to take.
- Value of information is the price paid to obtain a piece of information. The information obtained may or may not be useful in arriving at a correct decision.
- Value of perfect information is the price paid to obtain a piece of information that helps in making the right decision.

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II - UNIT TEST, OCTOBER & NOVEMBER 2022

DEPARTMENT OF COMPUTER SCIENCE

Date : 04.10.2022 **Duration : 1 Hr** **Class : II MSc CS**

Subject Name & Code: CLOUD COMPUTING – PSDEJ **Max : 25 Marks**

SECTION – A
Answer any FIVE Questions **(5 x 1 = 5)**

CO	5	**BL**	B4	**1.** Differentiate Grid computing and Cloud computing
CO	2	**BL**	B1	**2.** Identify web conferencing
CO	6	**BL**	B2	**3.** Classify the cloud service of SaaS.
CO	3	**BL**	B2	**4.** List the main characteristics of cloud computing
CO	5	**BL**	B4	**5.** Analyze the Cloud Computing
CO	3	**BL**	B1	**6.** List the popular Web Mail Services
CO	4	**BL**	B1	**7.** Define Cloud Storage

SECTION – B
Answer any TWO Questions **(2 x 5 = 10)**

CO	5	**BL**	B4	**8.** Differentiate between private, public and hybrid clouds
CO	4	**BL**	B2	**9.** Describe On – Demand cloud computing.
CO	1	**BL**	B3	**10.** Illustrate various service provided by Amazon Web Services
CO	4	**BL**	B2	**11.** Exploring Online Calendar Applications.

SECTION – C
Answer any ONE Question **(1 x 10 = 10)**

CO	4	**BL**	B2	**12.** Explain the cloud architecture with a neat diagram.
CO	1	**BL**	B3	**13.** Illustrate discovering cloud Services Development Services and Tools.

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CLOUD COMPUTING – PSDEJ
Answer Key

1. Differentiate Grid computing and Cloud computing

Cloud Computing	Grid Computing
Cloud Computing follows client-server computing architecture.	Grid computing follows a distributed computing architecture.
Scalability is high.	Scalability is normal.
Cloud Computing is more flexible than grid computing.	Grid Computing is less flexible than cloud computing.
Cloud operates as a centralized management system.	Grid operates as a decentralized management system.
In cloud computing, cloud servers are owned by infrastructure providers.	In Grid computing, grids are owned and managed by the organization.
Cloud computing uses services like Iaas, PaaS, and SaaS.	Grid computing uses systems like distributed computing, distributed information, and distributed pervasive.
Cloud Computing is Service-oriented.	Grid Computing is Application-oriented.
It is accessible through standard web protocols.	It is accessible through grid middleware.

2. Identify web conferencing

Web Conferences

- Web conferencing allows you to have a meeting where everyone can concurrently listen on the phone and see each other virtually through a web browser.
- The organizer can control the member's views, ensuring everyone is on the same page.
- To accentuate certain ideas, participants may also utilize drawing implements.
- It is mostly employed for online seminars and conferences.

3. Classify the cloud service of SaaS.

SaaS is also known as "**On-Demand Software**". It is a software distribution model in which services are hosted by a cloud service provider. These services are available to end-users over the internet so, the end-users do not need to install any software on their devices to access these services.

There are the following services provided by SaaS providers -

quick deployment of your applications by providing all the application services that you need for your application. Beanstalk is a plug-and-play platform that allows working with multiple programming languages and environments. Elastic Beanstalk supports a large range of platforms like Node js, Java, PHP, Python, and Ruby. So, you can develop your application to meet your requirements and simply deploy it on Elastic Beanstalk. The main aim to use AWS Elastic Beanstalk is to allow you to focus on the deployment and management of your applications. You can simply upload your code, and AWS Elastic Beanstalk automatically handles the deployment, from capacity provisioning, load balancing, and auto-scaling to application health monitoring. At the same time, you retain full control over the AWS resources powering your application and can access the underlying resources at any time.

2. Networking

Amazon VPC: Amazon VPC is your network environment in the cloud. It allows you to create a private network within the AWS cloud that uses many of the same concepts and constructs as an on-premises network. Amazon VPC also gives you complete control of the network configuration. Customers can define normal networking configuration items such as IP address ranges, subnet creation, route table creation, network gateways, and security settings. Amazon VPC is an AWS foundational service and integrates with numerous AWS services. For instance, Amazon EC2 instances are deployed into your Amazon VPC. Similarly, Amazon Relational Database Service (Amazon RDS) database instances deploy into your Amazon VPC, where the database is protected by the structure of the network just like your on-premises network. You can easily launch AWS resources into a virtual network by Amazon Virtual Private Cloud. An isolated virtual network environment in the AWS cloud is created by Amazon VPC.

Amazon Route 53: Amazon Route 53 is a highly available and scalable cloud Domain Name System (DNS) web service. It is designed to give developers and businesses an extremely reliable and cost-effective way to route end users to Internet applications by translating human-readable names, such as www.geeksforgeeks.com, into the numeric IP addresses that computers use to connect to each other. Amazon Route 53 is fully compliant with IPv6 as well.

3. Storage

Amazon S3 (Simple Storage Service): Amazon Simple Storage Service (Amazon S3) is

Parameter	Public Cloud	Private Cloud	Hybrid Cloud	Community Cloud
Host	Service provider	Enterprise (Third party)	Enterprise (Third party)	Community (Third party)
Users	General public	Selected users	Selected users	Community members
Access	Internet	Internet, VPN	Internet, VPN	Internet, VPN
Owner	Service provider	Enterprise	Enterprise	Community

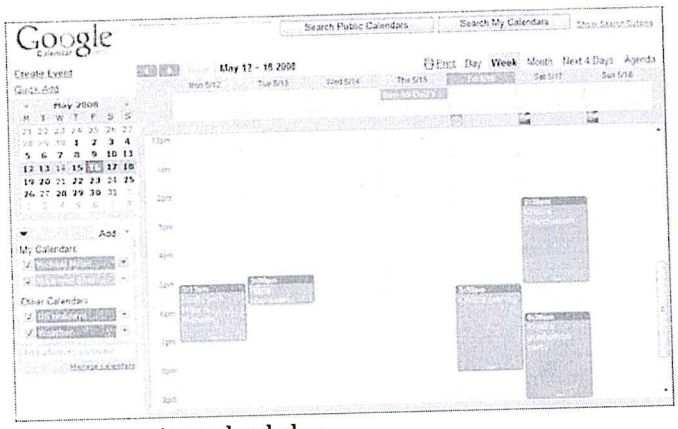
9. Describe On – Demand cloud computing.

- **On-demand cloud computing functionality** is delivered over the Internet and by providing configurable computing resources from a shared pool of servers, storage devices, networks, and software applications. On Demand Computing (ODC) is also called web-based services that are provided for a usage fee.
- Due to on-demand computing functionality, companies and individuals do not have to worry about the availability of resources at any given time. On-demand functionality of cloud computing is the foundation of services based on services provided to users of cloud computing. Without on-demand functionality, organizations will find it difficult to maintain huge IT resources to accommodate a large number of computer systems. It has helped small and large organizations reap the benefits of cloud computing.
- On-demand functionality is a service where resources are delivered instantly as needed. This could include storage space, speed, software applications, servers, networks, and the like. Cloud computing offers highly scalable features. Users can add more resources to the request in the event of a sudden increase in visitor traffic. They also have the freedom to have the resources they don't need.
- The cloud is the variety of resources grouped together as available hardware, network infrastructure, secondary storage devices, services and device interfaces. As could be easily deduced; that during peak hours, additional IT resources may be required to catch up with batch demand. Therefore, connectivity must be ensured through Internet connectivity. A server farm must provide additional resources that group scheduling interrupts and hardware. These approaches based on the usability of IT resources are very useful in times of adversity, that is, when the resources allocated are low and the exemptions are very high. This is to support the mechanism for allocating additional resources that is based on network infrastructure, hardware, additional storage

- automated multi-region replication
- in-memory caching
- data export tools.

11. Exploring Online Calendar Applications.

Google Calendar



The most popular web-based calendar today, no doubt due to its association with the web's most-used search engine, is Google Calendar (calendar.google.com). Google Calendar is free, full featured, and easy to use. It lets you create both personal and shared calendars, which makes it ideal for tracking business group, family, and community schedules.

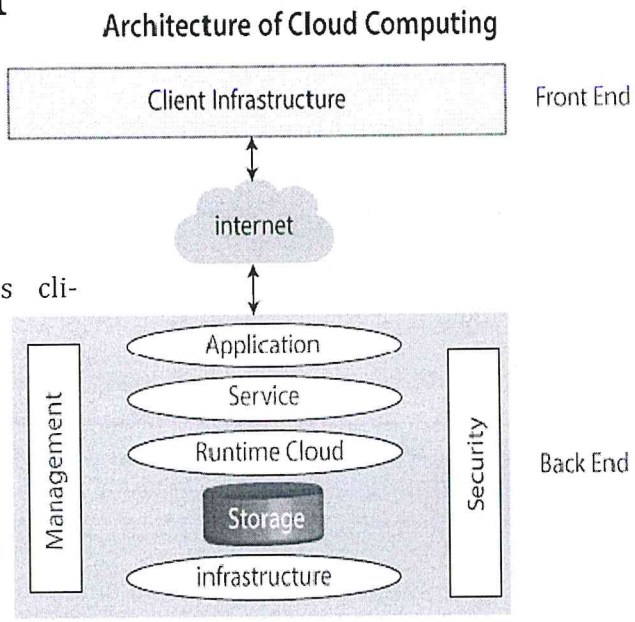
Figure 1. The easy-to-use interface of Google Calendar. Note the multiple calendars listed in the My Calendars box.

Like all web-based calendars, all your events are stored in the cloud (in this case, the cloud created by Google's own network of servers), not on your own computer. This means that you can access your calendar from any computer anywhere in the world. Just log in to the Google Calendar page and your calendar and all events are there.

Because Google Calendar is web based, you can use it to create not only a private calendar for yourself, but also public calendars for your company or organization. Create a public calendar and all employees or attendees can access it via the web. In addition, special event invitation features make it easy to invite others to an event—public or private.

In addition, Google allows you to create several different—and different types of—calendars. You can create one calendar for home, another for work, and yet another for your son's soccer team. Then you can view all your calendars from the same Google Calendar page, with the events from each calendar color-coded for easy visibility.

The below diagram shows the architecture of cloud computing -



Front End

Tht end is used by the client. It contains cli-sideinterfaces and applications that are required to access the cloud computing platforms. The front end includes web servers (including Chrome, Firefox, internet

explorer, etc.), thin & fat clients, tablets,

and mobile devices.

Back End

The back end is used by the service provider. It manages all the resources that are required to provide cloud computing services. It includes a huge amount of data storage, security mechanism, virtual machines, deploying models, servers, traffic control mechanisms, etc.

Components of Cloud Computing Architecture

There are the following components of cloud computing architecture -

1. Client Infrastructure

Client Infrastructure is a Front end component. It provides GUI (Graphical User Interface) to interact with the cloud.

2. Application

The application may be any software or platform that a client wants to access.

3. Service

A Cloud Services manages that which type of service you access according to the client's

It provides services on the **host level**, **application level**, and **network level**. Cloud infrastructure includes hardware and software components such as servers, storage, network devices, virtualization software, and other storage resources that are needed to support the cloud computing model.

7. Management

- This can be seen by observing the large number of small and start-up companies
- offering cloud development tools. In a more established industry, the smaller players eventually fall by the wayside as larger companies take centre stage.
- That said, cloud services development services and tools are offered by a variety of companies, both large and small.
- The most basic offerings provide cloud-based hosting for applications developed from scratch.
- The more fully featured offerings include development tools and pre-built applications that developers can use as the building blocks for their own unique web-based applications.

Amazon

That's right, Amazon, one of the largest retailers on the Internet, is also one of the primary providers of cloud development services.

Think of it this way:

Amazon has spent a lot of time and money setting up a multitude of servers to service its popular website, and is making those vast hardware resources available for all developers to use.

1. The service in question is called the Elastic Compute Cloud, also known as EC2.
2. This is a commercial web service that allows developers and companies to rent capacity on Amazon's proprietary cloud of servers— which happens to be one of the biggest server farms in the world.
3. EC2 enables scalable deployment of applications by letting customers request a set number of virtual machines, onto which they can load any application of their choice.

Thus, customers can create, launch, and terminate server instances on demand, creating a truly "elastic" operation.

Amazon's service lets customers choose from three sizes of virtual servers:

- Small, which offers the equivalent of a system with 1.7GB of memory, 160GB of storage, and one virtual 32-bit core processor
- Large, which offers the equivalent of a system with 7.5GB of memory, 850GB of storage, and two 64-bit virtual core processors
- Extra large, which offers the equivalent of a system with 15GB of memory, 1.7TB of storage, and four virtual 64-bit core processors
- In other words, you pick the size and power you want for your virtual server, and Amazon does the rest. EC2 is just part of Amazon's Web Services (AWS) set of

offerings, which provides developers with direct access to Amazon's software and machines.

- By tapping into the computing power that Amazon has already constructed,
- developers can build reliable, powerful, and low-cost web-based applications.
- Amazon provides the cloud (and access to it), and developers provide the rest.

They pay only for the computing power that they use.

AWS is perhaps the most popular cloud computing service to date.

Amazon claims a market of more than 330,000 customers—a combination of developers, start-ups, and established companies.

Google App Engine

- Google is a leader in web-based applications, so it's not surprising that the
- company also offers cloud development services.
- These services come in the form of the Google App Engine, which enables developers to build their own web applications utilizing the same infrastructure that powers Google's powerful applications.
- The Google App Engine provides a fully integrated application environment.
- Using Google's development tools and computing cloud, App Engine applications are easy to build, easy to maintain, and easy to scale.
- All you have to do is develop your application (using Google's APIs and the Python programming language) and upload it to the App Engine cloud; from there, it's ready to serve your users.

As you might suspect, Google offers a robust cloud development environment.

It includes the following features:

- Dynamic web serving
- Full support for all common web technologies
- Persistent storage with queries, sorting, and transactions
- Automatic scaling and load balancing
- APIs for authenticating users and sending email using Google Accounts

In addition, Google provides a fully featured local development environment that simulates the Google App Engine on any desktop computer.

And here's one of the best things about Google's offering: Unlike most other cloud hosting solutions, Google App Engine is completely free to use—at a basic level, anyway.

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II UNIT TEST – DEC 2022
Department of Computer Science

Date : 14.12.2022 **Duration : 1 Hr** **Class :I M.Sc CS**
Subject Name & Code : Advanced Python Programming – CS21B

Section A

(Answer any **FIVE** questions) (5 x 1 = 5)

CO3,4 BL1	1. What is Sqlite?
CO 2,5 BL1	2. Define socket.
CO1,6 BL1	3. Define deadlock.
CO2,3 BL1	4. List down the uses of pandas library
CO5 BL3	5. State thread
CO3 BL1	6. How will you create Dataframe
CO3,4 BL2	7. Outline dataset

Section B

(Answer any **TWO** questions) (2 x 5 = 10)

CO4 BL6	8. Discuss with example image processing in Python
CO2,5 BL2	9. Describe client-server programming with example
CO5,6 BL2	10. Demonstrate Producer-Consumer problem with example
CO1,6 BL3	11. Construct a GUI application using Python

Section C

(Answer any **ONE** question) (1 x 10 = 10)

CO3,4 BL5	12. Elaborate DML and DDL queries with example.
CO1,6 BL6	13. Explain with example visualization in Python

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UNIT TEST – DEC 2022
Department of Computer Science
Advanced Python Programming
Answer Key

Section A

CO3,4 BL1 1. What is Sqlite?

SQLite is a software library that provides a relational database management system. Python SQLite3 module is used to integrate the SQLite database with Python.

CO 2,5 BL1 2. Define socket.

Sockets allow communication between two different processes on the same or different machines.

CO1,6 BL1 3. Define deadlock.

A Deadlock is a situation where each of the computer process waits for a resource which is being assigned to some another process.

CO2,3 BL1 4. List down the uses of pandas library

- Pandas is mainly used for data analysis and associated manipulation of tabular data in DataFrames.
- Pandas allows importing data from various file formats such as comma-separated values, JSON, Parquet, SQL database tables or queries, and Microsoft Excel.

CO5 BL3 5. State thread

A Python thread may progress through three steps of its life-cycle: a new thread, a running thread, and a terminated thread.

CO3 BL1 6. How will you create Dataframe

Dataframe can be created using dataframe() function. The dataframe() takes one or two parameters.

CO3,4 BL2 7. Outline dataset

A Dataset is the basic data container in PyMVPA. It serves as the primary form of data storage, but also as a common container for results returned by most algorithms.

Section B

CO4 BL6 8. Discuss with example image processing in Python

Python provides lots of libraries for image processing, including –

- **OpenCV** – Image processing library mainly focused on real-time computer vision with application in wide-range of areas like 2D and 3D feature toolkits, facial & gesture recognition, Human-computer interaction, Mobile robotics, Object identification and others.
- **Numpy and Scipy libraries** – For image manipuation and processing.
- **Sckikit** – Provides lots of alogrithms for image processing.
- **Python Imaging Library (PIL)** – To perform basic operations on images like create thumnails, resize, rotation, convert between different file formats etc.

CO2,5 BL2 9. Describe client-server programming with example

Section C

CO3,4 BL5 12. Elaborate DML and DDL queries with example.

DDL (Data Definition Language):

DDL or Data Definition Language actually consists of the SQL commands that can be used to define the database schema. It simply deals with descriptions of the database schema and is used to create and modify the structure of database objects in the database. DDL is a set of SQL commands used to create, modify, and delete database structures but not data. These commands are normally not used by a general user, who should be accessing the database via an application.

List of DDL commands:

- CREATE: This command is used to create the database or its objects (like table, index, function, views, store procedure, and triggers).
- DROP: This command is used to delete objects from the database.
- ALTER: This is used to alter the structure of the database.
- TRUNCATE: This is used to remove all records from a table, including all spaces allocated for the records are removed.
- COMMENT: This is used to add comments to the data dictionary.
- RENAME: This is used to rename an object existing in the database.

DML(Data Manipulation Language):

The SQL commands that deals with the manipulation of data present in the database belong to DML or Data Manipulation Language and this includes most of the SQL statements. It is the component of the SQL statement that controls access to data and to the database. Basically, DCL statements are grouped with DML statements.

List of DML commands:

- INSERT : It is used to insert data into a table.
- UPDATE: It is used to update existing data within a table.
- DELETE : It is used to delete records from a database table.
- LOCK: Table control concurrency.
- CALL: Call a PL/SQL or JAVA subprogram.
- EXPLAIN PLAN: It describes the access path to data.

Example:

```
import sqlite3
# database name to be passed as parameter
con = sqlite3.connect('mydb.db')
cur = con.cursor()
cur.execute("CREATE TABLE st(stname, stno, mark1, mark2, mark3, tot, result)")
cur.execute("""insert into st values('Anu',101,70,80,90,240,'Pass'),
('Sim',102,80,80,90,250,'Pass') """)
con.commit()
res = cur.execute("SELECT * FROM st")
con.execute("UPDATE st SET stname = 'Sam' where stno=102")
con.commit()
data=cur.fetchall()
for i in data:
   print(i)
con.close()
```

Output:

('Anu', 101, 70, 80, 90, 240, 'Pass')
('Sam', 102, 80, 80, 90, 250, 'Pass')

CO1,6 BL6 13. Explain with example visualization in Python

Python provides various libraries that come with different features for visualizing data. All these libraries come with different features and can support various types of graphs. In this tutorial, we will be discussing four such libraries.

- Matplotlib
- Seaborn
- Bokeh
- Plotly

Matplotlib

Matplotlib is an easy-to-use, low-level data visualization library that is built on NumPy arrays. It consists of various plots like scatter plot, line plot, histogram, etc. Matplotlib provides a lot of flexibility.

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II UNIT TEST- DEC 2022
Department of Computer Science

Date : 05-12-2022 **Duration : One Hour** **Class :I MSC CS**
Subject Name &Code :ARTIFICIAL INTELLIGENCE CS21C

Section A (5 x 1 = 5)

(Answer any **FIVE** questions)

CO4	BL1	1.Define Adversarial Search.
CO5	BL1	2.List the basic inference rules in FOL.
CO5	BL1	3.How will you define procedural knowledge.
CO2	BL4	4.DistinguishSupervised and Unsupervised Learning .
CO5	BL1	5.What is Knowledge representation?
CO3	BL6	6.Write about Explanation based Learning..
CO4	BL1	7.Define the term - Semantic nets.

Section B (2 x 5 = 10)

(Answer any **TWO** questions)

CO2	BL6	8.Discuss Bayes theorem.
CO1	BL3	9.Discuss about problem reduction in AI ?
CO3	BL4	10.Distinguish forward and backward reasoning in AI.
CO5	BL2	11. Explain the mini max algorithm.

Section C (1 x 10 = 10)

(Answer any **ONE** question)

CO4	BL3	11.Discuss about Alpha Beta Pruning in detail.
CO5	BL2	12.Describe the First Oder Logic with example.

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Department of Computer Science

Date : 05-12-2022 **Duration : One Hour** **Class :I MSC CS**
Subject Name &Code :ARTIFICIAL INTELLIGENCE

Section A (5 x 1 = 5)
(Answer any **FIVE** questions)

CO4 BL1 1.Define Adversarial Search.
Adversarial search is basically a kind of search in which one can trace the movement of an enemy or opponent.

CO5 BL1 2.List the basic inference rules in FOL.
Universal Generalization.
Universal Instantiation.
Existential Instantiation.
Existential introduction.

CO5 BL1 3.How will you define procedural knowledge.
In artificial intelligence, procedural knowledge is one type of knowledge that can be possessed by an intelligent agent. Such knowledge is often represented as a partial or complete finite-state machine or computer program.

CO2 BL4 4.DistinguishSupervised and Unsupervised Learning.

Supervised Learning	Unsupervised Learning
Supervised Learning can be used for 2 different types of problems i.e. regression and classification	Unsupervised Learning can be used for 2 different types of problems i.e. clustering and association.
Input Data is provided to the model along with the output in the Supervised Learning.	Only input data is provided in Unsupervised Learning.

CO5 BL1 5.What is Knowledge representation?
Knowledge Representation in AI **describes the representation of knowledge**. Basically, it is a study of how the beliefs, intentions, and judgments of an intelligent agent can be expressed suitably for automated reasoning.

CO3 BL6 6.Write about Explanation based Learning.
In terms of Machine Learning, it is an algorithm that aims to understand why an example is a part of a particular concept to make generalizations or form concepts from training examples. For example, **EBL uses a domain theory and creates a program that learns to play chess.**

CO4 BL1 7.Define the term - Semantic nets.
A semantic network is **a knowledge structure that depicts how concepts are related to one another and illustrates how they interconnect**. Semantic networks use

artificial intelligence (AI) programming to mine data, connect concepts and call attention to relationships.

Section B (2 x 5 = 10)

(Answer any **TWO** questions)

CO2 BL6 8.Discuss Bayes theorem.

Bayes' theorem:

Bayes' theorem is also known as **Bayes' rule, Bayes' law**, or **Bayesian reasoning**, which determines the probability of an event with uncertain knowledge.

In probability theory, it relates the conditional probability and marginal probabilities of two random events.

Bayes' theorem was named after the British mathematician **Thomas Bayes**. The **Bayesian inference** is an application of Bayes' theorem, which is fundamental to Bayesian statistics.

It is a way to calculate the value of P(B|A) with the knowledge of P(A|B).

Bayes' theorem allows updating the probability prediction of an event by observing new information of the real world.

Example: If cancer corresponds to one's age then by using Bayes' theorem, we can determine the probability of cancer more accurately with the help of age.

Bayes' theorem can be derived using product rule and conditional probability of event A with known event B:

Theorem of Total Probability

Let $E_1, E_2, \ldots\ldots\ldots\ldots E_n$ is mutually exclusive and exhaustive events associated with a random experiment and lets E be an event that occurs with some E_i. Then, prove that

$$P(E) = {}^{n}\sum_{i=1} P(E/E_i) \,.\, P(E_j)$$

Proof:

Let S be the sample space. Then,

$S = E_1 \cup E_2 \cup E_3 \cup \ldots\ldots\ldots\ldots\ldots \cup En$ and $E_i \cap E_j = \emptyset$ for $i \neq j$.

Therefore, $E = E \cap S = E \cap (E_1 \cup E_2 \cup E_3 \cup \ldots\ldots\ldots\ldots\ldots \cup E_n)$

$= (E \cap E_1) \cup (E \cap E_2) \cup \ldots\ldots \cup (E \cap E_n)$

$\Rightarrow P(E) = P\{(E \cap E_1) \cup (E \cap E_2) \cup \ldots\ldots \cup (E \cap E_n)\}$

$= P(E \cap E_1) + P(E \cap E_2) + \ldots\ldots + P(E \cap E_n)$

$= \{$Therefore, $(E \cap E_1), (E \cap E_2), \ldots\ldots\ldots\ldots, (E \cap E_n)\}$ are pairwise disjoint$\}$

$= P(E/E_1) \,.\, P(E_1) + P(E/E_2) \,.\, P(E_2) + \ldots\ldots\ldots\ldots\ldots\ldots + P(E/E_n) \,.\, P(E_n)$ [by multiplication theorem]

$= {}^{n}\sum_{i=1} P(E/E_i) \,.\, P(E_i)$

CO1 BL3 9.Discuss about problem reduction in AI ?

The reflex agent of AI directly maps states into action. Whenever these agents fail to operate in an environment where the state of mapping is too large and not easily performed by the agent, then the stated problem dissolves and sent to a problem-solving domain which

breaks the large stored problem into the smaller storage area and resolves one by one. The final integrated action will be the desired outcomes.

Steps problem-solving in AI: The problem of AI is directly associated with the nature of humans and their activities. So we need a number of finite steps to solve a problem which makes human easy works.

These are the following steps which require to solve a problem :

- **Goal Formulation:** This one is the first and simple step in problem-solving. It organizes finite steps to formulate a target/goals which require some action to achieve the goal. Today the formulation of the goal is based on AI agents.
- **Problem formulation:** It is one of the core steps of problem-solving which decides what action should be taken to achieve the formulated goal. In AI this core part is dependent upon software agent which consisted of the following components to formulate the associated problem.

Components to formulate the associated problem:

- **Initial State:** This state requires an initial state for the problem which starts the AI agent towards a specified goal. In this state new methods also initialize problem domain solving by a specific class.
- **Action:** This stage of problem formulation works with function with a specific class taken from the initial state and all possible actions done in this stage.
- **Transition:** This stage of problem formulation integrates the actual action done by the previous action stage and collects the final stage to forward it to their next stage.
- **Goal test:** This stage determines that the specified goal achieved by the integrated transition model or not, whenever the goal achieves stop the action and forward into the next stage to determines the cost to achieve the goal.
- **Path costing:** This component of problem-solving numerical assigned what will be the cost to achieve the goal. It requires all hardware software and human working cost.

CO3 BL4 10.Distinguish forward and backward reasoning in AI.

FORWARD CHAINING	BACKWARD CHAINING
Forward chaining starts from known facts and applies inference rule to extract more data unit it reaches to the goal.	Backward chaining starts from the goal and works backward through inference rules to find the required facts that support the goal.
It is a bottom-up approach	It is a top-down approach
Forward chaining is known as data-driven inference technique as we reach to the goal using the available data.	Backward chaining is known as goal-driven technique as we start from the goal and divide into sub-goal to extract the facts.
Forward chaining reasoning applies a breadth-first search strategy.	Backward chaining reasoning applies a depth-first search strategy.
Forward chaining is suitable for the planning, monitoring, control, and interpretation application.	Backward chaining is suitable for diagnostic, prescription, and debugging application.
Forward chaining can generate an infinite number of possible conclusions.	Backward chaining generates a finite number of possible conclusions.

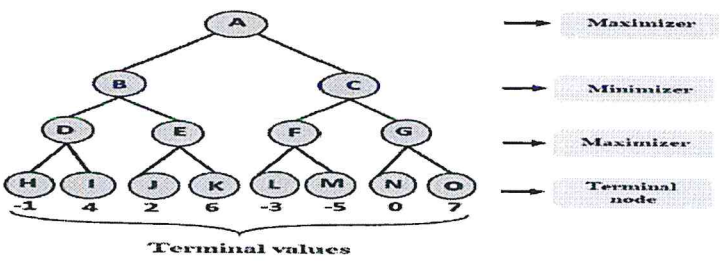
CO5 BL2 11. Explain the mini max algorithm.

Mini-Max Algorithm in Artificial Intelligence

- Mini-max algorithm is a recursive or backtracking algorithm which is used in decision-making and game theory. It provides an optimal move for the player assuming that opponent is also playing optimally.
- Mini-Max algorithm uses recursion to search through the game-tree.
- Min-Max algorithm is mostly used for game playing in AI. Such as Chess, Checkers, tic-tac-toe, go, and various tow-players game. This Algorithm computes the minimax decision for the current state.
- In this algorithm two players play the game, one is called MAX and other is called MIN.
- Both the players fight it as the opponent player gets the minimum benefit while they get the maximum benefit.
- Both Players of the game are opponent of each other, where MAX will select the maximized value and MIN will select the minimized value.
- The minimax algorithm performs a depth-first search algorithm for the exploration of the complete game tree.
- The minimax algorithm proceeds all the way down to the terminal node of the tree, then backtrack the tree as the recursion.

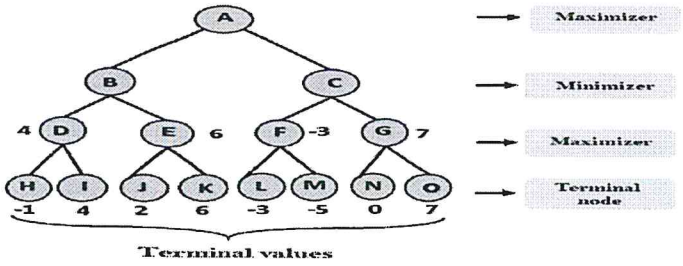
Working of Min-Max Algorithm:

- The working of the minimax algorithm can be easily described using an example. Below we have taken an example of game-tree which is representing the two-player game.
- In this example, there are two players one is called Maximizer and other is called Minimizer.
- Maximizer will try to get the Maximum possible score, and Minimizer will try to get the minimum possible score.
- This algorithm applies DFS, so in this game-tree, we have to go all the way through the leaves to reach the terminal nodes.
- At the terminal node, the terminal values are given so we will compare those value and backtrack the tree until the initial state occurs. Following are the main steps involved in solving the two-player game tree:
- **Step-1:** In the first step, the algorithm generates the entire game-tree and apply the utility function to get the utility values for the terminal states. In the below tree diagram, let's take A is the initial state of the tree. Suppose maximizer takes first turn which has worst-case initial value =- infinity, and minimizer will take next turn which has worst-case initial value = +infinity.



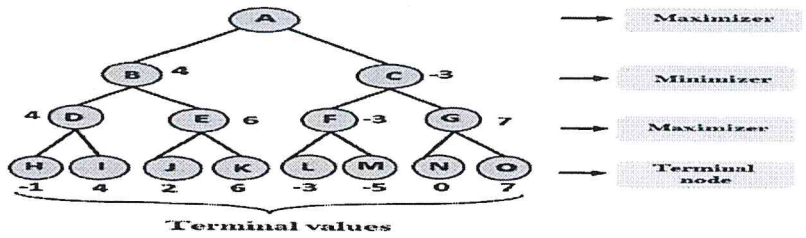
Step 2: Now, first we find the utilities value for the Maximizer, its initial value is -∞, so we will compare each value in terminal state with initial value of Maximizer and determines the higher nodes values. It will find the maximum among the all.

- For node D max(-1,- -∞) => max(-1,4)= 4
- For Node E max(2, -∞) => max(2, 6)= 6
- For Node F max(-3, -∞) => max(-3,-5) = -3
- For node G max(0, -∞) = max(0, 7) = 7



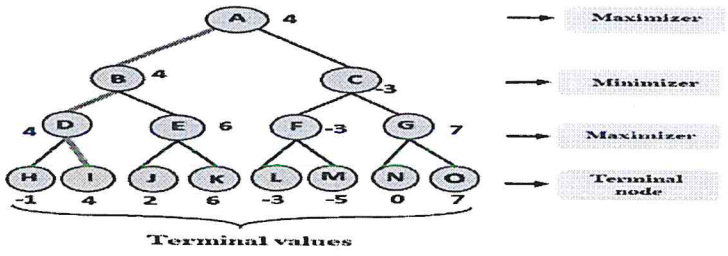
Step 3: In the next step, it's a turn for minimizer, so it will compare all nodes value with +∞, and will find the 3rd layer node values.

- For node B= min(4,6) = 4
- For node C= min (-3, 7) = -3



Step 4: Now it's a turn for Maximizer, and it will again choose the maximum of all nodes value and find the maximum value for the root node. In this game tree, there are only 4 layers, hence we reach immediately to the root node, but in real games, there will be more than 4 layers.

- For node A max(4, -3)= 4



That was the complete workflow of the minimax two player game.

Section C (1 x 10 = 10)

(Answer any **ONE** question)

CO4 BL3 11.Discuss about Alpha Beta Pruning in detail.

Alpha-Beta Pruning

- Alpha-beta pruning is a modified version of the minimax algorithm. It is an optimization technique for the minimax algorithm.
- As we have seen in the minimax search algorithm that the number of game states it has to examine are exponential in depth of the tree. Since we cannot eliminate the exponent, but we can cut it to half. Hence there is a technique by which without checking each node of the game tree we can compute the correct minimax decision, and this technique is called **pruning**. This involves two threshold parameter Alpha and beta for future expansion, so it is called **alpha-beta pruning**. It is also called as **Alpha-Beta Algorithm**.
- Alpha-beta pruning can be applied at any depth of a tree, and sometimes it not only prune the tree leaves but also entire sub-tree.
- The two-parameter can be defined as:
    a. **Alpha:** The best (highest-value) choice we have found so far at any point along the path of Maximizer. The initial value of alpha is $-\infty$.
    b. **Beta:** The best (lowest-value) choice we have found so far at any point along the path of Minimizer. The initial value of beta is $+\infty$.

The Alpha-beta pruning to a standard minimax algorithm returns the same move as the standard algorithm does, but it removes all the nodes which are not really affecting the final decision but making algorithm slow. Hence by pruning these nodes, it makes the algorithm fast.

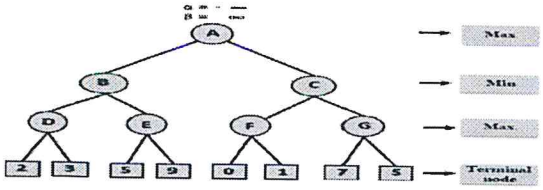
Condition for Alpha-beta pruning:

The main condition which required for alpha-beta pruning is: $\alpha >= \beta$

Key points about alpha-beta pruning:

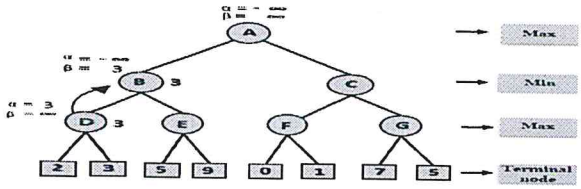
- The Max player will only update the value of alpha.
- The Min player will only update the value of beta.
- While backtracking the tree, the node values will be passed to upper nodes instead of values of alpha and beta.
- We will only pass the alpha, beta values to the child nodes.
- orking of Alpha-Beta Pruning:
- Let's take an example of two-player search tree to understand the working of Alpha-beta pruning

Step 1: At the first step the, Max player will start first move from node A where $\alpha = -\infty$ and $\beta = +\infty$, these value of alpha and beta passed down to node B where again $\alpha = -\infty$ and $\beta = +\infty$, and Node B passes the same value to its child D.



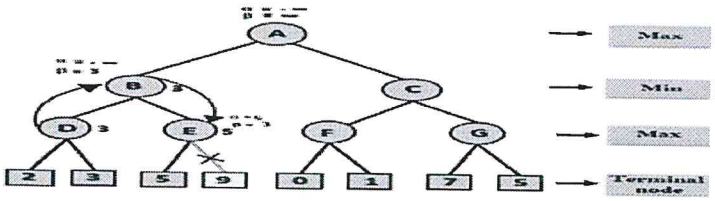
Step 2: At Node D, the value of α will be calculated as its turn for Max. The value of α is compared with firstly 2 and then 3, and the max (2, 3) = 3 will be the value of α at node D and node value will also 3.

Step 3: Now algorithm backtrack to node B, where the value of β will change as this is a turn of Min, Now β= +∞, will compare with the available subsequent nodes value, i.e. min (∞, 3) = 3, hence at node B now α= -∞, and β= 3.



In the next step, algorithm traverse the next successor of Node B which is node E, and the values of α= -∞, and β= 3 will also be passed.

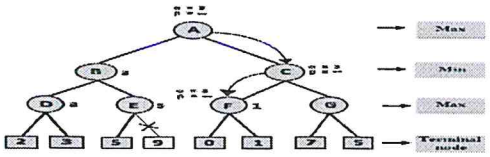
Step 4: At node E, Max will take its turn, and the value of alpha will change. The current value of alpha will be compared with 5, so max (-∞, 5) = 5, hence at node E α= 5 and β= 3, where α>=β, so the right successor of E will be pruned, and algorithm will not traverse it, and the value at node E will be 5.



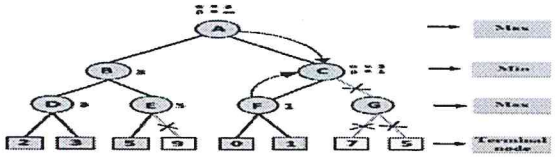
Step 5: At next step, algorithm again backtrack the tree, from node B to node A. At node A, the value of alpha will be changed the maximum available value is 3 as max (-∞, 3)= 3, and β= +∞, these two values now passes to right successor of A which is Node C.

At node C, α=3 and β= +∞, and the same values will be passed on to node F.

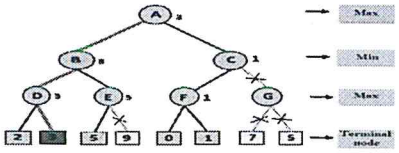
Step 6: At node F, again the value of α will be compared with left child which is 0, and max(3,0)= 3, and then compared with right child which is 1, and max(3,1)= 3 still α remains 3, but the node value of F will become 1.



Step 7: Node F returns the node value 1 to node C, at C α= 3 and β= +∞, here the value of beta will be changed, it will compare with 1 so min (∞, 1) = 1. Now at C, α=3 and β= 1, and again it satisfies the condition α>=β, so the next child of C which is G will be pruned, and the algorithm will not compute the entire sub-tree G.



Step 8: C now returns the value of 1 to A here the best value for A is max (3, 1) = 3. Following is the final game tree which is the showing the nodes which are computed and nodes which has never computed. Hence the optimal value for the maximizer is 3 for this example.



CO5 BL2 12.Describe the First Oder Logic with example.

First-Order Logic in Artificial intelligence

In the topic of Propositional logic, we have seen that how to represent statements using propositional logic. But unfortunately, in propositional logic, we can only represent the facts, which are either true or false. PL is not sufficient to represent the complex sentences or natural language statements. The propositional logic has very limited expressive power. Consider the following sentence, which we cannot represent using PL logic.

- **"Some humans are intelligent", or**
- **"Sachin likes cricket."**

To represent the above statements, PL logic is not sufficient, so we required some more powerful logic, such as first-order logic.

First-Order logic:

- First-order logic is another way of knowledge representation in artificial intelligence. It is an extension to propositional logic.

- FOL is sufficiently expressive to represent the natural language statements in a concise way.
- First-order logic is also known as **Predicate logic or First-order predicate logic.** First-order logic is a powerful language that develops information about the objects in a more easy way and can also express the relationship between those objects.
- First-order logic (like natural language) does not only assume that the world contains facts like propositional logic but also assumes the following things in the world:
    - **Objects:** A, B, people, numbers, colors, wars, theories, squares, pits, wumpus, ...
    - **Relations: It can be unary relation such as:** red, round, is adjacent, **or n-any relation such as:** the sister of, brother of, has color, comes between
    - **Function:** Father of, best friend, third inning of, end of, ...
- As a natural language, first-order logic also has two main parts:
    a. **Syntax**
    b. **Semantics**

Syntax of First-Order logic:

The syntax of FOL determines which collection of symbols is a logical expression in first-order logic. The basic syntactic elements of first-order logic are symbols. We write statements in short-hand notation in FOL.

Basic Elements of First-order logic:

Following are the basic elements of FOL syntax:

Constant	1, 2, A, John, Mumbai, cat,....
Variables	x, y, z, a, b,....
Predicates	Brother, Father, >,....
Function	sqrt, LeftLegOf, ...
Connectives	∧, ∨, ¬, ⇒, ⇔
Equality	==
Quantifier	∀, ∃

Atomic sentences:

- Atomic sentences are the most basic sentences of first-order logic. These sentences are formed from a predicate symbol followed by a parenthesis with a sequence of terms.
- We can represent atomic sentences as **Predicate (term1, term2, ..., term n).**

Example: Ravi and Ajay are brothers: => Brothers(Ravi, Ajay).
Chinky is a cat: => cat (Chinky).

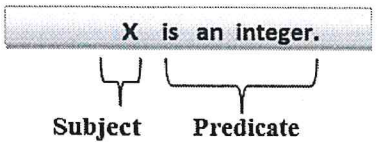
Complex Sentences:

- Complex sentences are made by combining atomic sentences using connectives.

First-order logic statements can be divided into two parts:

- **Subject:** Subject is the main part of the statement.
- **Predicate:** A predicate can be defined as a relation, which binds two atoms together in a statement.

Consider the statement: "x is an integer.", it consists of two parts, the first part x is the subject of the statement and second part "is an integer," is known as a predicate.



Quantifiers in First-order logic:

- A quantifier is a language element which generates quantification, and quantification specifies the quantity of specimen in the universe of discourse.
- These are the symbols that permit to determine or identify the range and scope of the variable in the logical expression. There are two types of quantifier:
    a. **Universal Quantifier, (for all, everyone, everything)**
    b. **Existential quantifier, (for some, at least one).**

Universal Quantifier:

Universal quantifier is a symbol of logical representation, which specifies that the statement within its range is true for everything or every instance of a particular thing.

The Universal quantifier is represented by a symbol ∀, which resembles an inverted A.

If x is a variable, then ∀x is read as:

- **For all x**
- **For each x**
- **For every x.**

Example:

Existential Quantifier:

Existential quantifiers are the type of quantifiers, which express that the statement within its scope is true for at least one instance of something.

It is denoted by the logical operator ∃, which resembles as inverted E. When it is used with a predicate variable then it is called as an existential quantifier.

f x is a variable, then existential quantifier will be ∃x or ∃(x). And it will be read as:

- **There exists a 'x.'**
- **For some 'x.'**
- **For at least one 'x.'**

Example:

1. All birds fly.
In this question the predicate is "**fly(bird).**"
And since there are all birds who fly so it will be represented as follows.

∀x bird(x) →fly(x).

2. Every man respects his parent.
In this question, the predicate is "**respect(x, y),**" **where x=man, and y= parent.**
Since there is every man so will use ∀, and it will be represented as follows:

∀x man(x) → respects (x, parent).

3. Some boys play cricket.
In this question, the predicate is "**play(x, y),**" where x= boys, and y= game. Since there are some boys so we will use **∃, and it will be represented as**:

∃x boys(x) → play(x, cricket).

4. Not all students like both Mathematics and Science.
In this question, the predicate is "**like(x, y),**" **where x= student, and y= subject.**
Since there are not all students, so we will use **∀ with negation, so** following representation for this:

¬∀ (x) [student(x) → like(x, Mathematics) ∧ like(x, Science)].

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SRM ARTS AND SCIENCE COLLEGE
II UNIT TEST- DEC 2022
Department of Computer Science

Date : 05-12-2022 **Duration : One Hour** **Class :I MSC CS**
Subject Name &Code :ARTIFICIAL INTELLIGENCE ***CS21C***

Section A (2 x 5 = 10)

(Answer any **ONE** questions)

CO1 BL6 1.Discuss about reinforcement learning.
CO3 BL4 2.Distinguish between backward chaining (vs) forward chaining

Section B (1 x 10 = 10)

(Answer any **TWO** question)

CO5 BL2 3.Explain about First order logic.
CO4 BL2 4.Describe about Alpha beta puring.
CO5 BL6 5. Discuss about decision tree.

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II UNIT TEST- NOV 2022
Department of Computer Science

Date : 05-11-2022 **Duration : One Hour** **Class :I MSC CS**
Subject Name &Code :ARTIFICIAL INTELLIGENCE

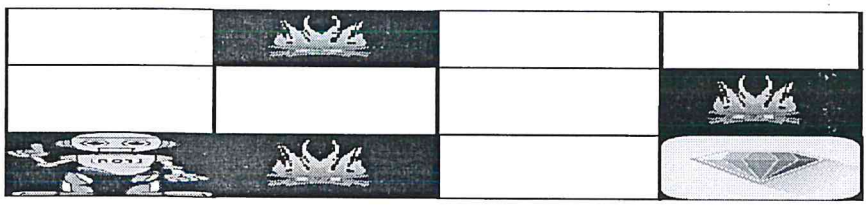
Section A (2 x 5 = 10)

(Answer any **ONE** questions)

CO1 BL6 1.Discuss about reinforcement learning.

Reinforcement learning is an area of Machine Learning. It is about taking suitable action to maximize reward in a particular situation. It is employed by various software and machines to find the best possible behavior or path it should take in a specific situation. Reinforcement learning differs from supervised learning in a way that in supervised learning the training data has the answer key with it so the model is trained with the correct answer itself whereas in reinforcement learning, there is no answer but the reinforcement agent decides what to do to perform the given task. In the absence of a training dataset, it is bound to learn from its experience.

Example: The problem is as follows: We have an agent and a reward, with many hurdles in between. The agent is supposed to find the best possible path to reach the reward. The following problem explains the problem more easily.



Main points in Reinforcement learning –

- Input: The input should be an initial state from which the model will start
- Output: There are many possible outputs as there are a variety of solutions to a particular problem
- Training: The training is based upon the input, The model will return a state and the user will decide to reward or punish the model based on its output.
- The model keeps continues to learn.
- The best solution is decided based on the maximum reward.

Types of Reinforcement:

1. **Positive** –
   Positive Reinforcement is defined as when an event, occurs due to a particular behavior, increases the strength and the frequency of the behavior. In other words, it has a positive effect on behavior.
2. **Negative** –
   Negative Reinforcement is defined as strengthening of behavior because a negative condition is stopped or avoided.

CO3 BL4 2.Distinguish between backward chaining (vs) forward chaining.

FORWARD CHAINING	BACKWARD CHAINING
When based on available data a decision is taken then the process is called as Forward chaining.	Backward chaining starts from the goal and works backward to determine what facts must be asserted so that the goal can be achieved.
Forward chaining is known as data-driven technique because we reach to the goal using the available data.	Backward chaining is known as goal-driven technique because we start from the goal and reaches the initial state in order to extract the facts.
It is a bottom-up approach.	It is a top-down approach.
It applies the Breadth-First Strategy.	It applies the Depth-First Strategy.
Its goal is to get the conclusion.	Its goal is to get the possible facts or the required data.
It operates in forward direction i.e it works from initial state to final decision.	It operates in backward direction i.e it works from goal to reach initial state.
Forward chaining is used for the planning, monitoring, control, and interpretation application.	It is used in automated inference engines, theorem proofs, proof assistants and other artificial intelligence applications.

Section B (1 x 10 = 10)

(Answer any **TWO** question)

CO5 BL2 3.Explain about First order logic.

First-Order Logic in Artificial intelligence

Propositional logic, we have seen that how to represent statements using propositional logic. But unfortunately, in propositional logic, we can only represent the facts, which are either true or false. PL is not sufficient to represent the complex sentences or natural language statements. The propositional logic has very limited expressive power. Consider the following sentence, which we cannot represent using PL logic.

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Variables x, y, z, a, b,....
Predicates Brother, Father, >,....
Function sqrt, LeftLegOf, ...
Connectives $\wedge$, $\vee$, $\neg$, $\Rightarrow$, $\Leftrightarrow$
Equality ==
Quantifier $\forall$, $\exists$

Atomic sentences:
o Atomic sentences are the most basic sentences of first-order logic. These sentences are formed from a predicate symbol followed by a parenthesis with a sequence of terms.
o We can represent atomic sentences as Predicate (term1, term2, ..., term n).
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Universal quantifier is a symbol of logical representation, which specifies that the statement

within its range is true for everything or every instance of a particular thing.

The Universal quantifier is represented by a symbol ∀, which resembles an inverted A.
If x is a variable, then ∀x is read as:
o For all x
o For each x
o For every x.
Example:
All man drink coffee.
Let a variable x which refers to a cat so all x can be represented in UOD as below:

∀x man(x) → drink (x, coffee).
It will be read as: There are all x where x is a man who drink coffee.
Existential Quantifier:
Existential quantifiers are the type of quantifiers, which express that the statement within its scope is true for at least one instance of something.
It is denoted by the logical operator ∃, which resembles as inverted E. When it is used with a predicate variable then it is called as an existential quantifier.
f x is a variable, then existential quantifier will be ∃x or ∃(x). And it will be read as:
o There exists a 'x.'
o For some 'x.'
o For at least one 'x.'
Example:
Some boys are intelligent.

∃x: boys(x) ∧ intelligent(x)
It will be read as: There are some x where x is a boy who is intelligent.
Some Examples of FOL using quantifier:
1. All birds fly.
In this question the predicate is "fly(bird)."
And since there are all birds who fly so it will be represented as follows.
∀x bird(x) →fly(x).
2. Every man respects his parent.
In this question, the predicate is "respect(x, y)," where x=man, and y= parent.
Since there is every man so will use ∀, and it will be represented as follows:
∀x man(x) → respects (x, parent).
3. Some boys play cricket.
In this question, the predicate is "play(x, y)," where x= boys, and y= game. Since there are
some boys so we will use ∃, and it will be represented as:
∃x boys(x) → play(x, cricket).
4. Not all students like both Mathematics and Science.
In this question, the predicate is "like(x, y)," where x= student, and y= subject.
Since there are not all students, so we will use ∀ with negation, so following representation for this:
¬∀ (x) [student(x) → like(x, Mathematics) ∧ like(x, Science)].

CO4 BL2 4.Describe about Alpha beta puring.

Alpha-Beta Pruning

- Alpha-beta pruning is a modified version of the minimax algorithm. It is an optimization technique for the minimax algorithm.
- As we have seen in the minimax search algorithm that the number of game states it has to examine are exponential in depth of the tree. Since we cannot eliminate the exponent, but we can cut it to half. Hence there is a technique by which without checking each node of the game tree we can compute the correct minimax decision, and this technique is called **pruning**. This involves two threshold parameter Alpha and beta for future expansion, so it is called **alpha-beta pruning**. It is also called as **Alpha-Beta Algorithm**.
- Alpha-beta pruning can be applied at any depth of a tree, and sometimes it not only prune the tree leaves but also entire sub-tree.
- The two-parameter can be defined as:
    a. **Alpha:** The best (highest-value) choice we have found so far at any point along the path of Maximizer. The initial value of alpha is $-\infty$.
    b. **Beta:** The best (lowest-value) choice we have found so far at any point along the path of Minimizer. The initial value of beta is $+\infty$.

The Alpha-beta pruning to a standard minimax algorithm returns the same move as the standard algorithm does, but it removes all the nodes which are not really affecting the final decision but making algorithm slow. Hence by pruning these nodes, it makes the algorithm fast.

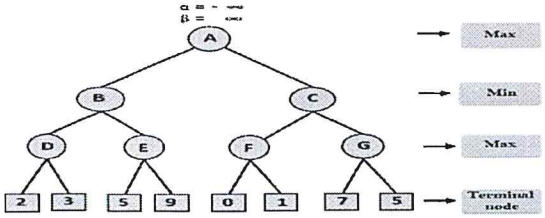
Condition for Alpha-beta pruning:

The main condition which required for alpha-beta pruning is:$\alpha >= \beta$

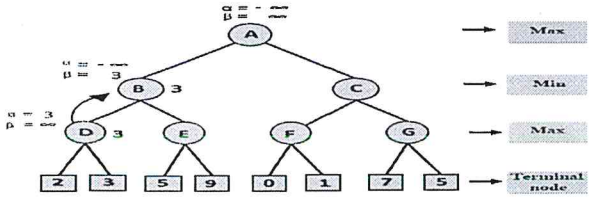
Key points about alpha-beta pruning:

- The Max player will only update the value of alpha.
- The Min player will only update the value of beta.
- While backtracking the tree, the node values will be passed to upper nodes instead of values of alpha and beta.
- We will only pass the alpha, beta values to the child nodes.
- Working of Alpha-Beta Pruning:

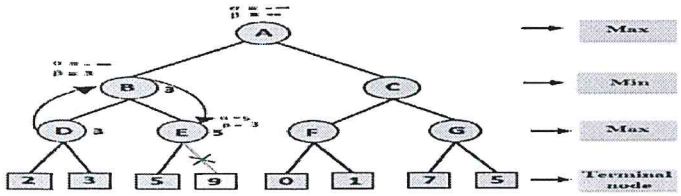
- Let's take an example of two-player search tree to understand the working of Alpha-beta pruning
- **Step 1:** At the first step the, Max player will start first move from node A where $\alpha = -\infty$ and $\beta = +\infty$, these value of alpha and beta passed down to node B where again $\alpha = -\infty$ and $\beta = +\infty$, and Node B passes the same value to its child D.



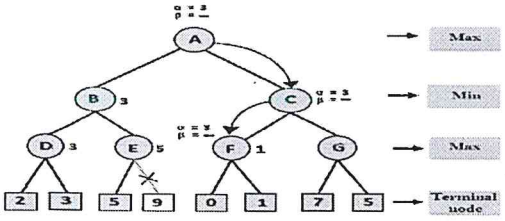
- **Step 2:** At Node D, the value of α will be calculated as its turn for Max. The value of α is compared with firstly 2 and then 3, and the max (2, 3) = 3 will be the value of α at node D and node value will also 3.
- **Step 3:** Now algorithm backtrack to node B, where the value of β will change as this is a turn of Min, Now $\beta = +\infty$, will compare with the available subsequent nodes value, i.e. min (∞, 3) = 3, hence at node B now $\alpha = -\infty$, and $\beta = 3$.



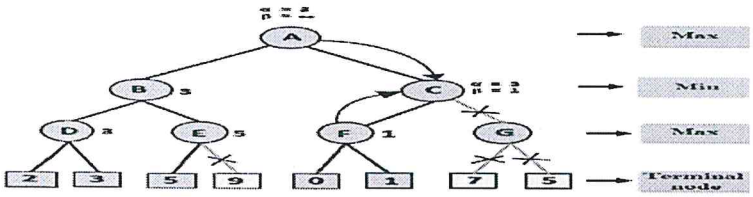
- In the next step, algorithm traverse the next successor of Node B which is node E, and the values of $\alpha = -\infty$, and $\beta = 3$ will also be passed.
- **Step 4:** At node E, Max will take its turn, and the value of alpha will change. The current value of alpha will be compared with 5, so max ($-\infty$, 5) = 5, hence at node E $\alpha = 5$ and $\beta = 3$, where $\alpha >= \beta$, so the right successor of E will be pruned, and algorithm will not traverse it, and the value at node E will be 5.



- **Step 5:** At next step, algorithm again backtrack the tree, from node B to node A. At node A, the value of alpha will be changed the maximum available value is 3 as max ($-\infty$, 3)= 3, and $\beta = +\infty$, these two values now passes to right successor of A which is Node C.
- At node C, $\alpha = 3$ and $\beta = +\infty$, and the same values will be passed on to node F.
- **Step 6:** At node F, again the value of α will be compared with left child which is 0, and max(3,0)= 3, and then compared with right child which is 1, and max(3,1)= 3 still α remains 3, but the node value of F will become 1.



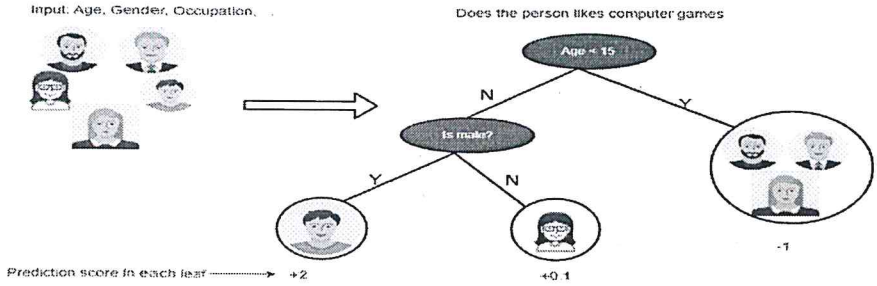
- **Step 7:** Node F returns the node value 1 to node C, at C α= 3 and β= +∞, here the value of beta will be changed, it will compare with 1 so min (∞, 1) = 1. Now at C, α=3 and β= 1, and again it satisfies the condition α>=β, so the next child of C which is G will be pruned, and the algorithm will not compute the entire sub-tree G.



- **Step 8:** C now returns the value of 1 to A here the best value for A is max (3, 1) = 3. Following is the final game tree which is the showing the nodes which are computed and nodes which has never computed. Hence the optimal value for the maximizer is 3 for this example.

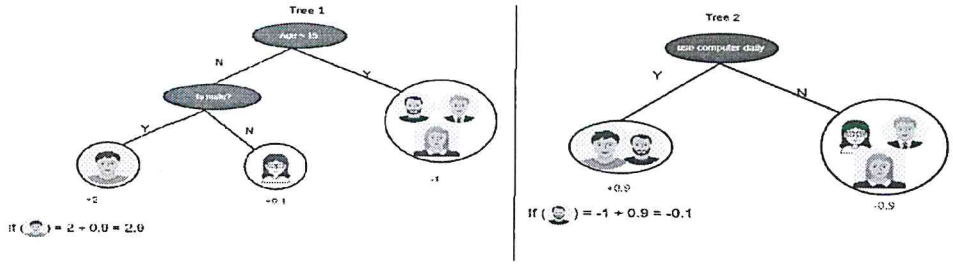
CO5 BL6 5. Discuss about decision tree.

Decision tree algorithm falls under the category of supervised learning. They can be used to solve both **regression** and **classification problems**. Decision tree uses the tree representation to solve the problem in which each leaf node corresponds to a class label and attributes are represented on the internal node of the tree. We can represent any boolean function on discrete attributes using the decision tree.



Below are some assumptions that we made while using the decision tree:

- At the beginning, we consider the whole training set as the root.
- Feature values are preferred to be categorical. If the values are continuous then they are discretized prior to building the model.
- On the basis of attribute values, records are distributed recursively.
- We use statistical methods for ordering attributes as root or the internal node.



As you can see from the above image the Decision Tree works on the Sum of Product form which is also known as *Disjunctive Normal Form*. In the above image, we are predicting the use of computer in the daily life of people. In the Decision Tree, the major challenge is the identification of the attribute for the root node at each level. This process is known as attribute selection. We have two popular attribute selection measures:

1. Information Gain
2. Gini Index

1. **Information Gain** When we use a node in a decision tree to partition the training instances into smaller subsets the entropy changes. Information gain is a measure of this change in entropy. ***Definition***: Suppose S is a set of instances, A is an attribute, S_v is the subset of S with A = v, and Values (A) is the set of all possible values of A, then
2. **Entropy** Entropy is the measure of uncertainty of a random variable, it characterizes the impurity of an arbitrary collection of examples. The higher the entropy more the information content. ***Definition***: Suppose S is a set of instances, A is an attribute, S_v is the subset of S with A = v, and Values (A) is the set of all possible values of A, the

Example:

For the set X = {a,a,a,b,b,b,b,b}

Total instances: 8

Instances of b: 5

Instances of a: 3

Entropy H(X) = -\left [\left (\frac{3}{8} \right)log_{2}\frac{3}{8} + \left (\frac{5}{8} \right)log_{2}\frac{5}{8} \right]

= -[0.375 * (-1.415) + 0.625 * (-0.678)]

= -(-0.53-0.424)

= 0.954

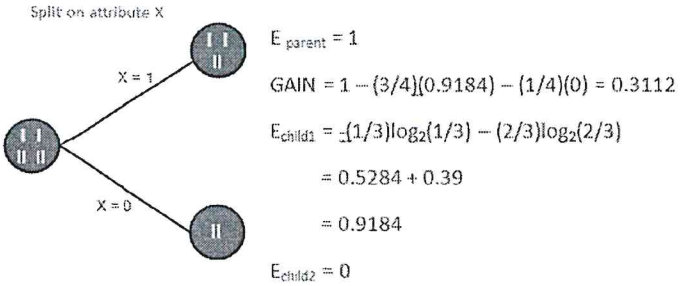
Building Decision Tree using Information Gain The essentials:

- Start with all training instances associated with the root node
- Use info gain to choose which attribute to label each node with
- *Note:* No root-to-leaf path should contain the same discrete attribute twice

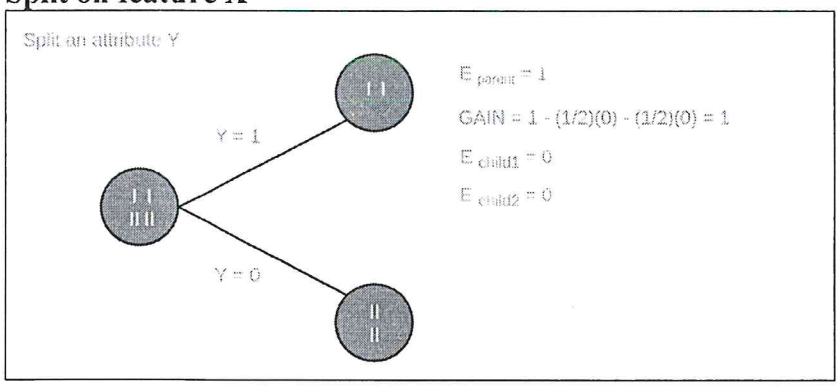
- Recursively construct each subtree on the subset of training instances that would be classified down that path in the tree.
- If all positive or all negative training instances remain, the label that node "yes" or "no" accordingly
- If no attributes remain, label with a majority vote of training instances left at that node
- If no instances remain, label with a majority vote of the parent's training instances.

Example: Now, let us draw a Decision Tree for the following data using Information gain. **Training set: 3 features and 2 classes**

Here, we have 3 features and 2 output classes. To build a decision tree using Information gain. We will take each of the features and calculate the information for each feature.



Split on feature X



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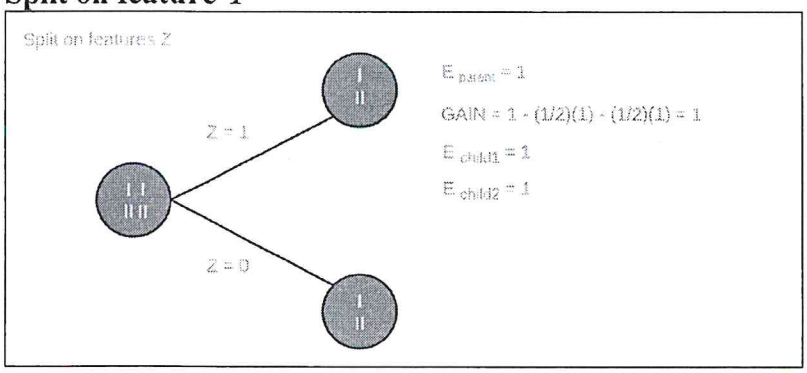
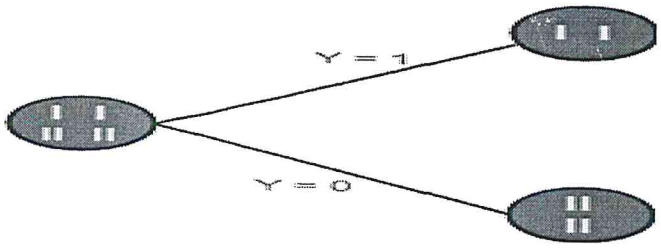


Split on feature Z

From the above images, we can see that the information gain is maximum when we make a split on feature Y. So, for the root node best-suited feature is feature Y. Now we can see that while splitting the dataset by feature Y, the child contains a pure subset of the target variable. So we don't need to further split the dataset. The final tree for the above dataset would look like this:



2. Gini Index

- Gini Index is a metric to measure how often a randomly chosen element would be incorrectly identified.
- It means an attribute with a lower Gini index should be preferred.
- Sklearn supports "Gini" criteria for Gini Index and by default, it takes "gini" value.
- The Formula for the calculation of the Gini Index is given below.

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SRM ARTS AND SCIENCE COLLEGE
Department of Computer Science

Date : 06-12-2022 Duration : One Hour Class :I MSC CS Marks : 25

Subject Name &Code :ADVANCED DATASTRUCTURES AND ALGORITHMS

Section A(3 x 5 = 15)
(Answer any **THREE** questions)

CO4	BL2	1. Describe AVLTree in brief
CO5	BL2	2. Describe about the Dynamic Programming approach
CO3	BL2	3. Explain the Back Tracking concepts
CO3	BL2	4. Define Greedy Approach

Section B(1 x 10 = 10)
(Answer any **ONE** question)

CO5	BL2	5.Explain in detail about Prims and Kruskal algorithms
CO2	BL3	6 Demonstrate the Fibanocci Heap in detail

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Department of Computer Science

Date : 06-12-2022 **Duration : One Hour** **Class :I MSC CS**
Subject Name &Code :ADVANCED DATASTRUCTURES AND ALGORITHMS(key)

1. An AVL tree is **a type of binary search tree**. Named after it's inventors Adelson, Velskii, and Landis, AVL trees have the property of dynamic self-balancing in addition to all the other properties exhibited by binary search trees. A BST is a data structure composed of nodes.
2. Dynamic programming is a technique that breaks the problems into sub-problems, and saves the result for future purposes so that we do not need to compute the result again. The subproblems are optimized to optimize the overall solution is known as optimal substructure property. The main use of dynamic programming is to solve optimization problems. Here, optimization problems mean that when we are trying to find out the minimum or the maximum solution of a problem. The dynamic programming guarantees to find the optimal solution of a problem if the solution exists.

   The definition of dynamic programming says that it is a technique for solving a complex problem by first breaking into a collection of simpler subproblems, solving each subproblem just once, and then storing their solutions to avoid repetitive computations.

3. Backtracking is a general algorithm for solving some computational problems, most notably constraint satisfaction problems, that incrementally builds candidates to the solutions and abandons a candidate's backtracks as soon as it determines that the candidate cannot be completed to a reasonable solution.
4. A greedy algorithm is an approach for solving a problem by selecting the best option available at the moment. It doesn't worry whether the current best result will bring the overall optimal result.

   The algorithm never reverses the earlier decision even if the choice is wrong. It works in a top-down approach.

   This algorithm may not produce the best result for all the problems. It's because it always goes for the local best choice to produce the global best result.

   However, we can determine if the algorithm can be used with any problem if the problem has the following properties:

   1. Greedy Choice Property

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31/10/22

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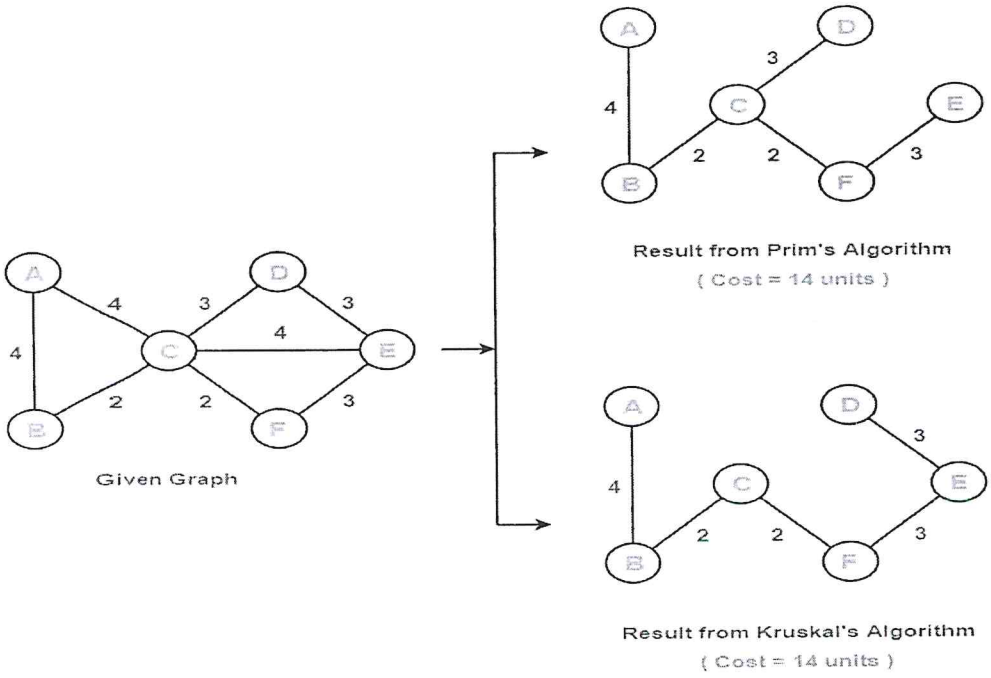
- If all the edge weights are not distinct, then both the algorithms may not always produce the same MST.
- However, cost of both the MST_s would always be same in both the cases.

Example-

Consider the following example-



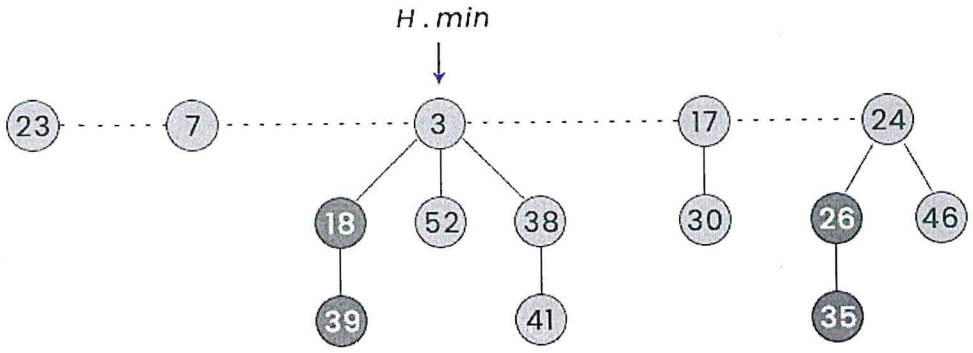
Here, both the algorithms on the above given graph produces different MST_s as shown but the cost is same in both the cases.

Concept-03:

Kruskal's Algorithm is preferred when-

- The graph is sparse.
- There are less number of edges in the graph like $E = O(V)$
- The edges are already sorted or can be sorted in linear time.

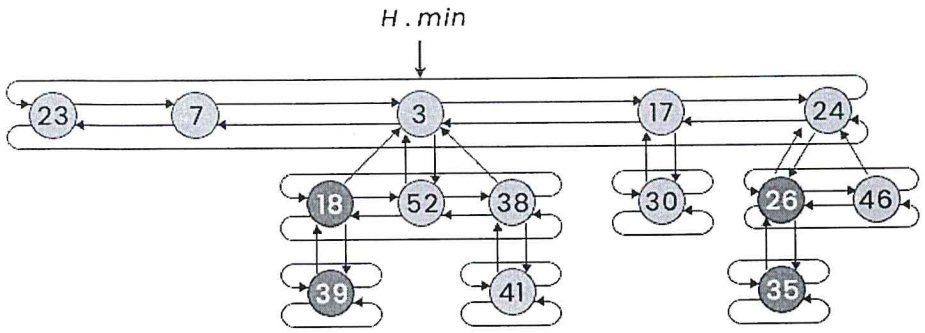
Prim's Algorithm is preferred when-



The above Fibonacci Heap consists of five rooted min-heap-ordered trees with 14 nodes. The min-heap-ordered tree means the tree which holds the property of a min-heap. The dashed line shows the root list. The minimum node in the Fibonacci heap is the node containing the key = 3 pointed by the pointer FH-min.

Here, 18, 39, 26, and 35 are marked nodes, meaning they have lost one child. The potential of the Fibonacci series = No. of rooted tree + Twice the number of marked nodes = 5 + 2 * 4 = 13.

Let us now observe the above example with the complete representation of the Fibonacci Heap:



In the above figure, we can observe that each node contains four pointers, the parent points to the parent (Upward), the child points to the child (downward), and the left and right pointers for the siblings (sideways).

Properties of Fibonacci Heap:

1. It can have multiple trees of equal degrees, and each tree doesn't need to have 2^k nodes.
2. All the trees in the Fibonacci Heap are rooted but not ordered.
3. All the roots and siblings are stored in a separated circular-doubly-linked list.

4. The degree of a node is the number of its children. Node X -> degree = Number of X's children.
5. Each node has a mark-attribute in which it is marked TRUE or FALSE. The FALSE indicates the node has not any of its children. The TRUE represents that the node has lost one child. The newly created node is marked FALSE.
6. The potential function of the Fibonacci heap is F(FH) = t[FH] + 2 * m[FH]
7. The Fibonacci Heap (FH) has some important technicalities listed below:
    1. min[FH] - Pointer points to the minimum node in the Fibonacci Heap
    2. n[FH] - Determines the number of nodes
    3. t[FH] - Determines the number of rooted trees
    4. m[FH] - Determines the number of marked nodes
    5. F(FH) - Potential Function.

The time complexities of different operations performed on a Fibonacci heap are listed below in the table:

1.	Find Min	Q (1)	Binary and Binomial heaps have the same time complexity.
2.	Extract Min	O(D(n)) = O(log n)	Binary and Binomial heaps have the same time complexity.
3.	Delete a Node	Q (1)	Binary takes O(logn) and Binomial takes Q (1)
4.	Decrease Key	Q (1)	Binary and Binomial both take O(logn)
5.	Union	Q (1)	Binarytakese O(m logn) or O(m+n) and Binomial takes O(logn).

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I UNIT TEST – FEB 2023
Department of Computer Science

Date : 01.03.23 **Duration : 1 hour** **Class : I BSc CS(Batch I)**

Subject Name & Code : Computer Organization

Section A (5 x 2 = 10)
(Answer any **FIVE** questions)

CO2	BL1	1. Enumerate the two complements for any base system r.
CO1	BL4	2. Compare Computer Architecture and Organization
CO2	BL1	3. What is ASCII code?
CO2	BL2	4. Give a note on Gray code and Excess-3 code.
CO6	BL1	5. List the classification of 8085 instruction set.
CO3	BL4	6. Compare Microprocessor and CPU.
CO4	BL1	7. What is Micro Operation?

Section B (1 x 5 = 5)
(Answer any **ONE** question)

CO2	BL2	8. Discuss about floating point representation.
CO4	BL2	9. Explain the BCD to Binary conversion with example.

Section C (1 x 10 = 10)
(Answer any **ONE** question)

CO2	BL2	10. Explain bus and memory transfer.
CO5	BL2	11. Describe the functional units of 8085 microprocessor.

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I UNIT TEST – FEB 2023
Department of Computer Science

Subject Name & Code: Computer Organization **Class: I BSc CS (Batch I)**

ANSWER KEY

Section A (5 x 2 = 10)
(Answer any **FIVE** questions)

1. Enumerate the two complements for any base system R.

For any base system r there the two complements persists are:

- R's complement
- (R-1)'s complement

For Decimal (10's and 9's complement) and for binary (2's and 1's complement)

2. Compare Computer Architecture and Organization

S. No.	Computer Architecture	Computer Organization
1.	Architecture describes what the computer does.	The Organization describes how it does it.
2.	Computer Architecture deals with the functional behavior of computer systems.	Computer Organization deals with a structural relationship.
3.	In the above figure, it's clear that it deals with high-level design issues.	In the above figure, it's also clear that it deals with low-level design issues.
4.	Architecture indicates its hardware.	Where Organization indicates its performance.

3. What is ASCII code?

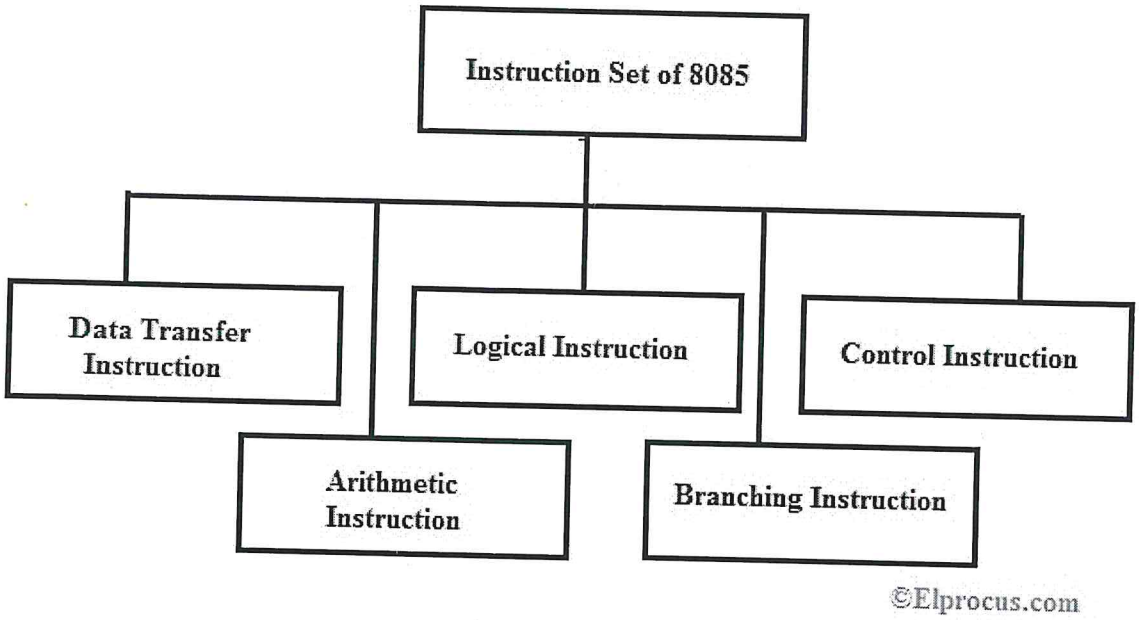
ASCII (American Standard Code for Information Interchange) is the most common character encoding format for text data in computers and on the internet. In standard ASCII-encoded data, there are unique values for 128 alphabetic, numeric or special additional characters and control codes.

4. Give a note on Gray code and Excess-3 code.

Gray Code

The **Gray Code** is a **non-weighted code** and is **cyclic** as well. It is referred to as cyclic because successive code words in this code differ by only one bit-position i.e., it is a unit distance code. It is also reflective. In many practical applications such as analog to digital conversion, unit distance codes are used.

5. List the classification of 8085 instruction set.



6. Compare Microprocessor and CPU.

The CPU is a microprocessor and not all microprocessors are CPUs. The CPU is a component that serves as the device's core. It's constructed of diodes, lots of them. The hardware that contains the CPU is known as a microprocessor. The microprocessor is broader than just the CPU. It houses secondary engines, such as the visual processing unit. Microprocessors house acoustic cards and connectivity adapters. So a CPU is a component of a microprocessor, although a microprocessor is bigger than just the CPU.

7. What is Micro Operation?

Micro-operations are the functional or atomic, operations of a processor. These are low level instructions used in some designs to implement complex machine instructions. They generally perform operations on data stored in one or more registers. They transfer data between registers or between external buses of the CPU, also performs arithmetic and logical operations on registers.

Section B (1 x 5 = 5)

(Answer any **ONE** question)

8. Discuss about floating point representation.

Floating point representation can also have a sign, with 0 denoting a positive value and 1 denoting a negative value. The IEEE (Institute of Electrical and Electronics Engineers) has developed a floating point representation standard.

- Single precision(32-bit)
- Double precision(64-bit)

- ✓ Else, shift the accumulator to right 4 times to obtain BCD_1. Next step is to multiply BCD_1 by 0AH
- ✓ Multiplication: Move BCD_1 to D and initialize E with 0AH as the counter. Clear the accumulator to 0 and add D to it E number of times
- ✓ Finally, add C to the accumulator and store the result in 2020H
- ✓ 2020H contains the result.

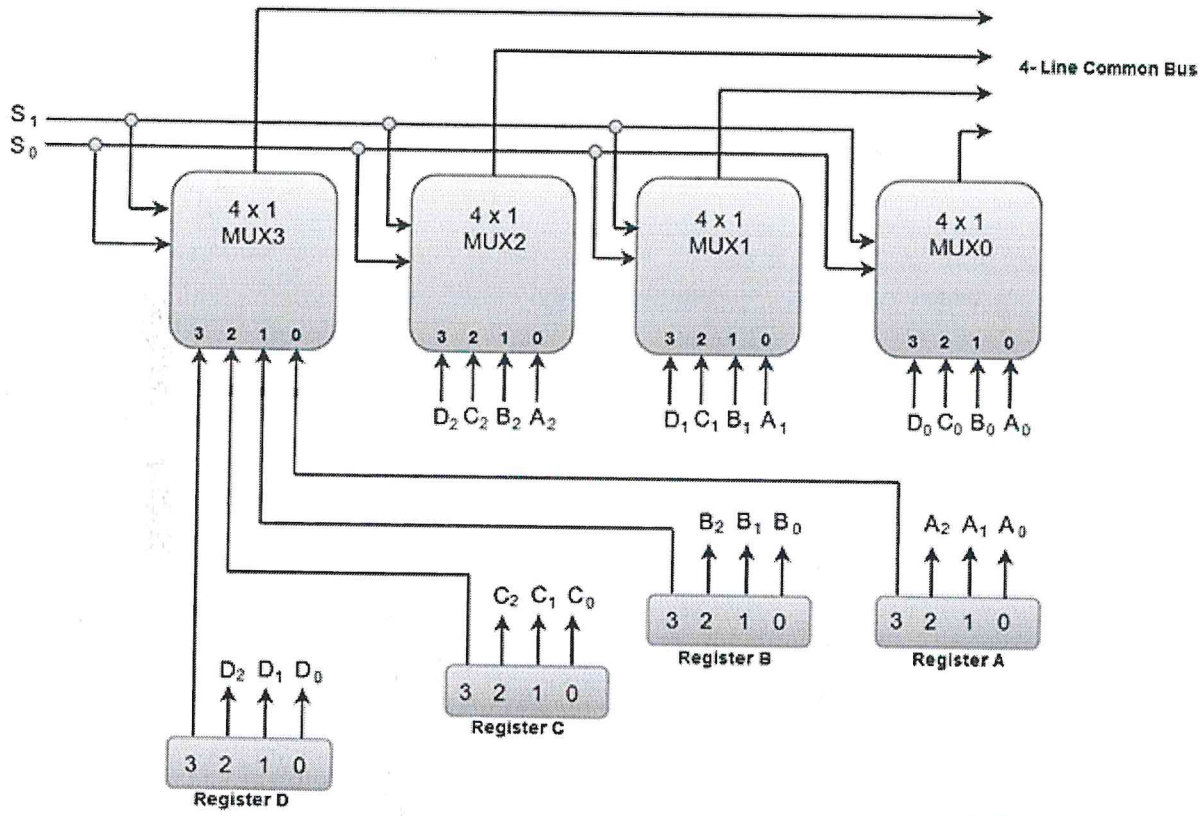
ADDRESS	LABEL	MNEMONIC
2000H		LDA 201FH
2001H		
2002H		
2003H		MOV B, A
2004H		ANI 0FH
2005H		
2006H		MOV C, A
2007H		MOV A, B
2008H		ANI F0H
2009H		
200AH		JZ SKIPMULTIPLY
200BH		
200CH		
200DH		RRC
200EH		RRC
200FH		RRC

A bus structure, on the other hand, is more efficient for transferring information between registers in a multi-register configuration system.

A bus consists of a set of common lines, one for each bit of register, through which binary information is transferred one at a time. Control signals determine which register is selected by the bus during a particular register transfer.

The following block diagram shows a Bus system for four registers. It is constructed with the help of four 4 * 1 Multiplexers each having four data inputs (0 through 3) and two selection inputs (S1 and S2).

Bus System for 4 Registers:



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I UNIT TEST – FEB 2023
Department of Computer Science

Date : 01.03.23 **Duration : 1 hour** **Class : I BSc CS(Batch II)**

Subject Name & Code : Computer Organization

Section A (5 x 2 = 10)
(Answer any **FIVE** questions)

CO2	BL2	1. Convert decimal 41.6875 into binary.
CO3	BL6	2. Write any four Microoperations.
CO2	BL2	3. Convert octal $(1325)_8$ to decimal.
CO1	BL1	4. Define Gray code.
CO3	BL1	5. List out Data transfer Instructions.
CO1	BL2	6. Find the 2's and 1's complement of binary number $(1011000)_2$.
CO2	BL1	7. What is Stack pointer?

Section B (1 x 5 = 5)
(Answer any **ONE** question)

CO2	BL2	8. Explain the types of shift mircro operations.
CO3	BL4	9. Explain Stack Organization.

Section C (1 x 10 = 10)
(Answer any **ONE** question)

CO1	BL2	10.Describe briefly Fixed and Floating point representation.
CO3	BL2	11. Discuss the various addressing modes available in the processors.

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DEPARTMENT OF COMPUTER SCIENCE - I UNIT TEST, FEB 2023

CLASS: **I BSc CS (Batch II)** TIME : 1 Hour

SUB: ***Computer Organization & SE22A*** Max : 25 Marks

ANSWER KEY

SECTION A – (5 X 2 = 10 Marks)
Answer any FIVE questions

1. **Convert decimal 41.6875 into binary.**

Figure Conversion of decimal 41.6875 into binary.

Integer = 41

41	
20	1
10	0
5	0
2	1
1	0
0	1

$(41)_{10} = (101001)_2$

Fraction = 0.6875

0.6875
x 2
1.3750
x 2
0.7500
x 2
1.5000
x 2
1.0000

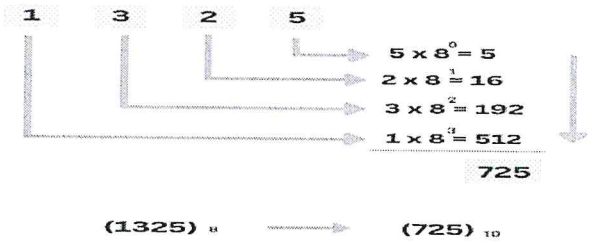
$(0.6875)_{10} = (0.1011)_2$

$(41.6875)_{10} = (101001.1011)_2$

2. **Write any four Micro operations.**

Symbolic Representation	Description
R3 ← R1 + R2	The contents of R1 plus R2 are transferred to R3.
R3 ← R1 - R2	The contents of R1 minus R2 are transferred to R3.
R2 ← R2'	Complement the contents of R2 (1's complement)
R1 ← R1 - 1	Decrement the contents of R1 by one

3. **Convert octal $(1325)_8$ to decimal.**



$(1325)_8 \longrightarrow (725)_{10}$

4. **Define Gray code.**

The reflected binary code or Gray code is an ordering of the binary numeral system such that two successive values differ in only one bit (binary digit). Gray codes are very useful in the normal sequence of binary numbers generated by the hardware that may cause an error or ambiguity during the transition from one number to the next.

5. **List out Data transfer Instructions.**

The data transfer instructions in 8085 include the following instructions:

1.	MOV R_d, R_s	2.	MOV R, M	3.	MOV M, R
4.	MVI R, data	5.	MVI M, data	6.	LXI R_p, 16-bit data
7.	LDA address	8.	STA address	9.	LHLD address

6. **Find the 2's and 1's complement of binary number $(1011000)_2$**

1's complement of 1011000 is 0100111
2's complement - 0100111 + 1 = 0101000

7. **What is Stack pointer?**

A stack pointer is a small register that stores the memory address of the last data element added to the stack or, in some cases, the first available address in the stack.

SECTION B – (1 X 5 = 5 Marks)
Answer any ONE question

8. **Explain the types of shift mircro operations.**

Shift micro-operations are those micro-operations that are used for the serial transfer of information. These are also used in conjunction with arithmetic micro-operation, logic micro-operation, and other data-processing operations. There are three types of shift micro-operations:

1. Logical Shift:

It transfers the 0 zero through the serial input. We use the symbols '<<' for the logical left shift and '>>' for the logical right shift.

Logical Left Shift:

In this shift, one position moves each bit to the left one by one. The Empty least significant bit (LSB) is filled with zero (i.e, the serial input), and the most significant bit (MSB) is rejected. The left shift operator is denoted by the double left arrow key (<<). The general syntax for the left shift is shift-expression << k.

Note: Every time we shift a number towards the left by 1 bit it multiplies that number by 2.

2. Arithmetic Shift:

The arithmetic shift micro-operation moves the signed binary number either to the left or to the right position.

Following are the two ways to perform the arithmetic shift.

1. Arithmetic Left Shift
2. Arithmetic Right Shift

Arithmetic Right Shift:
In this shift, each bit is moved to the right one by one and the least significant(LSB) bit is rejected and the empty most significant bit(MSB) is filled with the value of the previous MSB.

3. Circular Shift:

The circular shift circulates the bits in the sequence of the register around both ends without any loss of information.
Following are the two ways to perform the circular shift.

1. Circular Shift Left
2. Circular Shift Right

Circular Left Shift:
In this micro shift operation each bit in the register is shifted to the left one by one. After shifting, the LSB becomes empty, so the value of the MSB is filled in there.

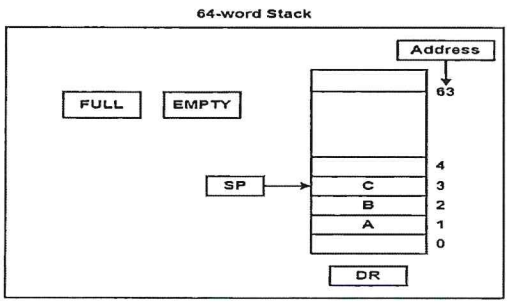
9. Explain Stack Organization.

The computers which use Stack-based CPU Organization are based on a data structure called a **stack**. The stack is a list of data words. It uses the **Last In First Out (LIFO)** access method which is the most popular access method in most of the CPU. A register is used to store the address of the topmost element of the stack which is known as **Stack pointer (SP)**.

Register Stack

The stack can be arranged as a set of memory words or registers. Consider a 64-word register stack arranged as displayed in the figure. The stack pointer register includes a binary number, which is the address of the element present at the top of the stack. The three-element A, B, and C are located in the stack.

The element C is at the top of the stack and the stack pointer holds the address of C that is 3. The top element is popped from the stack through reading memory word at address 3 and decrementing the stack pointer by 1. Then, B is at the top of the stack and the SP holds the address of B that is 2. It can insert a new word, the stack is pushed by incrementing the stack pointer by 1 and inserting a word in that incremented location.



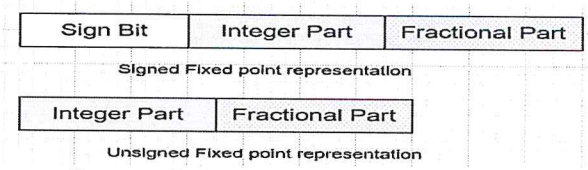
The stack pointer is incremented by 1 and the address of the next higher word is saved in the SP. The word from DR is inserted into the stack using the memory write operation. The first element is saved at address 1 and the final element is saved at address 0. If the stack pointer is at 0, then the stack is full and 'FULL' is set to 1. This is the condition when the SP was in location 63 and after incrementing SP, the final element is saved at address 0. During an element is saved at address 0, there are no more empty registers in the stack. The stack is full and the 'EMTY' is set to 0.The top element from the stack is read and transfer to DR and thus the stack pointer is decremented. If the stack pointer reaches 0, then the stack is empty and 'EMTY' is set to 1. This is the condition when the element in location 1 is read out and the SP is decremented by 1.

SECTION C – (1 X 10 = 10 Marks)
Answer any ONE question

10. Describe briefly Fixed and Floating point representation.

Fixed Point Representation

In computers, fixed-point representation is a real data type for numbers. Fixed point representation can convert data into binary form, and then the data is processed, stored, and used by the computer. It has a fixed number of bits for the integral and fractional parts. For example, if given fixed-point representation is IIIII.FFF, we can store a minimum value of 00000.001 and a maximum value of 99999.999. There are three parts of the fixed-point number representation: **Sign bit**, **Integral part,** and **Fractional part**. The below figure depicts it.



Parts of Fixed point representation

Sign bit:- The fixed-point number representation in binary uses a sign bit. The negative number has a sign bit 1, while a positive number has a bit 0.

Integral Part:- The integral part in fixed-point numbers is of different lengths at different places. It depends on the register's size; for an 8-bit register, the integral part is 4 bits.

Fractional part:- The Fractional part is of different lengths at different places. It depends on the registers; for an 8-bit register, the fractional part is 3 bits.

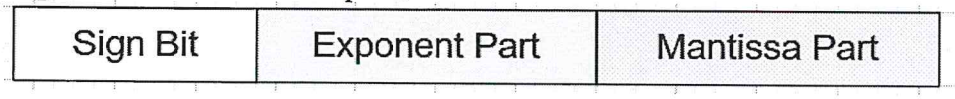
Floating Point Representation

Floating Point representation doesn't reserve any specific number of bits for the integer or fractional parts. But instead, it reserves certain bits for the number (called the significand or mantissa) and a fixed number of bits to say where the decimal place lies(called the exponent).

The computer uses floating-point number representation to convert the input data into binary form. This binary form number is converted into scientific notation, which is converted into floating-point representation. The floating-point representation has two types of notation:

1. Scientific notation: Scientific notation is the method of representing binary numbers into $a \times b^e$ form. It is further converted into floating-point representation. For example,
Number = 32625
Number in Scientific Notation = 32.625×10^3
Number in binary form = $1101.101*2^{101}$
Here, Mantissa is **1101.101** and Base part is $\mathbf{2^{101}}$.

2. Normalization notation: It is a special case of scientific notation. Normalized means that we have at least one non-zero digit after the decimal point.
A floating-point representation has three parts: **Sign bit**, **Exponent Part**, and **Mantissa**. We can see the below diagram to understand these parts.



Parts of Floating – point representation

Sign bit:- The floating-point numbers in binary uses a sign bit. A negative number has a sign bit 1, while a positive number has a sign bit 0. The sign of any number depends on mantissa, not on exponent.

Mantissa Part:- The mantissa part is of different lengths at different places. It depends on registers like for a 16-bit register, and mantissa part is of 8 bits.

Exponent Part:- It is the power of the number. It depends on the size of the register. For example, in the 16-bit register, the exponent part is of 7 bits.

11. Discuss the various addressing modes available in the processors.

Types of Addressing Modes-

Implied Addressing Mode-

In this mode, the operands are specified implicitly in the definition of the instruction. It is also called as implicit addressing mode.

Stack Addressing Mode-

In this addressing mode, the operand is contained at the top of the stack.

Example: ADD

Immediate Addressing Mode-

In this addressing mode, the operand is specified in the instruction explicitly. Instead of address field, an operand field is present that contains the operand.

Examples:

- ADD 10 will increment the value stored in the accumulator by 10.
- MOV R #20 initializes register R to a constant value 20.

Direct Addressing Mode-

In this addressing mode,

- The address field of the instruction contains the effective address of the operand.
- Only one reference to memory is required to fetch the operand.
- It is also called as **absolute addressing mode**.

Example:

- ADD X will increment the value stored in the accumulator by the value stored at memory location X. AC ← AC + [X]

Indirect Addressing Mode-

In this addressing mode,

- The address field of the instruction specifies the address of memory location that contains the effective address of the operand.
- Two references to memory are required to fetch the operand.

Example:

- ADD X will increment the value stored in the accumulator by the value stored at memory location specified by X. AC ← AC + [[X]]

Indexed Addressing Mode-

In this addressing mode,

- Effective address of the operand is obtained by adding the content of index register with the address part of the instruction.

Effective Address = Content of Index Register + Address part of the instruction

Base Register Addressing Mode-

In this addressing mode, Effective address of the operand is obtained by adding the content of base register with the address part of the instruction.

Effective Address = Content of Base Register + Address part of the instruction

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Date : 01.03.2023 **Duration : 01:00** **Class :II B.Sc**

Subject Code & Name :SE24A & Webtechnology

Section A (5 x 2 = 10)
(Answer any **FIVE** questions)

CO1	BL1	1. List the uses of PHP.
CO1	BL1	2.Define Variable in PHP.
CO 2	BL2	3. Define Comments in PHP.
CO2	BL1	4. Write a procedure to create a PHP Program.
CO2	BL4	5. Categories the special types of Constants.
CO3	BL1	6. Define Array.
CO3	BL2	7. Differentiate Indexed and Associative Array in PHP.

Section B (1 x 5 = 5)
(Answer any **ONE** question)

CO3	BL2	8. Explain Data types in PHP.
CO1	BL2	9. Summarize Operators in PHP.

Section C (1 x 10 = 10)
(Answer any **ONE** question)

CO2	BL2	10. Write short notes on the following. a. String Function b. Number Function and c. Math Function
CO5	BL2	11. Demonstrate Conditional and Looping Statements in PHP with example.

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ANSWER KEY

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Date : 05.07.2023 **Duration : 01:00** **Class :II B.Sc**

Subject Code & Name :SE24A & Webtechnology

Section A (5 x 2 = 10)
(Answer any **FIVE** questions)

CO1 BL1 1. List the uses of PHP.

PHP can be used to develop dynamic and interactive web pages, applications, and ecommerce platforms. PHP is well suited to various web tasks, from generating dynamic web pages, sending emails, and collecting web forms to sending and receiving cookies.

CO1 BL1 2.Define Variable in PHP.

a variable is declared using a $ sign followed by the variable name. After declaring a variable, it can be reused throughout the code. Assignment Operator (=) is used to assign the value to a variable. Syntax of declaring a variable in PHP is given below:

$variable name=value;

CO 2 BL2 3. Define Comments in PHP.

A comment in PHP code is a line that is not executed as a part of the program. Its only purpose is to be read by someone who is looking at the code. Comments can be used to: Let others understand your code.

CO2 BL1 4. Write a procedure to create a PHP Program.

Any PHP script (code) must be enclosed within the PHP tags which are represented using <?php (opening tag) and ?> (closing tag). Let's consider a simple PHP script which prints "Hello World" on the web document:

<? PHP

PRINT "HELLOWORLD";

?>

CO2 BL4 5. Categories the special types of Constants.

PHP constants can be defined by 2 ways: 1. Using define() function 2.Using const keyword

CO3 BL1 6. Define Array.

PHP array is an ordered map (contains value on the basis of key). It is used to hold multiple values of similar type in a single variable.

CO3 BL2 7. Differentiate Indexed and Associative Array in PHP.

PHP index is represented by number which starts from 0. We can store number, string and object in the PHP array. All PHP array elements are assigned to an index number by default.

$season=array("summer","winter","spring","autumn");
We can associate name with each array elements in PHP using => symbol.

$salary=array("Sonoo"=>"350000","John"=>"450000","Kartik"=>"200000");

Section B (1 x 5 = 5)

(Answer any **ONE** question)

CO3 BL2 8. Explain Data types in PHP.

PHP supports the following data types:

- String
- Integer
- Float (floating point numbers - also called double)
- Boolean
- Array
- Object
- NULL
- Resource

CO1 BL2 9. Summarize Operators in PHP.

Operators are used to perform operations on variables and values.PHP divides the operators in the following groups:

- Arithmetic operators
- Assignment operators
- Comparison operators
- Increment/Decrement operators
- Logical operators
- String operators
- Array operators
- Conditional assignment operators

Section C (1 x 10 = 10)

(Answer any **ONE** question)

CO2 BL2 10. Write short notes on the following.

a.String Function

strlen() Function: It returns the length of the string i.e. the count of all the characters in the string including whitespaces characters.
Syntax: strlen(*string* or *variable* name)
strrev() Function: It returns the reversed string of the given string.
Syntax:
strrev(*string or variable name*)
strtoupper() and strtolower() Function: It returns the *string* after changing cases of its letters.

- strtoupper() – It returns the string after converting all the letters to uppercase.
- strtolower() – It returns the string after converting all the letters to lowercase.

Syntax:
strtoupper(*string*)
strtolower(*string*) trim(), ltrim(), rtrim(), and chop() Functions: It remove white spaces or other characters from the string. They have two parameters: one string and another charList, which is a list of characters that need to be omitted.

- trim() – Removes characters or whitespaces from both sides.
- rtrim() & chop() – Removes characters or whitespaces from right side.
- ltrim() – Removes characters or whitespaces from the left side.

b.Number Function

Definition and Usage -The is_numeric() function checks whether a variable is a number or a numeric string. This function returns true (1) if the variable is a number or a numeric string, otherwise it returns false/nothing.

Syntax : is_numeric(variable);

c.Math Function

abs() function-The abs() function returns absolute value of given number. It returns an integer value but if you pass floating point value, it returns a float value.

Syntax : number abs (mixed $number)

The ceil() function rounds fractions up. Syntax : float ceil (float $value)

CO5 BL2 11. Demonstrate Conditional and Looping Statements in PHP with example.

In PHP we have the following conditional statements:

- if statement - executes some code if one condition is true
- if...else statement - executes some code if a condition is true and another code if that condition is false
- if...elseif...else statement - executes different codes for more than two conditions
- switch statement - selects one of many blocks of code to be executed

Loops in PHP are used to execute the same block of code a specified number of times. PHP supports following four loop types.

- for – loops through a block of code a specified number of times.
- while – loops through a block of code if and as long as a specified condition is true.
- do...while – loops through a block of code once, and then repeats the loop as long as a special condition is true.
- foreach – loops through a block of code for each element in an array.

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Unit Test - I

Date : 23.02.2023 **Duration : 01 HR** **Class : III B.Sc CS I &II**

Subject Name & Code : SOFTWARE ENGINEERING

Section A (5 x 2 = 10)

(Answer any **FIVE** questions)

CO1	BL1	1. List the goals of software engineering?
CO2	BL2	2. Difference between verification and validation?
CO3	BL2	3. Classify the two types of software products?
CO1	BL1	4. . List out the six task regions of the spiral life cycle model.
CO2	BL1	5. Identify the various categories of software?
CO4	BL2	6. Describe project scheduling.
CO2	BL1	7. Define software metric.

Section B (1 x 5 = 5)

(Answer any **ONE** question)

CO6	BL2	8. Explain the following: (i) waterfall model (ii) Spiral model (iii)RAD model
CO1	BL1	9.List the principles of agile software development.

Section C (1 x 10 = 10)

(Answer any **ONE** question)

CO4	BL2	10. Discuss the role of software evaluations.
CO3	BL2	11. Explain the component based software development life cycle

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Unit Test-I

Date : 27.02.2023 **Duration : 01HR** **Class :III B.Sc CS I&II**

Subject Name & Code : **Software Engineering**

Section A (5 x 2 = 10)

(Answer any **FIVE** questions)

CO1 BL1 1. List the goals of software engineering?

Satisfy user requirements , High reliability , Low maintenance cost , Delivery on time , Low production cost , High performance , Ease of reuse.

CO2 BL2 2. Difference between verification and validation?

Verification refers to the set of activities that ensure that software correctly implements a specific function. Verification: "Are we building the product right?" Validation refers to a different set of activities that ensure that the software that has been built is traceable to customer requirements. Validation: "Are we building the right product?"

CO3 BL2 3. Classify the two types of software products?

1. Generic products: these are stand-alone systems that are produced by a development Organization and sold in the open market to any customer who wants to buy it.

2. Customized products: these are systems that are commissioned by a specific customer and developed specially by some contractor to meet a special need.

CO1 BL1 4. . List out the six task regions of spiral life cycle model.

Requirement Gathering

Risk Analysis

Prototyping

Coding

Testing

Customer Evaluation

CO2 BL1 5. Identify the various categories of software? System software , Application software ,Engineering/Scientific software , Embedded software , Web Applications, Artificial Intelligence software

CO4 BL2 6. Describe project scheduling.

It is the process of identifying and organizing the tasks of a project into a sequence of events ensuring a harmonious completion of the venture. These events are dependent on the results of their preceding activities, thus interlinking all the activities of the project.

CO2 BL1 7. Define software metric.

Software metrics deals with the measurement of the software product and the process by which it is developed. The two categories of software metric are product and project metrics. Product metrics-measure the software product at any stage of its development. Project Metrics – used by the project manager to control the project in terms of project cost, time and effort.

Section B (1 x 5 = 5)

(Answer any **ONE** question)

CO6 BL2 8. Explain the following: (i) waterfall model (ii) Spiral model (iii)RAD model

A Project management methodology based on asequential design process

Finishes one phase before another phase can begin SDLC Model Linear Sequential Model Simple to understand and easy to implement

Waterfall model phases There are separate identified phases in the waterfall model: 1. Requirements analysis and definition 2. System and software design 3. Implementation and unittesting 4. Integration and system testing 5. Operation and maintenance

The main drawback of the waterfall model is the difficulty of accommodating change after the process is underway. In principle, a phase has to be complete before moving onto the next phase.

(ii)SPIRAL MODEL The spiral model is divided into a number of frameworks. These frameworks are 22 denoted by task regions. Usually there are six task regions. In the spiral model project entry point axis is defined. The task regions are: 1. Customer communication ,Planning Risk analysis., Engineering, Construct and release and Customer evaluation. Drawbacks 1. It is based on customer communication. 2. It demands considerable risk assessment.

(iii) RAD Model RAD or Rapid Application Development process is an adoption of the waterfall model; it targets at developing software in a short span of time. RAD follows the iterative SDLC RAD model has following phases iv. Business Modeling v. Data Modeling vi. Process Modeling vii. Application Generation viii. Testing and Turnover 24 iv) Prototyping Model Prototype methodology is defined as a Software Development model in which a prototype is built, test, and then reworked when needed until an acceptable prototype is achieved. It also creates a base to produce the final system. Software prototyping model works best in scenarios where the project's requirements are not known. It is an iterative, trial, and error method which take place between the developer and the client Often, a customer defines a set of general objectives for software.

CO1 BL1 9.List the principles of agile software development

Adaptive planning
1. Evolutionary development
2. Early delivery

3. Continuous improvement
4. Encourages rapid and flexible response to change
(d) These principles support the definition and continuing evolution of many software development methods .
(e) Every project needs to be handled differently Existing methods need to be tailored to best suit the project requirements
(f) Tasks are divided to time boxes (small time frames) to deliver specific features for a release
(g) Iterative approach is taken & working software build is delivered after each iteration

Section C (1 x 10 = 10)

(Answer any **ONE** question)

CO4 BL2 10. Discuss the various life cycle models in software development?

The Software Development Lifecycle (SDLC) is a systematic process for building software that ensures the quality and correctness of the software built. SDLC process aims to produce high-quality software which meets customer expectations. The system development should be complete in the pre-defined time frame and cost. DLC consists of a detailed plan which explains how to plan, build, and maintain specific software. Every phase of the SDLC life cycle has its own process and deliverables that feed into the next phase.

Phase 1: Requirement collection and analysis

Phase 2: Feasibility study: Phase 3: Design: Phase 4: Coding: Phase 5: Testing:

Phase 6: Installation/Deployment: Phase 7: Maintenance:

CO3 BL2 11. Explain the component based software development model with a neat sketch.

Component-based software engineering (CBSE)

It is also called components-based development (CBD), is a branch of software engineering that emphasizes the separation of concerns with respect to the wide ranging functionality available throughout a given software system.

It is a reuse-based approach to defining, implementing and composing loosely coupled independent components into systems.

This practice aims to bring about an equally wide-ranging degree of benefits in both the short-term and the long-term for the software itself and for organizations that sponsor such software.

Software engineering practitioners regard components as part of the starting platform for service-orientation.

Components play this role, for example, in web services, and more recently, in service-oriented architectures (SOA), whereby a component is converted by the web service into a service and subsequently inherits further characteristics beyond that of an ordinary component.

*COTS(CommercialOffTheShelf)software components, developed by vendors who offer them as products can be used whensoftwareistobuilt.

- Provides interfaces targeted functionality with well defined
- Incorporates model many of the characteristics of Spiral model

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Unit Test I - February 2023

Date : 28.02.2023 **Duration :1 Hr** **Class : III B.Sc.CS**

Subject Name & Code: Introduction to Data Science **Marks: 25**

Section A (5 x 2 = 10)

(Answer any **FIVE** questions)

CO 1 BL 1 1. Define data science.
CO 1 BL 3 2. State big data.
CO 2 BL 1 3. What is data cleansing?
CO 4 BL 2 4. Outline data transformation.
CO 3 BL 1 5. What is automation?
CO 6 BL 1 6. Define data science process.
CO 5 BL 1 7. What is Exploratory data Analysis?

Section B (1 x 5 = 5)

(Answer any **ONE** question)

CO 3 BL 6 8. Discuss the facets of data.
CO 4 BL 3 9. Write short notes on Model building.

Section C (1 x 10 = 10)

(Answer any **ONE** question)

CO 2 BL 6 10. Explain data science process.
CO 4 BL 5 11. Elaborate big data ecosystem and data science.

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Answer Key
Introduction to Data Science

Section A

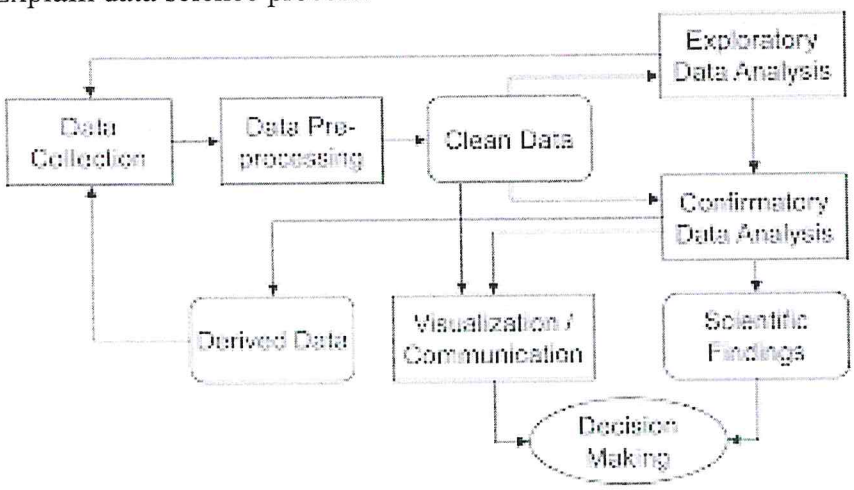
1. Define data science.
   Data science is the study of data to extract meaningful insights for business. It is a multidisciplinary approach that combines principles and practices from the fields of mathematics, statistics, artificial intelligence, and computer engineering to analyze large amounts of data.
2. State big data.
   Big Data is a collection of data that is huge in volume, yet growing exponentially with time.
3. What is data cleansing?
   Data cleansing removes false values from a data source and inconsistencies across data sources
4. Outline data transformation.
   Data transformation ensures that the data is in a suitable format for use in your models
5. What is automation?
   Data automation is the process of updating data on your open data portal programmatically, rather than manually.
6. Define data modelling.
   Building a model is an iterative process that involves selecting the variables for the model, executing the model, and model diagnostics.
7. List down the characteristics of big data.
   Volume, variety and velocity

Section B

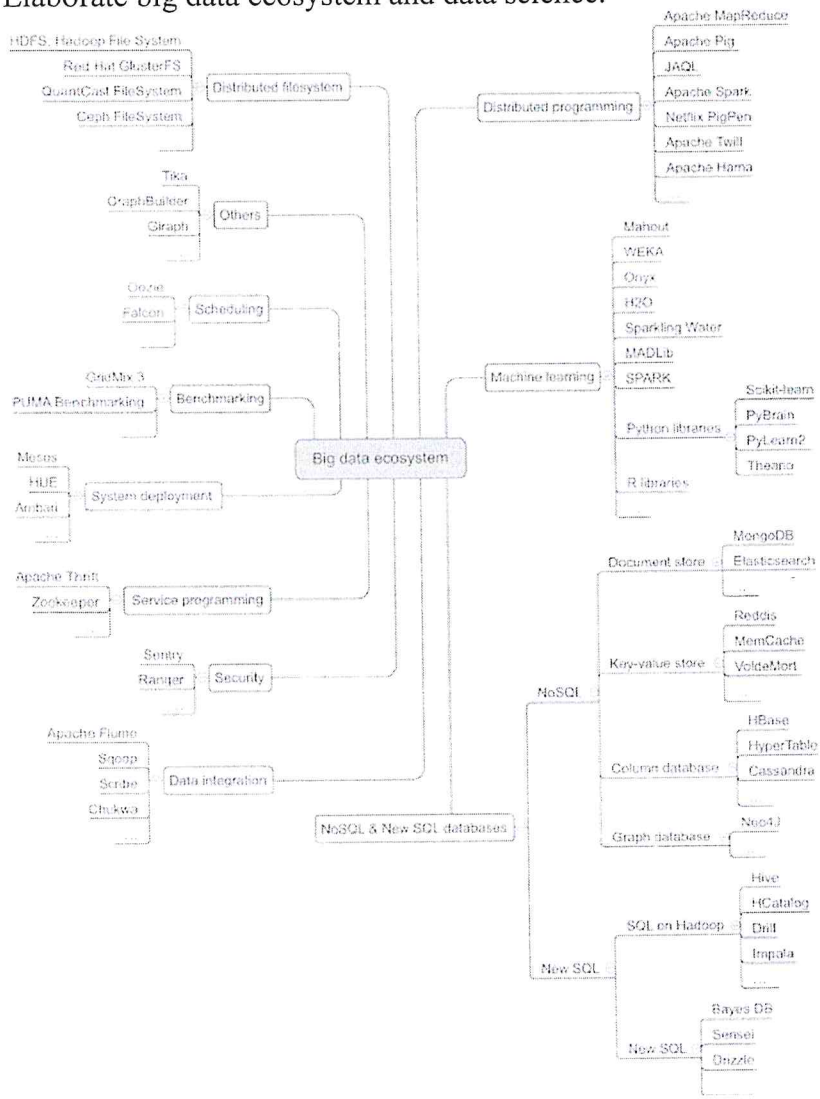
8. Discuss the facets of data.
   - Structured
   - Unstructured
   - Natural language
   - Machine-generated
   - Graph-based
   - Audio, video, and images
   - Streaming
9. Write short notes on NoSQL databases.
   The name of this group can be misleading, as "No" in this context stands for "Not Only." A lack of functionality in SQL isn't the biggest reason for the paradigm shift, and many of the NoSQL databases have implemented a version of SQL themselves. But traditional databases had shortcomings that didn't allow them to scale well. By solving several of the problems of traditional databases, No SQL databases allow for a virtually endless growth of data. These shortcomings relate to every property of big data: their storage or processing power can't scale beyond a single node and they have no way to handle streaming, graph, or unstructured forms of data. Many different types of databases have arisen, but they can be categorized into the following types: Column databases, Document stores, Streaming data, SQL on Hadoop etc.

Section C

10. Explain data science process.



11. Elaborate big data ecosystem and data science.



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Date : .1. 2023 **Duration : 1 Hour** **Class : III BSc CS II Batch**
Subject Name & Code : Cloud Computing

Section - A **(5 x 2 = 10)**

(Answer any FIVE questions)

CO1 BL1 1. Define cloud computing.
CO1 BL2 2. Explain the role of performance cloud in cloud computing.
CO2 BL1 3. State the importance of cloud computing in IT sector.
CO3 BL1 4. List the characteristics of cloud computing.
CO3 BL1 5. Define important is platform as a service.
CO4 BL1 6. Define pros and cons of cloud computing.
CO2 BL1 7. Define nature of the cloud.

Section - B **(1 x 5 = 5)**

(Answer any ONE question)

CO2 BL4 8. Explain the technologies in cloud computing.
CO6 BL4 9. Explain the migrating into the cloud computing.

Section - C **(1x10=10)**
(Answer any ONE question)

CO3 BL2 10. Describe the history of cloud computing.
CO5 BL2 11. Explain the types of cloud computing.

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Answer keys

Date : .1. 2023 **Duration : 1 Hour** **Class : III BSc CS II Batch**

Subject Name & Code : Cloud Computing

Section A (5 x 2 = 10)

(Answer any **FIVE** questions)

CO1 BL1 1. Define cloud computing

The cloud computing is the delivery of computing services—including servers, storage, databases, networking, software, analytics, and intelligence—over the Internet ("the cloud") to offer faster innovation, flexible resources, and economies of scale.

CO1 BL2 2. Explain the role of performance cloud in cloud computing.

It is is useful in transferring maximum amount of data instantly. It is used by the professionals who work on high performance computing research. The cloud delivers **more flexibility and reliability, increased performance and efficiency**, and helps to lower IT costs. It also improves innovation, allowing organizations to achieve faster time to market and incorporate AI and machine learning use cases into their strategies.

CO2 BL1 3. State the importance of cloud computing in IT sector.

The cloud computing and states the importance of migrating to cloud computing, as it supports/provides the following benefits: • Online storage • Accessible in different platforms • Using online resources • Online collaboration and • Easy outsourcing processes.

CO3 BL1 4. List the characteristics of cloud computing.

Dynamic Computing Infrastructure, IT Service-centric Approach, Self-service Based Usage Model, Minimally or Self-managed Platform, Consumption-based Billing, On-demand self-service. Resource pooling. Scalability and rapid elasticity., Pay-per-use pricing. Measured service, Resiliency and availability. Security and Broad network access.

CO3 BL1 5. Define important is platform as a service.

Platform as a service (PaaS) is a cloud computing model where a third-party provider delivers hardware and software tools to users over the internet. Usually, these tools are needed for application development. A PaaS provider hosts the hardware and software on its own infrastructure.

CO4 BL1 6. Define pros and cons of cloud computing.

pros	cons
No administrative or management stress	Limited control of infrastructure
Easy accessibility	Restricted or limited flexibility
Pay-per-use	Ongoing costs
Reliability	Security

CO2 BL1 7. Define nature of the cloud.

1.Organizational perspective, the cloud give services for client and enterprise needs in a simplifi ed way, brought ahead of scale and high worth of service that drives the capability for expansion and innovation. **2. User's perspective,** it enables computing services in a simpler, more responsive model without complete knowledge of the underlying technology. It is an effective service acquisition and delivery model for IT resources if properly implemented within an all-inclusive technology strategy. Cloud computing can help to improve overall business performance while controlling the costs of distributing IT resources to the organization.

Section - B (1 x 5 = 5)

(Answer any ONE question)

CO2 BL4 8. Explain the technologies in cloud computing.

Grid computing: It defi ned as an extension of distributed and parallel computing in which a super and virtual computer consists of a number of networked and loosely coupled computers that act together to perform enormous tasks.
Utility computing: When the resources used in computing process are packaged as a metered service similar to electricity—a traditional public utility.
Autonomic computing: It defi nes that systems are capable of self-management.

Working of Cloud: Cloud computing uses information technology as a service over the network. Cloud computing consists of Infrastructure as a service (IaaS), Platform as a service (PaaS), Hardware as a Service (HaaS) and Software as a service (SaaS). Cloud computing fi nally enables the user to rent a virtual server loaded with software and turn it on and off according to the need from the user and it can furthermore be cloned to meet an immediate workload demand. Cloud computing also stores a large amount of data that can be accessed by the certifi ed users with the authorized applications. A cloud is used as a storage medium which handles applications, business and personal data.
Key Characteristic of Cloud and its Role:

Virtualization Technique: Virtualization works on the management of how the likeness of the OS, middleware and programs procreated and assigned to a personal system or part of the server stack away. These technologies in addition helps in reusing certificates of OS, middleware or programs requests after the customer distributes their service from the cloud computing platform.
Service-oriented Architecture (SOA) Cloud computing is basically a collection of services, which communicate with each other. displays the basic architecture of SOA and its components such as: (i) service providers, (ii) service requestor and (iii) contract details or in other words service level agreements. Normally services are used to pass the data and if some services integrated in a way to execute some specific activities. As opposed to the past decades, most of the applications are standalone and are designed for a single use only now the system is growing towards service orientation. Several big companies such as Google, Microsoft, Sun and even Amazon have the competence of providing services instead of directly promoting the software to the user. Those companies that desire cost cuts through choosing to rent rather than purchasing most definitely need these characteristics. Anyhow issues like security, cost, availability and integration of applications will play a vital role in adopting these architectures. SOA Compositional Operator Components Contract Service-oriented Architecture

CO6 BL4 9. Explain the migrating into the cloud computing.

Among the new technologies introduced in the IT market, the cloud computing buzz is an extended level of previous 'year-of' technologies such as application service providers, software as a service (SaaS) and utility computing. In this case, the hype may be true. As of the current survey indicates that the cloud CPU will be used by many industrial giants in near future. Our mission as an IT engineer is to understand:

- What is a cloud and what are the benefits it offers to clients?
- What challenges and obstacles clients might have to overcome to tap into the cloud?
- How their management of IT must change to secure and control their new cloud-driven infrastructure?

When you **migrate** from a client to the cloud, the issues you will face fall into the following overall categories.

Security : Security is an obvious threshold question, if the cloud is not secure, enterprises will not consider migrating to it fearing their sensitive data will be tampered. The external SAAS providers can also give satisfaction to the customers in security level.

Vendor Management: As soon as you realize that the cloud is not in your IT platform and it is in the hands of an outside firm, how do you guarantee that their technical or business problems won't become yours? When the user is going to migrate with the outsource providers, then the service level agreements and its terms are thoroughly checked. While the whole idea behind cloud computing is to propose a standardized, multi-tenant infrastructure, cloud vendors may not offer the same level of custom SLAs as IT managers. Amazon's AWS Management Console, which is a monitoring interface, offers robust features and helpful to IT Managers.

Technical Integration: The technical issues are also complex. Now most firms that migrate to the cloud environment in a hybrid model, are keeping certain key elements of their infrastructure in-house and under their direct control, while outsourcing less susceptible or core components. Integrating internal and external infrastructures can be a technical concern. A VM template should incorporate infrastructure, application and security to fullfill the need of the user. Like Force.com and Salesforce.com's cloud offering, is leading the way by integration as a service on top of its cloud contributions.

Process and Culture : There is also the ever-present political and cultural landmine, when anyone with a credit card can surf the web site of a public cloud vendor and dial up terafl ops of cloud capacity, how does IT maintain control of its application architecture? We have seen that cloud services are offered with a credit card. When IT power becomes economical and easily accessed, it's control over its domestic customers can be liquefied.

The Business View: Enterprises around the world have invested trillions of dollars in technology, hoping to improve their execution potential, drive productivity, improve profitability and attain continued competitive advantage. Some have been more successful than others in getting the predictable returns from their technology investments but few, if any, have been able to recognize the full potential of their investments. In reality, many enterprise's IT organizations have developed in complexity as well as in size and are proving to become quite uncontrollable—a drain on their business margin structures and some are even viewed as inhibitors for sustaining the ever-changing needs of business.

Migrating to the Cloud: Deployment Considerations, The Process: Key Stages in Migrating to the Cloud,

Cloud migration process can be divided into three areas: Plan , Execute and Monitor

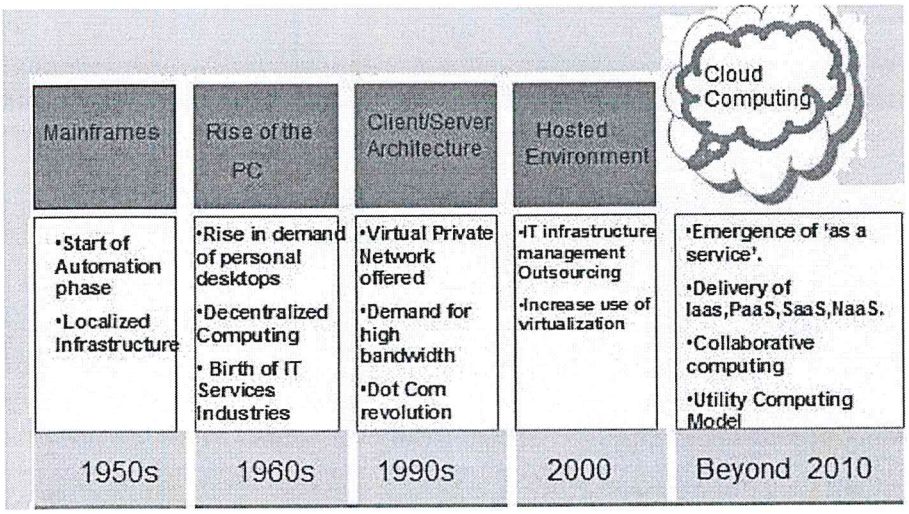
Section - C **(1x10=10)**

(Answer any ONE question)

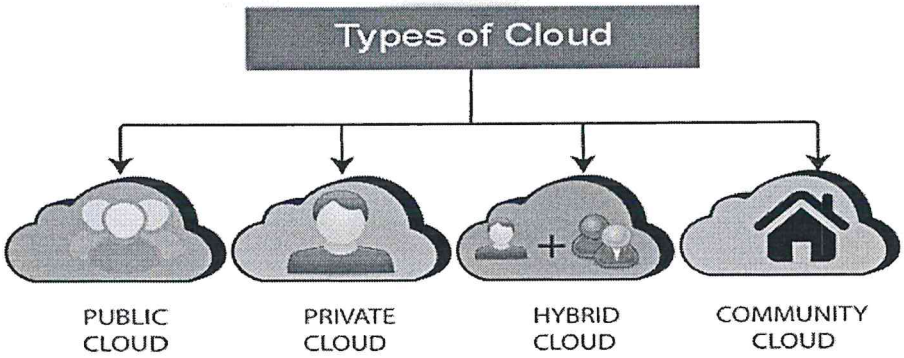
CO3 BL2 10. Describe the history of cloud computing.

Cloud computing is believed to have been invented by **Joseph Carl Robnett Licklider** in the 1960s with his work on ARPANET to connect people and data from anywhere at any time. Cloud computing comprises of various phases, which include grid and utility computing, application service providers (ASP) and Software as a Service (SaaS). Though the concept of delivering computing resources through a universal network was started in the 1960s, intergalactic computer network was introduced by J.C.R. Licklider. His dream was for everyone on the earth to be connected with anyone and be able to access programs and data at any location from any place. In 1960, the famous scientist John McCarthy predicts that the computation being available as pubic service. In 1960, the cloud computing evolved along with numbers of lines, Web 2.0 being the most recent development. Salesforce.com was the first cloud computing to have arrived in the 1999, which pioneered the idea of delivering enterprise applications through a simple website. The concepts behind the cloud computing are not new, whereas all these concepts are really.

It was in the late 1990s that companies such as Sun Microsystems decided to introduce the concept called 'the network is the computer'. The idea that Oracle founder Larry Ellison stated was as follows 'all these ideas were indeed profound but they never failed with consumers, who were looking for more complete personal computer solutions specializing with, some storage capacity availabilities'. As of now, the personal computer is not a dummy terminal. In reality, the rise of the Internet, in the mid 1990s, changed the usage of computers and information distribution. With the idea of utility computing, Amazon began to establish and control server farms, to offer apps to their buyers. Essentially, Amazon is far from being a company that specializes in retail. Its assistance to cloud computing will be discussed shortly in a profile of companies using cloud technology, but it is clear to any IT expert that Amazon is the first company that built on the basics of technical innovation, particularly after the dot-com bubble time



CO5 BL2 11. Explain the types of cloud computing.



4 types of cloud that you can deploy according to the organization's needs:

Parameter	Public Cloud	Private Cloud	Hybrid Cloud	Community Cloud
Host	Service provider	Enterprise (Third party)	Enterprise (Third party)	Community (Third party)
Users	General public	Selected users	Selected users	Community members
Access	Internet	Internet, VPN	Internet, VPN	Internet, VPN
Owner	Service provider	Enterprise	Enterprise	Community

Public Cloud

Public cloud is **open to all** to store and access information via the Internet using the pay-per-usage method. In public cloud, computing resources are managed and operated by the Cloud Service Provider (CSP).

Example: Amazon elastic compute cloud (EC2), IBM SmartCloud Enterprise, Microsoft, Google App Engine, Windows Azure Services Platform.

Private Cloud

Private cloud is also known as an **internal cloud** or **corporate cloud**. It is used by organizations to build and manage their own data centers internally or by the third party. It can be deployed using Opensource tools such as Openstack and Eucalyptus.

Based on the location and management, National Institute of Standards and Technology (NIST) divide private cloud into the following two parts-

- On-premise private cloud
- Outsourced private cloud

Hybrid Cloud

Hybrid Cloud is a combination of the public cloud and the private cloud. we can say:

Hybrid Cloud = Public Cloud + Private Cloud

Hybrid cloud is partially secure because the services which are running on the public cloud can be accessed by anyone, while the services which are running on a private cloud can be accessed only by the organization's users.

Example: Google Application Suite (Gmail, Google Apps, and Google Drive), Office 365 (MS Office on the Web and One Drive), Amazon Web Services.

Community Cloud

Community cloud allows systems and services to be accessible by a group of several organizations to share the information between the organization and a specific community. It is owned, managed, and operated by one or more organizations in the community, a third party, or a combination of them.

Example: Health Care community cloud

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SRM ARTS AND SCIENCE COLLEGE

I - UNIT TEST, JANUARY 2023

DEPARTMENT OF COMPUTER SCIENCE

Date : 01-03-2023 **Duration : 1 Hr** **Class : III BSc CS - I BATCH**

Subject Name & Code: CLOUD COMPUTING **Max : 25 Marks**

SECTION – A

Answer any FIVE Questions **(5 x 2 = 10)**

CO	5	**BL**	B4	1. Analyze the Cloud Computing
CO	2	**BL**	B1	2. Identify Facebook
CO	6	**BL**	B2	3. Classify the cloud service of SaaS.
CO	5	**BL**	B4	4. Categorize Salesforce.com
CO	3	**BL**	B1	5. List the popular Web Mail Services
CO	2	**BL**	B1	6. Identify twitter
CO	3	**BL**	B1	7. List out the types of Services.

SECTION – B

Answer any ONE Question **(1 x 5 = 5)**

CO	4	**BL**	B2	8. Describe the components of cloud computing.
CO	5	**BL**	B4	9. Differentiate Grid computing and Cloud computing

SECTION – C

Answer any ONE Question **(1 x 10 = 10)**

CO	6	**BL**	B2	10. Classify the characteristic of cloud computing
CO	1	**BL**	B5	11. Briefly summarize the architecture of Cloud Computing

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Answer Key

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I - UNIT TEST, JANUARY 2023
DEPARTMENT OF COMPUTER SCIENCE

Date : 01:03:2023 **Duration : 1 Hr** **Class : III BSc CS I & II**

Subject Name & Code: CLOUD COMPUTING **Max : 25 Marks**

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1. Analyze the Cloud Computing

   Ans: Cloud Computing is the delivery of computing services such as servers, storage, databases, networking, software, analytics, intelligence, and more, over the Cloud (Internet).

2. Identify Facebook

   Facebook is a **social networking website** which allows active users to share files, photos, videos, status, more to their friends, relatives, and business partners using the cloud storage system.

3. Classify the cloud service of SaaS.

   Ans:SaaS(Software as a Service) is also known as "**On-Demand Software**". It is a software distribution model in which services are hosted by a cloud service provider.

4. Categorize Salesforce.com

   Ans:, **Salesforce.com** *started delivering of applications to users using a simple website.*

5. List the popular Web Mail Services.

   - Gmail. Gmail is the most used and popular email service provider with over 1.2 billion users all around the world. ...
   - Outlook. Outlook was initially founded as Hotmail by Microsoft. ...
   - AOL Mail. ...
   - 4. Yahoo Mail. ...
   - iCloud Mail. ...
   - ProtonMail. ...
   - Zoho Mail. ...
   - Yandex Mail.

Answer Key

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DEPARTMENT OF COMPUTER SCIENCE

Date : **Duration : 1 Hr** **Class : III BSc CS I & II**

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   - 4. Yahoo Mail. ...
   - iCloud Mail. ...
   - ProtonMail. ...
   - Zoho Mail. ...

- Yandex Mail.

6. Identify twitter

   Twitter is a **social networking** site. It is a **microblogging** system. It allows users to follow high profile celebrities, friends, relatives, and receive news. It sends and receives short posts called tweets

7. List out the types of Services
   - **Software as a Service (SaaS)**
   - **Platform as a Service (PaaS**
   - **Infrastructure as a Service (IaaS)**

PART B – (2 X 5 = 10 Marks)

Answer any TWO questions

8. Describe the components of cloud computing.

There are the following components of cloud computing architecture -

Client Infrastructure

Client Infrastructure is a Front end component. It provides GUI (Graphical User Interface) to interact with the cloud.

Application

The application may be any software or platform that a client wants to access.

Service

A Cloud Services manages that which type of service you access according to the client's requirement.

4. Runtime Cloud

Runtime Cloud provides the **execution and runtime environment** to the virtual machines.

5. Storage

Storage is one of the most important components of cloud computing. It provides a huge amount of storage capacity in the cloud to store and manage data.

6. Infrastructure

It provides services on the **host level, application level**, and **network level**. Cloud infrastructure includes hardware and software components such as servers, storage, network devices, virtualization software, and other storage resources that are needed to support the cloud computing model.

7. Management

Management is used to manage components such as application, service, runtime cloud, storage, infrastructure, and other security issues in the backend and establish coordination between them.

8. Security

Security is an in-built back end component of cloud computing. It implements a security mechanism in the back end.

9. Internet

The Internet is medium through which front end and back end can interact and communicate with each other.

9. Differentiate Grid computing and Cloud computing

Cloud Computing	Grid Computing
Cloud Computing follows client-server computing architecture.	Grid computing follows a distributed computing architecture.
Scalability is high.	Scalability is normal.
Cloud Computing is more flexible than grid computing.	Grid Computing is less flexible than cloud computing.
Cloud operates as a centralized management system.	Grid operates as a decentralized management system.
In cloud computing, cloud servers are owned by infrastructure providers.	In Grid computing, grids are owned and managed by the organization.
Cloud computing uses services like Iaas, PaaS, and SaaS.	Grid computing uses systems like distributed computing, distributed information, and distributed pervasive.
Cloud Computing is Service-oriented.	Grid Computing is Application-oriented.
It is accessible through standard web protocols.	It is accessible through grid middleware.

10. Classify the characteristic of cloud computing

Characteristics of Cloud Computing

The characteristics of cloud computing are given below:

1) Agility

The cloud **works in a distributed computing environment**. It shares resources among users and works very fast.

2) High availability and reliability

The availability of servers is high and more reliable because the **chances of infrastructure failure are minimum.**

3) High Scalability

Cloud offers **"on-demand" provisioning of resources on a large scale,** without having engineers for peak loads.

4) Multi-Sharing

With the help of cloud computing, **multiple users and applications can work more efficiently** with cost reductions by sharing common infrastructure.

5) Device and Location Independence

Cloud computing enables the users to access systems using a web browser regardless of their location or what device they use e.g. PC, mobile phone, etc. **As infrastructure is off-site** (typically provided by a third-party) **and accessed via the Internet, users can connect from anywhere.**

6) Maintenance

Maintenance of cloud computing applications is easier, since they **do not need to be installed on each user's computer and can be accessed from different places.** So, it reduces the cost also.

7) Low Cost

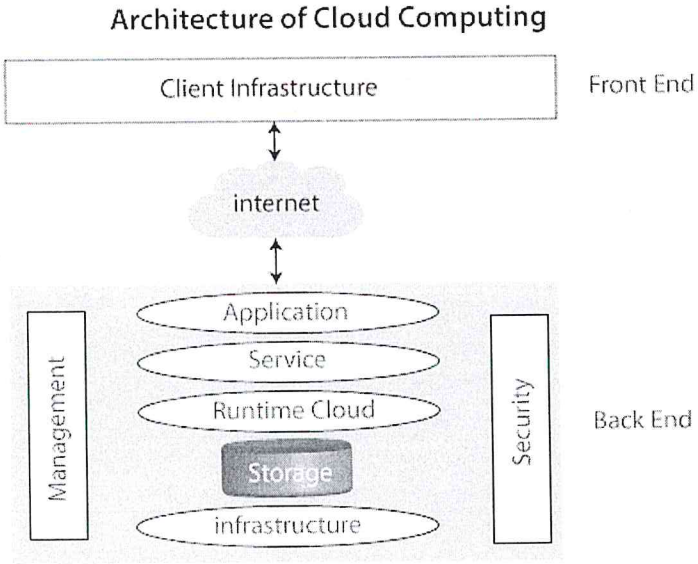
By using cloud computing, the cost will be reduced because to take the services of cloud computing, **IT company need not to set its own infrastructure** and pay-as-per usage of resources.

8) Services in the pay-per-use mode

Application Programming Interfaces **(APIs) are provided to the users so that they can access services on the cloud** by using these APIs **and pay the charges as per the usage of services.**

11. **Briefly summarize the architecture of Cloud Computing**

12.



Front End

The front end is used by the client. It contains client-side interfaces and applications that are required to access the cloud computing platforms. The front end includes web servers (including Chrome, Firefox, internet explorer, etc.), thin & fat clients, tablets, and mobile devices.

Back End

The back end is used by the service provider. It manages all the resources that are required to provide cloud computing services. It includes a huge amount of data storage, security mechanism, virtual machines, deploying models, servers, traffic control mechanisms, etc.

Note: Both front end and back end are connected to others through a network, generally using the internet connection.

Components of Cloud Computing Architecture

There are the following components of cloud computing architecture -

1. Client Infrastructure

Client Infrastructure is a Front end component. It provides GUI (Graphical User Interface) to interact with the cloud.

2. Application

The application may be any software or platform that a client wants to access.

3. Service

A Cloud Services manages that which type of service you access according to the client's requirement.

Cloud computing offers the following three type of services:

i. Software as a Service (SaaS) – It is also known as **cloud application services.** Mostly, SaaS applications run directly through the web browser means we do not require to download and install these applications. Some important example of SaaS is given below –

Example: Google Apps, Salesforce Dropbox, Slack, Hubspot, Cisco WebEx.

ii. Platform as a Service (PaaS) – It is also known as **cloud platform services.** It is quite similar to SaaS, but the difference is that PaaS provides a platform for software creation, but using SaaS, we can access software over the internet without the need of any platform.

Example: Windows Azure, Force.com, Magento Commerce Cloud, OpenShift.

iii. Infrastructure as a Service (IaaS) – It is also known as **cloud infrastructure services.** It is responsible for managing applications data, middleware, and runtime environments.

Example: Amazon Web Services (AWS) EC2, Google Compute Engine (GCE), Cisco Metapod.

4. Runtime Cloud

Runtime Cloud provides the **execution and runtime environment** to the virtual machines.

5. Storage

Storage is one of the most important components of cloud computing. It provides a huge amount of storage capacity in the cloud to store and manage data.

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Date: 02.03.2023 **Class: III B.Sc. (CS)**
Subject Name & Code: Internet of Things **Duration: 1 Hour**

Section A (5 x 2 = 10)

(Answer any **FIVE** questions)

CO1	BL1	1. Define IoT.
CO1	BL3	2. Illustrate the challenges from a societal and policy perspective.
CO1	BL6	3. Design the Innovation Matrix of IERC.
CO3	BL2	4. Indicate the part of a future IoT Ecosystem.
CO2	BL6	5. Create the convergence of IoT.
CO3	BL1	6. List the technologies for the Internet of Things.
CO3	BL2	7. Identify the future value chains of the European economy.

Section B (1 x 5 = 5)

(Answer any **ONE** question)

CO3	BL2	8. Summarize the factors, which limit the full exploitation of the IoT.
CO2	BL1	9. List the foundation for a step forward to the Internet of Things.

Section C (1 x 10 = 10)

(Answer any **ONE** question)

CO1	BL2	10. Explain the Internet of Things Vision.
CO5	BL2	11. Explain the IoT Strategic Research and Innovation Directions.

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Department of Computer Science
Answer Key

Date: 02.03.2023 **Class: III B.Sc. (CS)**
Subject Name & Code: Internet of Things **Duration: 1 Hour**

Section A

1. Define IoT.

   Internet of Things (IoT) is a concept and a paradigm that considers pervasive presence in the environment of a variety of things/objects that through wireless and wired connections and unique addressing schemes are able to interact with each other and cooperate with other things/objects to create new applications/services and reach common goals.

2. Challenges from a societal and policy perspective remain equally important, in particular the following

   - Fostering of a consistent, interoperable and accessible Internet of Things across sectors, including standardisation.
   - Directing effort and attention to important societal application areas such as health and environment, including focus on low energy consumption.
   - Offering orientation on security, privacy, trust and ethical aspects in the scope of current legislation and development of robust and future-proof general data protection rules.
   - Providing resources like spectrum allowing pan-European service provision and removal of barriers such as roaming.
   - Maintaining the Internet of Things as an important subject for international cooperation both for sharing best practises and developing coherent strategies.

3. Innovation Matrix of IERC.

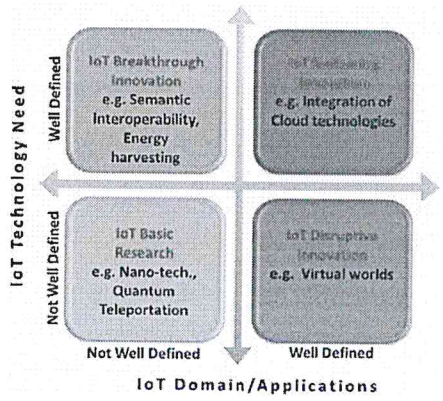

Fig. 1.2 Innovation Matrix of IERC — Internet of Things European Research Cluster.

4. Part of a future IoT Ecosystem:

   Public safety, Energy & environmental protection, Agriculture and Tourism as part of a future IoT Ecosystem have acquired high attention.

5. convergence create

   The convergence creates the open, global network connecting people, data, and things. This convergence leverages the cloud to connect intelligent things that sense and transmit a broad array of data, helping creating services that would not be obvious without this level of connectivity and analytical intelligence.

6. technologies for the Internet of Things can be grouped into three categories.

   (i) technologies that enable "things" to acquire contextual information, (ii) technologies that enable "things" to process contextual information, and (iii) technologies to improve security and privacy.

7. future value chains of the European economy:

   - Nanotechnologies
   - Micro and Nano electronics Photonics
   - Biotechnology
   - Advanced Materials
   - Advanced Manufacturing Systems

Section B

8. factors, which limit the full exploitation of the IoT.

   a. No clear approach for the utilisation of unique identifiers and numbering spaces for various kinds of persistent and volatile objects at a global scale.

   b. No accelerated use and further development of IoT reference architectures like for example the Architecture Reference Model (ARM) of the project IoT-A.

   c. Less rapid advance in semantic interoperability for exchanging sensor information in heterogeneous environments.

   d. Difficulties in developing a clear approach for enabling innovation, trust and ownership of data in the IoT while at the same time respecting security and privacy in a complex environment.

   e. Difficulties in developing business which embraces the full potential of the Internet of Things.

   f. Missing large-scale testing and learning environments, which both facilitate the experimentation with complex sensor networks and stimulate innovation through reflection and experience.

   g. Only partly deployed rich interfaces in light of a growing amount of data and the need for context-integrated presentation.

h. Practical aspects like substantial roaming-charges for geographically large-range sensor applications and missing technical availability of instant and reliable network connectivity.

9. the following will likely provide the foundation for a step forward to the Internet of Things:
    a. Coherence of object capabilities and behaviour: the objects in the Internet of Things will show a huge variety in sensing and actuation capabilities, in information processing functionality and their time of existence. In either case it will be necessary to generally apprehend object as entities with a growing "intelligence" and patterns of autonomous behaviour.
    b. Coherence of application interactivity: the applications will increase in complexity and modularisation, and boundaries between applications and services will be blurred to a high degree. Fixed programmed suites will evolve into dynamic and learning application packages. Besides technical, semantic interoperability will become the key for context aware information exchange and processing.
    c. Coherence of corresponding technology approaches: larger concepts like Smart Cities, Cloud computing, Future Internet, robotics and others will evolve in their own way, but because of complementarity also partly merge with the Internet of Things. Here a creative view on potential synergies can help to develop new ecosystems.
    d. Coherence of real and virtual worlds: today real and virtual worlds are perceived as two antagonistic conceptions. At the same time virtual worlds grow exponentially with the amount of stored data and ever increasing network and information processing capabilities. Understanding both paradigms as complementary and part of human evolution could lead to new synergies and exploration of living worlds

Section C

10. Internet of Things Vision:

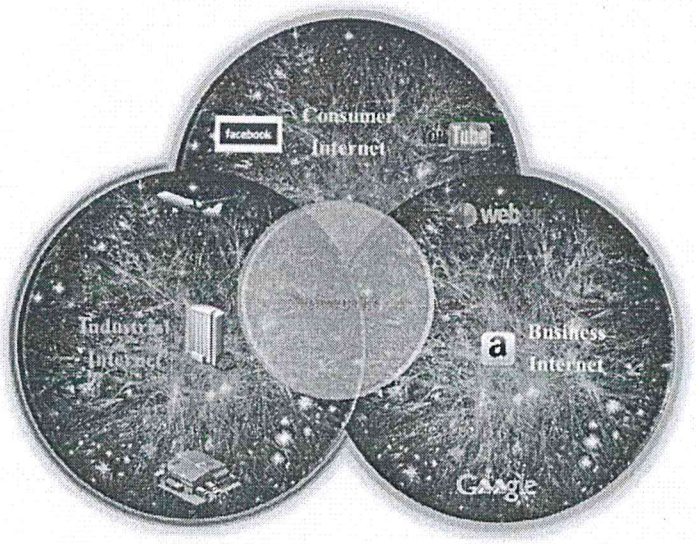

Fig. 2.1 Convergence of consumer, business and industrial internet.

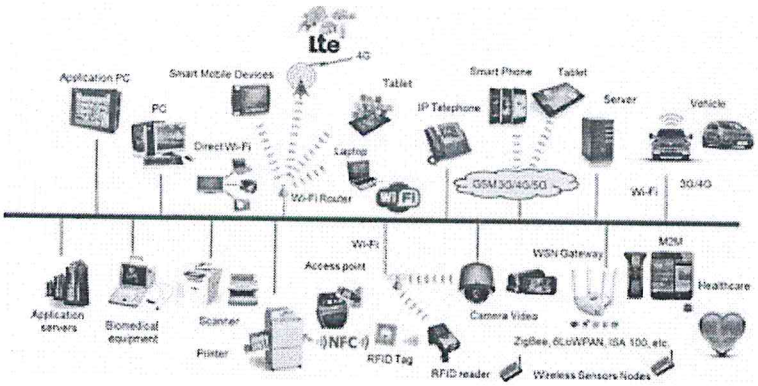

Fig. 2.4 IP convergence.

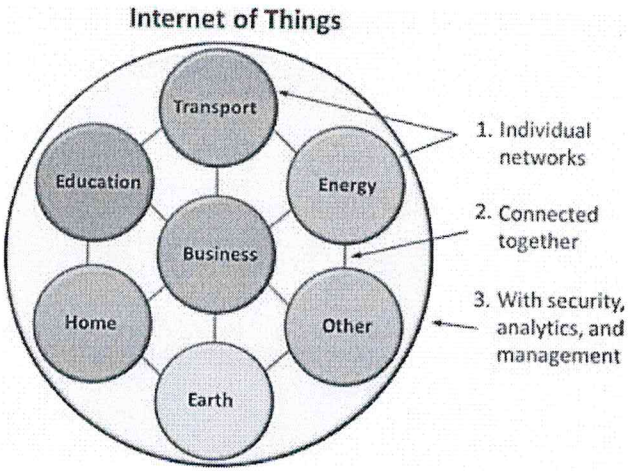

Fig. 2.5 IoT viewed as a network of networks.
(*Source*: Cisco IBSG, April 2011).

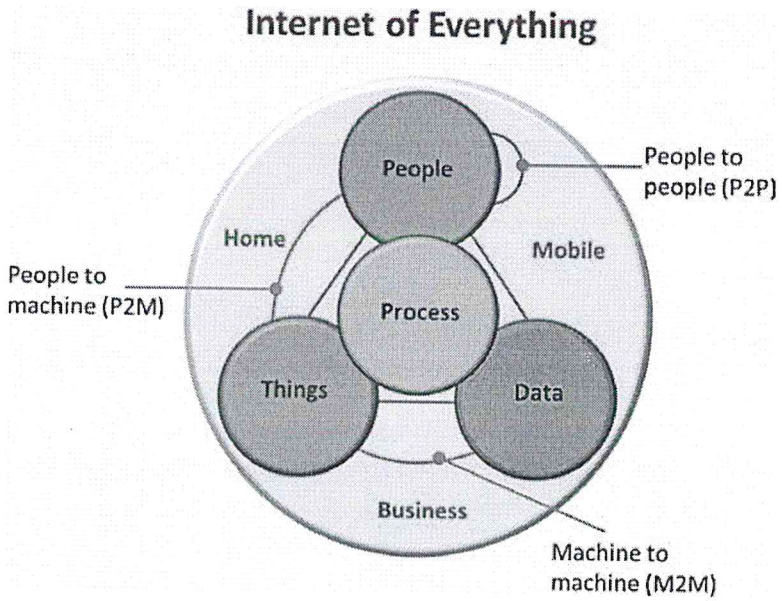

Fig. 2.6 Internet of everything.
(*Source*: Cisco).

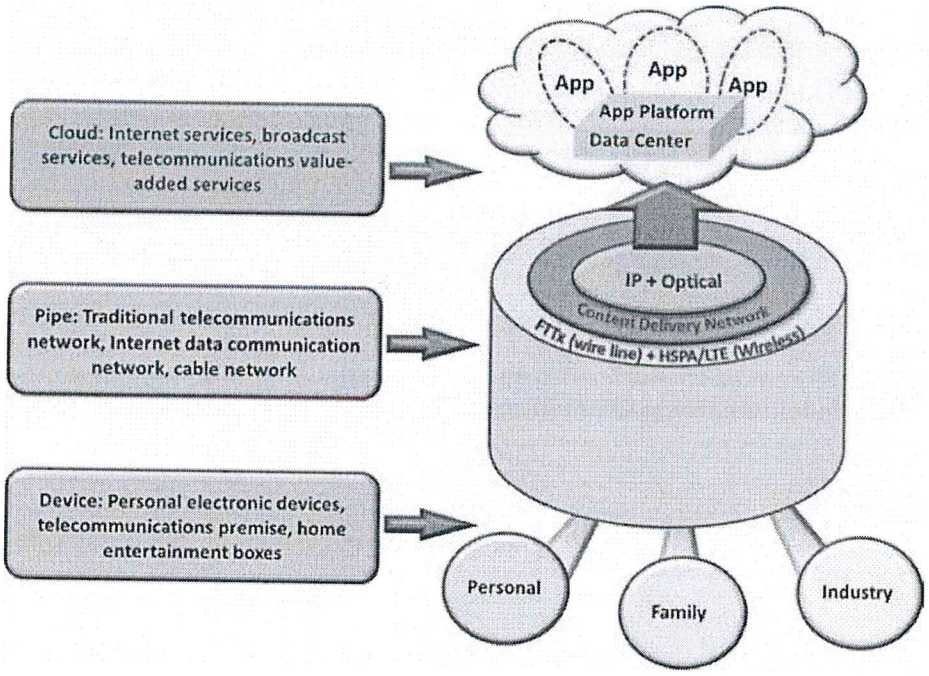

Fig. 2.7 Factors driving the convergence and contributing to the integration and transformation of cloud, pipe, and device technologies.

11. IoT Strategic Research and Innovation Directions:

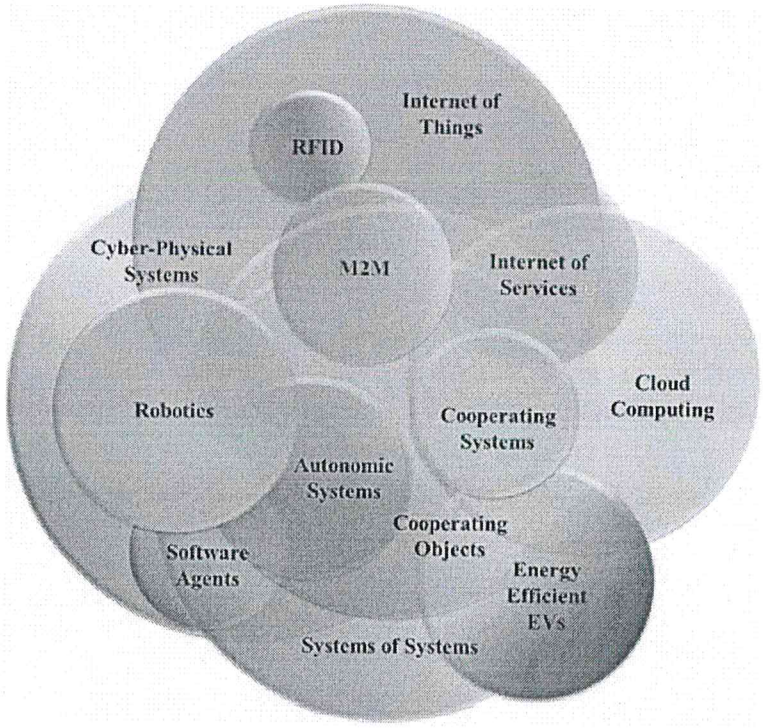

Fig. 2.8 Technology convergence.

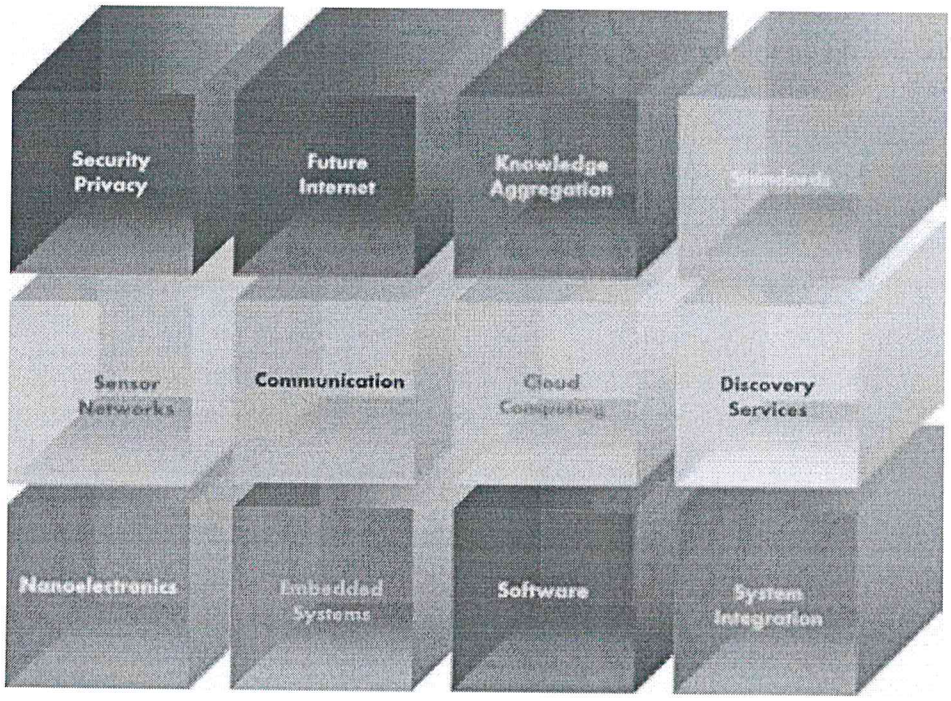

Fig. 2.9 Internet of Things — enabling technologies.

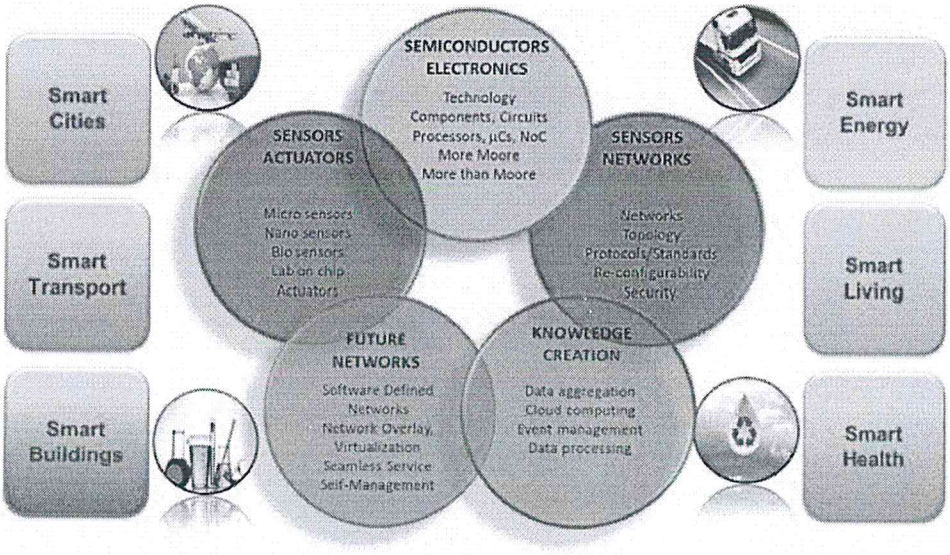

Fig. 2.10 Internet of Things — smart environments and smart spaces creation.

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Department of Computer Science

Date: 27-02-2023 **Duration: 1 Hour** **Class: I M.Sc. (CS)**
Subject Name & Code: Machine Learning

Section A **(5 x 1 = 5)**
(Answer any FIVE questions)

CO1	BL1	1. Define Regression.
CO3	BL1	2. Differentiate Variance and Bias.
CO1	BL1	3. Write about vector space
CO2	BL2	4. Define Hypothesis and Model.
CO6	BL1	5. Differentiate multiclass and multilevel classification
CO2	BL1	6. State the application of Reinforcement Learning.
CO2	BL6	7. Write about the correlation and its types.

Section B **(2 x 5 = 10)**
(Answer any TWO questions)

CO3	BL5	8. Summarize about Pearson correlation.
CO1	BL6	9. Write about Decision Tree.
CO1	BL2	10. Discuss about the application of Machine Learning.
CO3	BL2	11. Explain the types of hypothesis.

Section C **(1 x 10 = 10)**
(Answer any ONE question)

CO1	BL2	12. Discuss about the learning paradigms in Machine Learning.
CO2	BL2	13. Explain about ID3 algorithm with example.

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Department of Computer Science

Subject Name & Code: Machine Learning **Class: I M.Sc. (CS)**

ANSWER KEY

Section A **(5 x 1 = 5)**
(Answer any FIVE questions)

1. Define Regression.

Regression is a technique for investigating the relationship between independent variables or features and a dependent variable or outcome

2. Differentiate Variance and Bias.

Basis of comparison	Bias	Variance
Definition	When an algorithm is employed in a machine learning model and it does not fit well, a phenomenon known as bias can develop. Bias arises in several situations.	The term "variance" refers to the degree of change that may be expected in the estimation of the target function as a result of using multiple sets of training data.
Values	The disparity between the values that were predicted and the values that were actually observed is referred to as bias.	A random variable's variance is a measure of how much it varies from the value that was predicted for it.
Data	The model is incapable of locating patterns in the dataset that it was trained on, and it produces inaccurate results for both seen and unseen data.	The model recognizes the majority of the dataset's patterns and can even learn from the noise or data that isn't

3. Write about vector space

Vector spaces are used extensively in machine learning to represent data, features and models. Many machine learning algorithms operate on vectors or matrices, which can be viewed as collection of vectors or vector space.

4. Define Hypothesis and Model.

Hypothesis (h): It is defined as the approximate function that best describes the target in supervised machine learning algorithms. It is primarily based on data as well as bias and restrictions applied to data.

Model: A machine learning model is a file that has been trained to recognize certain types of patterns. we can train a model over a set of data, providing it an algorithm that it can use to reason over and learn from those data

5. Differentiate multiclass and multilevel classification

In multi-class classification, each input will have only one output class, but in multi-label classification, each input can have multi-output classes.

6. State the application of Reinforcement Learning.

Text summarization, question answering, translation, dialogue generation etc

7. Write about the correlation and its types.

Pearson Correlation, Spearman's Rank Correlation, Kendall Rank Correlation, Point Biserial Correlation.

Section B **(2 x 5 = 10)**

(Answer any TWO questions)

8. Summarize about Pearson correlation.

Pearson *r* correlation is the most widely used correlation statistic to measure the degree of the relationship between linearly related variables. For example, in the stock market, if we want to measure how two stocks are related to each other, Pearson *r* correlation is used to measure the degree of relationship between the two. The point-biserial correlation is conducted with the Pearson correlation formula except that one of the variables is dichotomous. The following formula is used to calculate the Pearson *r* correlation:

$$r_{xy} = \frac{n\sum x_i y_i - \sum x_i \sum y_i}{\sqrt{n\sum x_i^2 - (\sum x_i)^2}\sqrt{n\sum y_i^2 - (\sum y_i)^2}}$$

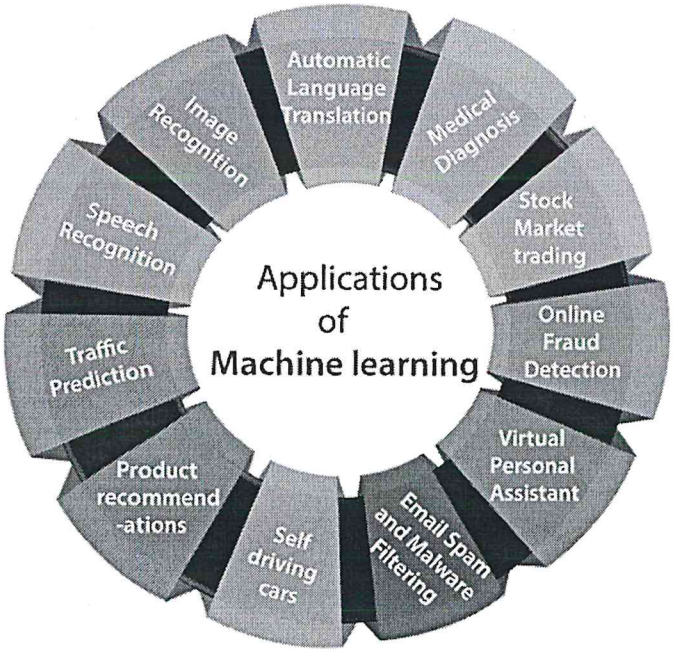
rxy = Pearson r correlation coefficient between x and y
n = number of observations
xi = value of x (for ith observation)
yi = value of y (for ith observation)

9. Write about Decision Tree.

Decision Tree is a supervised learning technique that can be used for both classification and Regression problems, but mostly it is preferred for solving Classification problems. It is a tree-structured classifier, where internal nodes represent the features of a dataset, branches represent the decision rules and each leaf node represents the outcome.

- In a Decision tree, there are two nodes, which are the Decision Node and Leaf Node. Decision nodes are used to make any decision and have multiple branches, whereas Leaf nodes are the output of those decisions and do not contain any further branches.
- The decisions or the test are performed on the basis of features of the given dataset.

10. Discuss about the application of Machine Learning.



11. Explain the types of hypothesis.

Hypothesis in Machine Learning is used when in a Supervised Machine Learning, we need to find the function that best maps input to output. This can also be called function approximation because we are approximating a target function that best maps feature to the target.

1. Hypothesis(h): A Hypothesis can be a single model that maps features to the target, however, may be the result/metrics. A hypothesis is signified by "**h**".

2. Hypothesis Space(H): A Hypothesis space is a complete range of models and their possible parameters that can be used to model the data. It is signified by "**H**". In other words, the Hypothesis is a subset of Hypothesis Space.

Section C **(1 x 10 = 10)**

(Answer any ONE question)

12. Discuss about the learning paradigms in Machine Learning.

Machine learning is commonly separated into three main learning paradigms: supervised learning, unsupervised learning and reinforcement learning.

Supervised Learning

Supervised learning is a machine learning task in which a function maps the input to output data using the provided input-output pairs.

Unsupervised Learning

In this type of learning paradigm, the computer is provided with just the input to develop a learning pattern. It is basically learning from no results.

Reinforcement Learning

Reinforcement Learning

Is a type of Machine Learning, and thereby also a branch of Artificial Intelligence. It allows machines and software agents to automatically determine the ideal behavior within a specific context, in order to maximize its performance.

13. Explain about ID3 algorithm with example.

D3 stands for **Iterative Dichotomiser 3**. It is a classification algorithm that follows a greedy approach by selecting a best attribute that yields maximum Information Gain(IG) or minimum Entropy(H).

Mathematical expression for Entropy:-

$H(D) = \sum_{x \subset X} (- p(x) \log_2 (x))$

Where,

D- is the dataset

X- is the set of classes in D

p(x)- is the probability of x in D.

Mathematical expression for Information Gain:-

$I(A,D) = H(D) - \sum_{y \subset Y} (- p(y) H(y))$

H(D)- is the entropy of D

Y- is the subset created by splitting D at node A.

p(y)- is the probability of y in the set D.

H(y) – is the entropy of subset y.

Procedure of ID3 Algorithm

1. Calculate entropy for the dataset.
2. For each node
    1. Calculate entropy for all its categorical values.
    2. Calculate information gain for the node.
3. Find the node with highest information gain at a particular level.
4. Repeat steps from 1 to 3 till we reach the leaf node and have created our decision tree.

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I UNIT TEST- DEC 2022
Department of Computer Science

Date : 28-02-2023 **Duration : I Hour** **Class :I MSC CS**
Subject Name &Code :ADVANCED NETWORKS

Section A (5 x 1 = 5)

(Answer any **FIVE** questions)

CO4	BL6	1.Write the expansion of ARQ in reliable transmission.
CO5	BL1	2.List the importance of acknowledgement and Timeout.
CO5	BL1	3. What are frames.
CO2	BL4	4.Distinguish Network and Internet .
CO5	BL1	5.What is Internetworking in Computer Networks?
CO3	BL6	6.Write about Multicasting.
CO4	BL1	7.Define the term - VPN.

Section B (2 x 5 = 10)

(Answer any **TWO** questions)

CO2	BL6	8.Discuss about Wireless networks.
CO1	BL1	9. Explain Multi access Network.
CO3	BL4	10.Describe about Routing among Mobile devices.
CO5	BL2	11. Explain Global Internet.

Section C (1 x 10 = 10)

(Answer any **ONE** question)

CO4	BL2	11.Describe three different ARQ algorithms.
CO5	BL3	12.Discuss about Multi protocol label Switching.

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Department of Computer Science

Date : 28-02-2023 **Duration : 1Hour** **Class :I MSC CS**
Subject Name &Code : ADVANCED NETWORKS

Section A (5 x 1 = 5)
(Answer any **FIVE** questions)

CO4 BL6 1.Write the expansion of ARQ in reliable transmission.

Automatic Repeat Request (ARQ) is an error-control mechanism for data transmission which uses acknowledgements (or negative acknowledgements) and timeouts to achieve reliable data transmission over an unreliable communication link.

CO5 BL1 2.List the importance of acknowledgement and Timeout.

An acknowledgment (ACK for short) is a small control frame that a protocol sends back to its peer saying that it has received an earlier frame. The receipt of an acknowledgment indicates to the sender of the original frame that its frame was successfully delivered. If the sender does not receive an acknowledgment after a reasonable amount of time, then it *retransmits* the original frame. This action of waiting a reasonable amount of time is called a *timeout*.

CO5 BL1 3. What are frames.

In networking, a frame is a unit of data. A frame works to help identify data packets used in networking and telecommunications structures. Frames also help to determine how data receivers interpret a stream of data from a source.

CO2 BL4 4.Distinguish Network and Internet .

A network is a collection of two or multiple connected computer systems that may share resources, such as an internet connection, an app, a printer, etc. In contrast, the internet is a network of interconnected devices that are spread around the globe.

CO5 BL1 5.What is Internetworking in Computer Networks?

In internetworking, routers have knowledge of each other's address and addresses beyond them. Internetworking primarily consists of three units: Extranet, Internet, and Intranet.

CO3 BL6 6.Write about Multicasting.

Multicast routing is a networking method for efficient distribution of one-to-many traffic. A multicast source, such as a live video conference, sends traffic in one stream to a multicast group. The multicast group contains receivers such as computers, devices, and IP phones.

CO4 BL1 7.Define the term - VPN.

A virtual private network, or VPN, is an encrypted connection over the Internet from a device to a network. The encrypted connection helps ensure that sensitive data is safely transmitted.

Section B (2 x 5 = 10)

(Answer any **TWO** questions)

CO2 BL6 8.Discuss about Wireless networks.

Wireless media are also inherently multi-access; it's difficult to direct your radio transmission to just a single receiver or to avoid receiving radio signals from any transmitter with enough power in your neighborhood. Hence, media access control is a central issue for wireless links. And, because it's hard to control who receives your signal when you transmit over the air, issues of eavesdropping may also have to be addressed.

	Bluetooth (802.15.1)	**Wi-Fi (802.11)**	**4G Cellular**
Typical link length	10 m	100 m	Tens of kilometers
Typical data rate	2 Mbps (shared)	150-450 Mbps	1-5 Mbps
Typical use	Link a peripheral to a computer	Link a computer to a wired base	Link mobile phone to a wired tower
Wired technology analogy	USB	Ethernet	PON

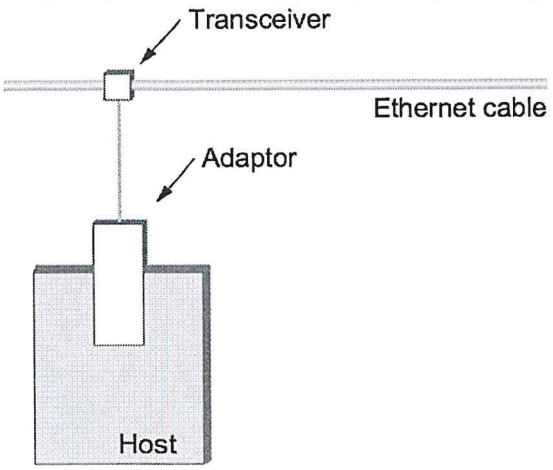
CO1 BL1 9. Explain Multi access Network.

The Ethernet is a multiple-access network, meaning that a set of nodes sends and receives frames over a shared link. You can, therefore, think of an Ethernet as being like a bus that has multiple stations plugged into it. The "carrier sense" in CSMA/CD means that all the nodes can distinguish between an idle and a busy link, and "collision detect" means that a node listens as it transmits and can therefore detect when a frame it is transmitting has interfered (collided) with a frame transmitted by another node.

Physical properties

Ethernet segments were originally implemented using coaxial cable of length up to 500 m. (Modern Ethernets use twisted copper pairs, usually a particular type known as "Category 5," or optical fibers, and in some cases can be quite a lot longer than 500 m.) This cable was similar to the type used for cable TV. Hosts connected to an Ethernet segment by tapping into

it. A *transceiver*, a small device directly attached to the tap, detected when the line was idle and drove the signal when the host was transmitting. It also received incoming signals. The transceiver, in turn, connected to an Ethernet adaptor, which was plugged into the host. This configuration is shown below



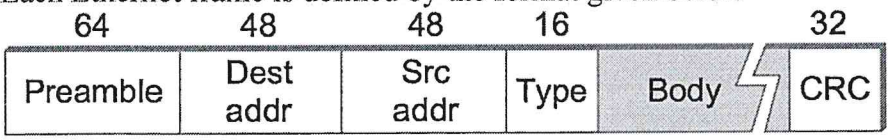
Multiple Ethernet segments can be joined together by *repeaters* (or a multi-port variant of a repeater, called a *hub*). A repeater is a device that forwards digital signals, much like an amplifier forwards analog signals; repeaters do not understand bits or frames. No more than four repeaters could be positioned between any pair of hosts, meaning that a classical Ethernet had a total reach of only 2500 m.

Access Control

The algorithm that controls access to a shared Ethernet link is called the Ethernet's *media access control* (MAC). It is typically implemented in hardware on the network adaptor.

Frame Format

Each Ethernet frame is defined by the format given below



Ethernet frame format

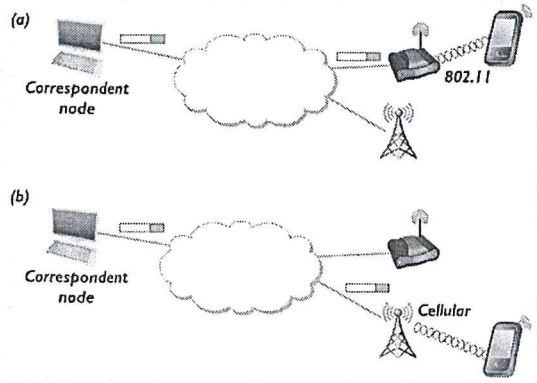
CO3 BL4 10.Describe about Routing among Mobile devices.

It probably should not be a great surprise to learn that mobile devices present some challenges for the Internet architecture. The Internet was designed in an era when computers were large, immobile devices, and, while the Internet's designers probably had some notion that mobile devices might appear in the future, it's fair to assume it was not a top priority to accommodate them. Today, of course, mobile computers are everywhere, notably in the form of laptops and smart phones, and increasingly in other forms, such as drones. In this section,

we will look at some of the challenges posed by the appearance of mobile devices and some of the current approaches to accommodating them.

challenges for Mobile Networking

It is easy enough today to turn up in a wireless hotspot, connect to the Internet using 802.11 or some other wireless networking protocol, and obtain pretty good Internet service. One key enabling technology that made the hotspot feasible is DHCP. You can settle in at a coffee shop, open your laptop, obtain an IP address for your laptop, and get your laptop talking to a default router and a Domain Name System (DNS) server, and for a broad class of applications you have everything you need.

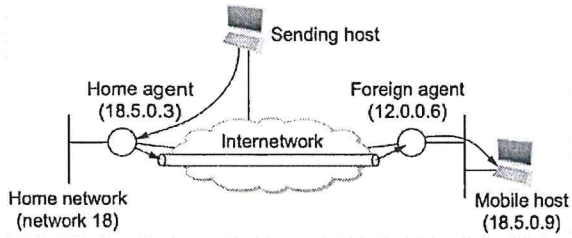


There are many different ways to tackle the problem just described, and we will look at some of them below. Assuming that there is some way to redirect packets so that they come to your new address rather than your old address, the next immediately apparent problems relate to security. For example, if there is a mechanism by which I can say, "My new IP address is X," how do I prevent some attacker from making such a statement without my permission, thus enabling him to either receive my packets, or to redirect my packets to some unwitting third party? Thus, we see that security and mobility are quite closely related.

Routing to Mobile Hosts (Mobile IP)

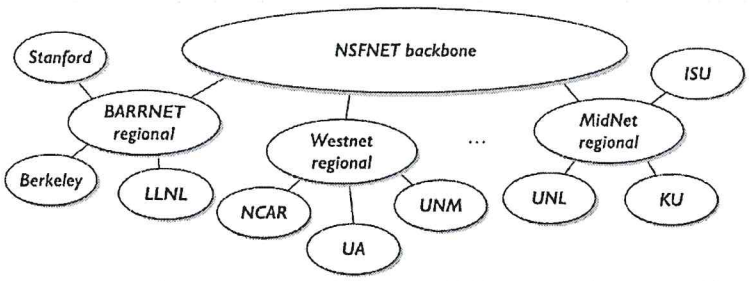
Mobile IP is the primary mechanism in today's Internet architecture to tackle the problem of routing packets to mobile hosts. It introduces a few new capabilities but does not require any change from non-mobile hosts or most routers—thus making it incrementally deployable.

The mobile host is assumed to have a permanent IP address, called its *home address*, which has a network prefix equal to that of its *home network*. This is the address that will be used by other hosts when they initially send packets to the mobile host; because it does not change, it can be used by long-lived applications as the host roams. We can think of this as the long-lived identifier of the host.



CO5 BL2 11. Explain Global Internet.

We say "somewhat" scalable because, even though each router does not need to know about all the hosts connected to the internet, it does, in the model described so far, need to know about all the networks connected to the internet. Today's Internet has hundreds of thousands of networks connected to it (or more, depending on how you count). Routing protocols such as those we have just discussed do not scale to those kinds of numbers. This section looks at a variety of techniques that greatly improve scalability and that have enabled the Internet to grow as far as it has.



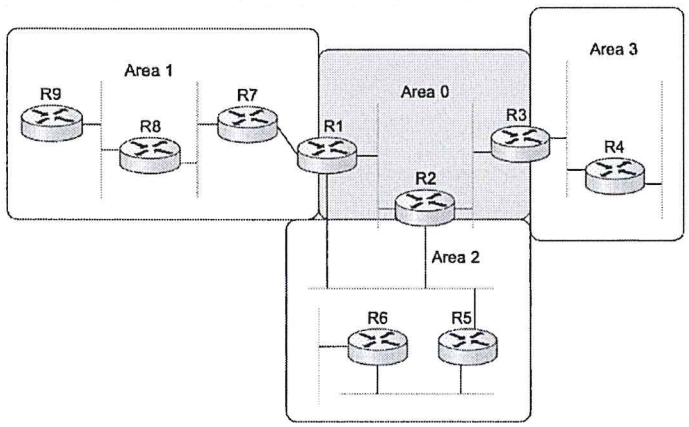
NSFNET gave way to Internet2, which still runs a backbone on behalf of Research and Education institutions in the US (there are similar R&E networks in other countries), but of course most people get their Internet connectivity from commercial providers. Although the detail is not shown in the figure, today the largest provider networks (they are called tier-1) are typically built from dozens of high-end routers located in major meteropolitan areas (colloquially referred to as "NFL cities") connected by point-to-point links (often with 100 Gbps capacity). Similarly, each end-user site is typically not a single network but instead consists of multiple physical networks connected by switches and routers.

Routing Areas

As a first example of using hierarchy to scale up the routing system, we'll examine how link-state routing protocols (such as OSPF and IS-IS) can be used to partition a routing domain into sub domains called *areas*. (The terminology varies somewhat among protocols—we use the OSPF terminology here.) By adding this extra level of hierarchy, we enable single

domains to grow larger without overburdening the routing protocols or resorting to the more complex inter domain routing protocols described later.

An area is a set of routers that are administratively configured to exchange link-state information with each other. There is one special area—the backbone area, also known as area 0. An example of a routing domain divided into areas. Routers R1, R2, and R3 are members of the backbone area. They are also members of at least one non backbone area; R1 is actually a member of both area 1 and area 2. A router that is a member of both the backbone area and a non backbone area is an area border router (ABR). Note that these are distinct from the routers that are at the edge of an AS, which are referred to as As border routers for clarity.



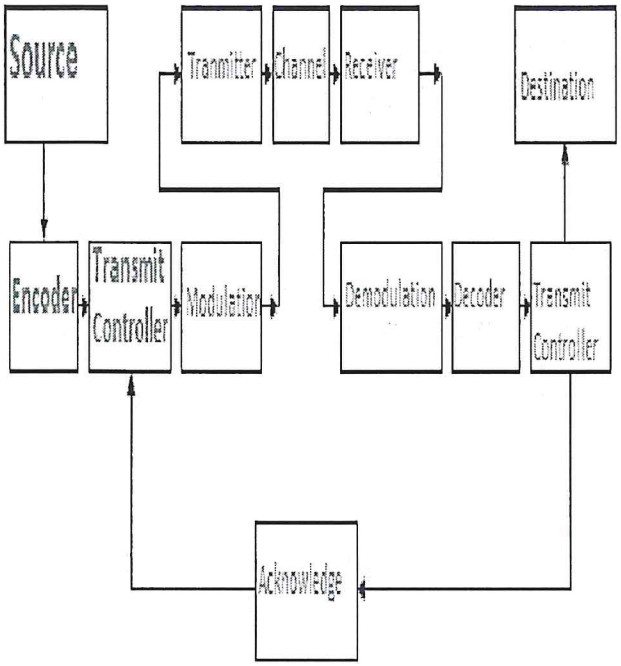
Section C (1 x 10 = 10)

(Answer any **ONE** question)

CO4 BL2 11.Describe three different ARQ algorithms.

ARQ stands for **Automatic Repeat Request** also known as **Automatic Repeat Query**. ARQ is an error-control strategy used in a two-way communication system. It is a group of error-control protocols to achieve reliable data transmission over an unreliable source or service. These protocols reside in Transport Layer and Data Link Layer of the OSI(Open System Interconnection) model . These protocols are responsible for automatic retransmission of packets that are found to be corrupted or lost during the transmission process.

Automatic Repeat Request(ARQ)



Types

There are several types of ways in which these protocols function in the data link layer :

- **Stop And Wait ARQ:**
  Stop and wait ARQ is also referred to as the alternating protocol is a method used in two-way communication systems to send information between two connected devices (sender and a receiver). It is referred to as stop and wait ARQ because the function of this protocol is to send **one frame at a time** . After sending a frame or packet, the sender doesn't send any further packets until it receives an acknowledgement from the receiver. Moreover, the sender keeps a copy of the sent packet. After receiving the desired frame, the receiver sends an acknowledgement. If the acknowledgement does not reach the sender before the specified time, known as the timeout, the sender sends the same packet again. The timeout is reset after each frame transmission. The above scenario depicts a Stop and wait situation, so this control mechanism is termed as Stop and wait ARQ.

- **Go Back-N ARQ:**
  Go-Back-N ARQ is a type of the ARQ protocol, in which the sending process continues to **send several frames or packets even without receiving an acknowledgement**

packet from the receiver. The receiver process keeps track of the sequence number of the next packet it expects to receive and sends that sequence number with every acknowledgement to the sender. The receiver will remove any packet that does not have the desired sequence number it expects and will resend an acknowledgement for the last correct frame. There are only two possibilities that a frame won't match the sequence number: it is either a duplicated frame of an existing frame or an out-of-order frame that needs to be sent later, the receiver recognizes this scenario and sends an acknowledgement signal accordingly. Once the sender has sent all of the frames in its window, it will identify that all of the frames since the first lost frame, and will **go back to the sequence number** of the last acknowledgement signal that it received from the receiver pr and continue the process over again. The only drawback of this type of system is that it results in sending packets multiple times: if any frame was lost or found to be corrupted, then that frame and all following frames in the send window will be re-transmitted.

This protocol is more efficient than Stop and wait ARQ as there is no waiting time.

- **Selective Repeat ARQ/Selective Reject ARQ:**
  Selective Repeat ARQ/Selective Reject ARQ protocol mechanism is similar to the Go-Back-N protocol mechanism but in Selective Repeat ARQ the sending process continues even after a frame is found to be corrupt or lost. This is achieved: the receiver process keeps track of the sequence number of the earliest frame it has not received and sends the respective sequence number with the acknowledgement signal. If a frame is not received at the receiver end, the sender continues to send the succeeding frames until it has emptied its window. once this error-correction process has been done, the process continues where it left off. Unlike, Go back-N protocol this does not send a packet multiple times.

CO5 BL3 12.Discuss about Multi protocol label Switching.

Multi Protocol Label Switching (MPLS) is an IP packet routing technique that routes IP packet through paths via labels instead of looking at complex routing tables of routers. This feature helps in increasing the delivery rate of IP packets.

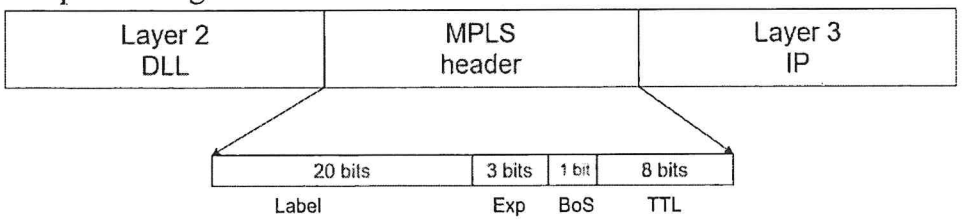
MPLS uses layer 3 service i.e, Internet Protocol, and uses router as forwarding device. The traffic of different customers is separated from each other because MPLS works somewhat like VPN. It does not work like regular VPN that encrypts the data but it ensures packet from one customer cannot be received by another customer. An MPLS header is added to packet that lies between layers 2 and 3. Hence, it is also considers to be *Layer 2.5 protocol.*

MPLS Header –

The MPLS Header is 32 bit long and is divided into four parts –

1. **Label** – This field is 20 bit long and can take value b/w 0 & $2^{20} - 1$.
2. **Exp** – They are 3 bits long and used for *Quality of Service(QoS)*.

3. **Bottom of stack (S)** – It is of size 1 bit. MPLS labels are stacked one over other. If there is only one label remained in MPLS header, then its value is 1 otherwise 0.
4. **Time to Live (TTL)** – It is 8 bit long and its value is decreased by one at each hop to prevent packet to get stuck in network.



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Department of Computer Science

Date: 02 .03.2023 **Duration: 1 Hour** **Class: I M.Sc. (CS)**
Subject Name & Code: Internet of Things

Section A (5 x 1 = 5)
(Answer any **FIVE** questions)

CO5	BL1	1. List out the protocols.
CO2	BL2	2. Define IoT. state its characteristics.
CO1	BL1	3. Demonstrate Peer to peer networks.
CO4	BL2	4. Outline of an Ubiquitous IoT Application.
CO2	BL2	5. Summarize the current status of IoT standardization.
CO5	BL1	6. Define a smart object by IPSO.
CO6	BL1	7. List the key objectives of the IoT-A consortium.

Section B (2 x 5 = 10)
(Answer any **TWO** questions)

CO1	BL3	8. Discuss about Internet Layers.
CO2	BL1	9. List out four pillars of IoT. Explain briefly.
CO4	BL2	10. Describe the architecture of SCADA.
CO6	BL2	11. Explain the ISO/IEC 14443/15693 smart card standards.

Section C (1 x 10 = 10)
(Answer any **ONE** question)

CO4	BL2	12. Describe the Sensor networks , Multimedia and Functional Requirements.
CO6	BL2	13. Explain about M2M and WSN Protocols.

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Answer Key

Date: 02.03.2023 **Duration: 1 Hour** **Class: I M.Sc. (CS)**
Subject Name & Code: IoT

Section A (5 x 1 = 5)

1. List out the protocols.

   TCP/IP (Transmission Control Protocol/Internet Protocol) suite.2 ARP (Address Resolution Protocol)3 DHCP (Dynamic Host Configuration Protocol) 4 DNS (Domain Name System)5 FTP (File Transfer Protocol)6 HTTP (Hyper Text Transfer Protocol)7 HTTPS (Hypertext Transfer Protocol Secure)

2. Define IoT. state its characteristics.
   IoT is a dynamic global network infrastructure of physical and virtual objects having unique identities, which are embedded with software, sensors, actuators, electronic and network connectivity to facilitate intelligent applications by collecting and exchanging data.
3. Demonstrate Peer to peer networks.
   In peer-to-peer (P2P) networking, a group of computers are linked together with equal permissions and responsibilities for processing data. Unlike traditional client-server networking, no devices in a P2P network are designated solely to serve or to receive data.
4. Define Packets.
   In networking, a packet is a small segment of a larger message. Data sent over computer networks*, such as the Internet, is divided into packets. These packets are then recombined by the computer or device that receives them.
5. current status of IoT standardization
   Fragmented architectures, no coherent unifying concepts, solutions exist only for application silos. ▪ No holistic approach to implement the IoT has yet been proposed. ▪ Many island solutions do exist (RFID, sensor nets, etc.). ▪ Little cross-sector reuse of technology and exchange of knowledge.
6. smart object by IPSO

- An intelligent (RFID) tag ▪ A sensor: device that measures a physical quantity and converts it to an analog or digital signal, such as power consumption and quality, vibration of an engine, pollution, motion detection, temperature ▪ An actuator: device that controls a set of equipment, such as controls and/or modulates the flow of a gas or liquid, controls electricity distribution, performs a mechanical operation ▪ An embedded device: a purpose-built connected device that performs a specific function, such as a factory robotic arm, vending machine, smart grid analyzer ▪ Any combination of the above features to form a more complex entity

7. key objectives of the IoT-A consortium

   ▪ Create the architectural foundations of an interoperable Internet of Things as a key dimension of the larger future Internet ▪ Architectural reference model together with an initial set of key building blocks: – Not reinventing the wheel but federating already existing technologies – Demonstrating the applicability in a set of use cases – Removing the barriers of deployment and widescale acceptance of the IoT by establishing a strongly involved stakeholder group ▪ Federating heterogeneous IoT technologies into an interoperable IoT fabric.

Section B (2 x 5 = 10)

8. Discuss about Internet Layers.

Internet Layer

The Internet layer, also known as the **network layer** or **IP layer**, accepts and delivers packets for the network. This layer includes the powerful Internet Protocol (IP), the Address Resolution Protocol (ARP), and the Internet Control Message Protocol (ICMP).

IP Protocol

The IP protocol and its associated routing protocols are possibly the most significant of the entire TCP/IP suite. IP is responsible for the following:

- **IP addressing** – The IP addressing conventions are part of the IP protocol. Designing an IPv4 Addressing Scheme introduces IPv4 addressing and IPv6 Addressing Overview introduces IPv6 addressing.
- **Host-to-host communications** – IP determines the path a packet must take, based on the receiving system's IP address.
- **Packet formatting** – IP assembles packets into units that are known as **datagrams**. Datagrams are fully described in Internet Layer: Where Packets Are Prepared for Delivery.
- **Fragmentation** – If a packet is too large for transmission over the network media, IP on the sending system breaks the packet into smaller fragments. IP on the receiving system then reconstructs the fragments into the original packet.

Oracle Solaris supports both IPv4 and IPv6 addressing formats, which are described in this book. To avoid confusion when addressing the Internet Protocol, one of the following conventions is used:

- When the term "IP" is used in a description, the description applies to both IPv4 and IPv6.
- When the term "IPv4" is used in a description, the description applies only to IPv4.
- When the term "IPv6" is used in a description, the description applies only to IPv6.

ARP Protocol

The Address Resolution Protocol (ARP) conceptually exists between the data-link and Internet layers. ARP assists IP in directing datagrams to the appropriate receiving system by mapping Ethernet addresses (48 bits long) to known IP addresses (32 bits long).

ICMP Protocol

The Internet Control Message Protocol (ICMP) detects and reports network error conditions. ICMP reports on the following:

- **Dropped packets** – Packets that arrive too fast to be processed
- **Connectivity failure** – A destination system cannot be reached
- **Redirection** – Redirecting a sending system to use another router

9. List out four pillars of IoT. Explain briefly.

   The Internet of Things (IoT) is a system of devices – for example, computer, mechanical and digital machines which are all interrelated and have the ability to transfer data over a network through unique identifiers (UIDs) without the need for a human to interact with the information. This can include home systems such as lighting, electronic appliances, streaming services, and smart speakers. Several large cities are also utilizing IoT in order to monitor traffic volumes and weather conditions.

   There are four pillars which underpin the ability of IoT to operate successfully:

   1. Device

   An IoT device is a form of hardware that is capable of transmitting data from one location to another through the internet. This data is usually recorded by a sensor located within the device. A wireless solution is needed to support many devices that run on a single network. IoT devices can include mobile devices, medical devices, cars and electronic appliances.

   2. Data

   The major function of IoT is to gather vast amounts of data in order to improve application functionality and process information. For example, music streaming services gather data on the music and artists that each individual listens to; and exercise applications regularly utilize location trackers to track users' movements and physical activities throughout the day. Organizations often integrate IoT with their HVAC (heating, ventilation and air conditioning) and security, allowing enterprises to control these systems from one centralized location or even remotely. Several forms

of data can be collected, however, status data is the simplest and most prevalent form collated. This is then used for more complex analysis.

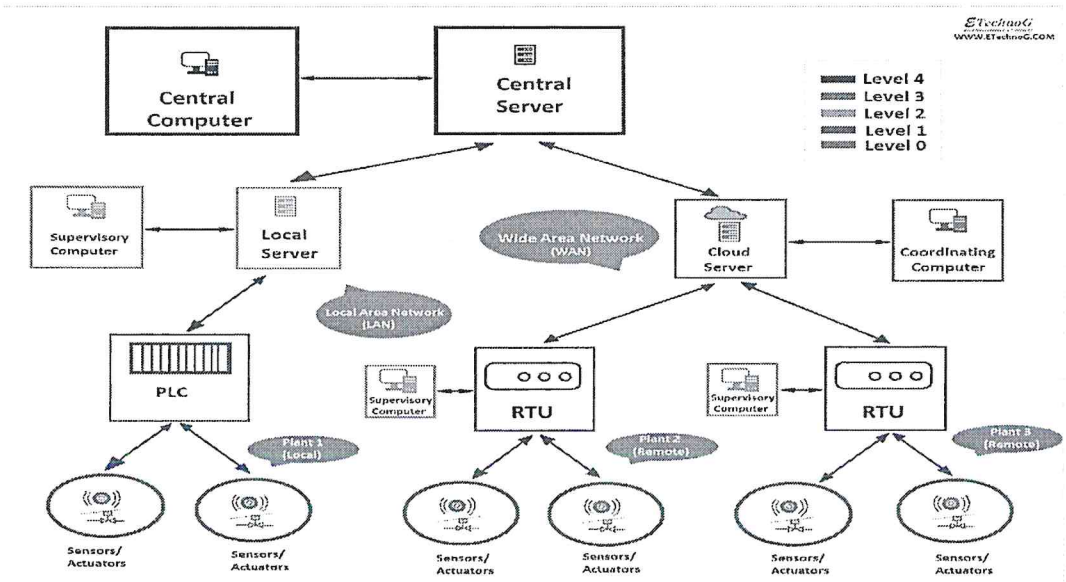
3. Analytics

It is essential that the gathered data can be analyzed correctly and processed efficiently. This pillar is what makes IoT applications so powerful and useful in the everyday life of individuals and organizations. Analytics is performed through the application of data analysis tools and procedures to the generated data types. Once this data is processed and understood, it then becomes valuable information. Analytics helps to optimize and enhance the benefits of IoT for the user.

4. Connectivity

Connectivity enables the three previously mentioned pillars to work in conjunction with each other. It is essential that connection is maintained so that data can be transferred and analyzed correctly. High-bandwidth connectivity with little to no issues is a requirement in order to maintain this real-time data flow. Without this regular flow of data from the device, no analysis of data could take place. Without this information, the optimization of systems could not occur. Any data that was collected may also be inaccurate due to the loss of potentially valuable data through poor connection.

10. the architecture of SCADA



Architecture and Block Diagram of SCADA System

11. Explain the ISO/IEC 14443/15693 smart card standards.

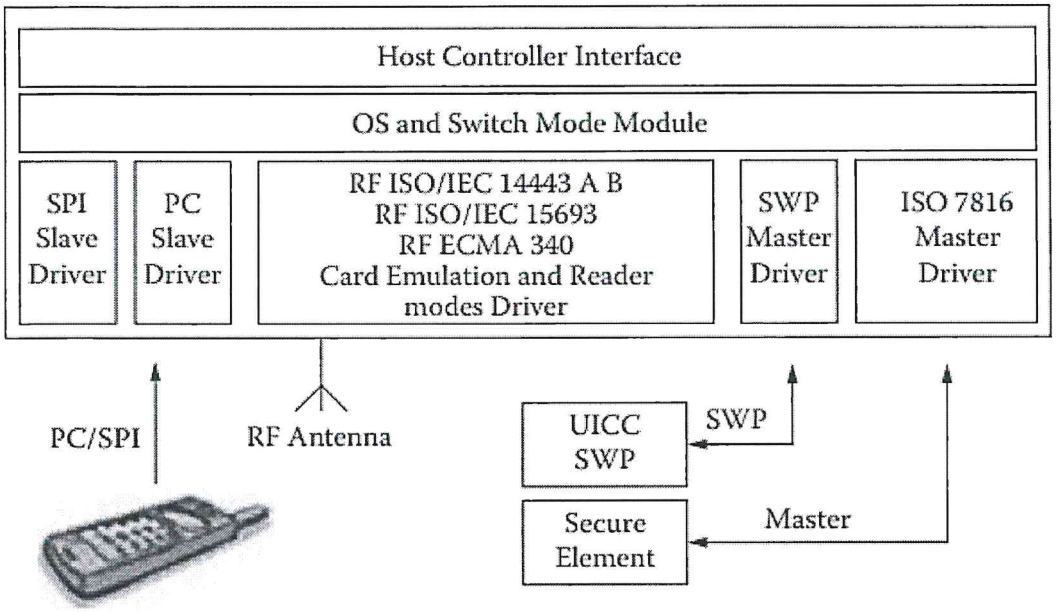


Figure 6.11 ISO/IEC 14443/15693 smart card standards.

Section C (1 x 10 = 10)

12. Describe the Sensor networks , Multimedia and Functional Requirements.

A wireless sensor network consists of sensors that have sensing, computation and wireless communication capabilities. Each sensor monitors the environment surrounding it, collects and processes data, and when appropriate transmits information so as to cooperatively achieve a global detection objective.

Functional requirements are **product features or functions that developers must implement to enable users to accomplish their tasks**. So, it's important to make them clear both for the development team and the stakeholders. Generally, functional requirements describe system behavior under specific conditions.

13. M2M and WSN Protocols

M2M standards activities include the following: ▪ Data transport protocol standards: M2MXML, JavaScript Object Notation (JSON) (originally not for IoT applications, used by the Mango open source M2M project), BiTXML [117], WMMP (shown in Figure 6.8), MDMP, open Building Information Exchange (oBIX), EEML, open M2M Information exchange (oMIX) ▪ Extend OMA DM to support M2M devices protocol management objects ▪ M2M device management, standardize M2M

gateway ▪ M2M security and fraud detection ▪ Network API's M2M service capabilities ▪ Charging standards ▪ MULTI IMSI, M2M sevices that do not have MSISDN ▪ IP addressing issues for devices IPV6 ▪ Remote diagnostics and monitoring, remote provisioning and discovery ▪ Remote management of devices behind a gateway or firewall ▪ Open REST-based API for M2M applications

The IEEE 1451 family of standards includes the following: ▪ 1451.0-2007 Common Functions, Communication Protocols, and TEDS Formats ▪ 1451.1-1999 Network Capable Application Processor Information Model ▪ 1451.2-1997 Transducer to Microprocessor Communication Protocols & TEDS Formats ▪ 1451.3-2003 Digital Communication & TEDS Formats for Distributed Multi-drop Systems ▪ 1451.4-2004 Mixed-mode Communication Protocols & TEDS Formats ▪ 1451.5-2007 Wireless Communication Protocols & TEDS Formats ▪ 1451.7-2010 Transducers to Radio Frequency Identification (RFID) Systems Communication Protocols and TEDS Formats

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I - UNIT TEST, FEBRUARY 2023

DEPARTMENT OF COMPUTER SCIENCE

Date : 03-03-2023 **Duration : 1 Hr** **Class : I MSc CS**

Subject Name & Code: FULLSTACK WEB DEVELOPMENT **Max : 25 Marks**

Section A (5 x 1 = 5)

(Answer any FIVE questions)

CO1	BL1	1. Define Full Stack Web development.
CO3	BL1	2. Differentiate Three Tier and Client-Server Architecture.
CO1	BL1	3. Define HTML5.
CO2	BL2	4. Define CSS.
CO6	BL1	5. Compare CSS vs CSS3.
CO2	BL1	6. State JavaScript.
CO2	BL6	7. Write down the functions of JavaScript.

Section B (2 x 5 = 10)

(Answer any TWO questions)

CO3	BL5	8. Summarize the Client-Server Applications.
CO1	BL6	9. Write short notes on Structural Elements of HTML5. Give an Example
CO2	BL2	10. Discuss advanced CSS with CSS3.
CO3	BL2	11. Explain the Control Flow Statements in JavaScript.

Section C (1 x 10 = 10)

(Answer any ONE question)

CO1	BL2	12. Briefly Discuss HTML5 form elements.
CO2	BL2	13. Explain Cascading Style Sheet types.

****

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Answer Key

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Department of Computer Science

Date: **Duration: 1 Hour** **Class: I M.Sc. (CS)**
Subject Name & Code: FullStackWebDevelopment, PSDED

Section A **(5 x 1 = 5)**
(Answer any FIVE questions)

CO1 BL1 1. Define Full stack Web development.

The Full Stack Web Development refers to the process of both the Front-end and Back-end process of the application. A Web Development process includes three layers. The Presentation Layer with the front and user interface aspects. The Business Logic Layer is concerned with the backend and data validation along with the Database layer.

CO3 BL1 2. Differentiate Three Tier and Client-Server Architecture.

It mainly contains three layers- the Data Layer, the Business Layer, and the Client Layer. A two-tier DB architecture either buries the application logic within the server database, on the client (inside the UI), or both of them. A three-tier DB architecture buries the process or application logic in the middle-tier.

CO1 BL1 3. Define HTML5.

Hypertext Markup Language revision 5 (HTML5) is markup language for the structure and presentation of World Wide Web contents. HTML5 supports the traditional HTML and XHTML-style syntax and other new features in its markup, New APIs, XHTML and error handling.

CO2 BL2 4. Define CSS.

CSS stands for Cascading Style Sheets.CSS describes how HTML elements are to be displayed on screen, paper, or in other media.CSS saves a lot of work. It can control the layout of multiple web pages all at once.External stylesheets are stored in CSS files

CO6 BL1 5. Compare CSS vs CSS3.

CSS does not support responsive design.	CSS3 is the latest version and supports the responsive design.

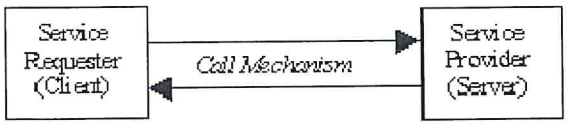

Figure 2-1: Basic client/server architecture

The following are typical features of a client/server application:

- A client program can request services from multiple server programs
- A client program does not need to be aware of the actual subprograms that provide a service
- Multiple subprograms can work together to provide the service
- Multiple client programs can request services from a single server program
- A server program can provide multiple services
- Typically, the server program runs on a machine that is remote from the machine running the client program

CO1 BL6 9. Write short notes on Structural Elements of HTML5.

There are a group of HTML elements that are created to broadly give our documents more structure.
Body -The body element contains all of the content of our document.This typically encompasses everything except the meta element and its sub elements.
Main-Most webpages contain a lot of information that is repeated across the site. This includes branding, navigation, advertisements and copyright information.
Article & Section-The article and section elements are both used similarly to represent thematic parts of a document. The primary difference between the two is that articles are meant to encapsulate content that is self-contained.A section on the other hand, is only a part of a greater whole and does not stand on its own.
Nav-The nav element is used to indicate areas of the page used for primary navigation.
Header & Footer-The header and footer elements are both used within the context of their containing element.The most common form is when the containing element is the body element.

CO2 BL2 10. Discuss advanced CSS with CSS3.

CSS stands for Cascading Style Sheets.Cascading" means that one or more style sheets can be applied on the HTML document one after the other using some rules.So, the same tag can use one or more styles.In short, for Styling the HTML document, you have to use CSS.HTML simply creates the structure or skeleton while CSS will make the website colorful,better and clear.CSS stands for *Cascading Style Sheets*.For Styling the HTML document, you have to use CSS.You can create CSS files in the HTML document as well as an external files.The external CSS files are more popular and widely used.Mostly, we apply CSS by creating Ids and Classes but there are other ways as well. At the time of writing the 1st version of this tutorial, CSS3 is most popular version of CSS.

Date: 03/04/2023
Circular No: 08/EVEN SEMESTER/2023

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CIRCULAR

Students are advised to write the 2ND Internal Examinations in APRIL 2023, which will be held from **10-APRIL-2023 to 17-APRIL-2023**. The schedules for 2ND internal examinations are provided below.

I B.SC COMPUTER SCIENCE

Language	LA12A	10-04-2023
English	LZ12A	11-04-2023
Computer Organization	SE22A	12-04-2023
Maths- II	SM3AE	13-04-2023
Core Practical-II - Computer Organization	SE221	17-04-2023

II B.SC COMPUTER SCIENCE

Language	LA14A	10-04-2023
English	LZ14B	11-04-2023
Web Technology	SE24A	12-04-2023
Statistics II	SP3AB	13-04-2023
Core Practical-IV - Web Technology	SE241	17-04-2023

III B.SC COMPUTER SCIENCE

Software Engineering	SE26A	10-04-2023
Introduction To Data Science	SE26B	11-04-2023
Introduction To Cloud Computing	SE26C	12-04-2023
Elective II- IOTA	SE45E	13-04-2023
Practical : CASE Tools And Testing Tools Lab	SE261	17-04-2023

I M.SC COMPUTER SCIENCE

Machine Learning	CS22A	10-04-2023
Advanced Networks	CS22B	11-04-2023
Principles of Compiler Design	CS32A	12-04-2023
Elective-1: Internet of Things	CS42B	13-04-2023
Elective-2: Full Stack Web Development	CS42D	17-04-2023
Practical 3: Machine Learning Lab(FN) / Practical 4: Full Stack Web Development Lab(AN)	CS221/CS241	18-04-2023

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SEATING ARRANGEMENT

EVEN SEM - UNIT TEST –II- EXAMINATIONS, APRIL 2023

DATE: 10.04.2023 - 18.04.2023 TIME : 12.00 PM- 1.00 PM

S.NO	ROLL NO / REGISTER NO	CLASS	STRENGTH	HALL NO
01	222207554 - 222207573 832200322 - 832200341 222106429 - 222106440	I B.SC(CS) I BATCH I M.SC(CS) II B.SC(CS) II BATCH	20 20 10	102 (MAIN BLOCK)
02	222207574 - 222207593 832200342 - 832200349 222207594 - 222207605 222106441 - 222106450	I B.SC(CS) I BATCH I M.SC(CS) I B.SC(CS) II BATCH II B.SC(CS) II BATCH	20 08 12 10	103 (MAIN BLOCK)
03	222005927 - 222005947 222207606 - 222207646 222106451 - 222106467	III B.SC(CS) I BATCH I B.SC(CS) I BATCH II B.SC(CS) I BATCH	17 15 10	302 (MBA BLOCK)

S.NO	ROLL NO / REGISTER NO	CLASS	STRENGTH	HALL NO
04	222005948 - 222005965 222207607 - 222207623 222006024 - 222006031	III B.SC(CS) I BATCH I B.SC(CS) II BATCH III B.SC(CS) II BATCH	17 17 8	202 (MBA BLOCK)
05	222005966 - 222006018 222207624 - 222207654	III B.SC(CS) I BATCH I B.SC(CS) II BATCH	17 17	304 (MBA BLOCK)
06	22207655 - 222207658 222106389 - 222106415 222005930 - 222005989 222006019 - 222006020	I B.SC(CS) II BATCH II B.SC(CS) I BATCH III B.SC(CS) II BATCH III B.SC(CS) I BATCH	04 23 21 02	LAB - I (MBA BLOCK)

S.NO	ROLL NO / REGISTER NO	CLASS	STRENGTH	HALL NO
07	222106416 – 222106464	II B.SC(CS) I BATCH	17	LAB - II (MBA BLOCK)
	222005990 – 222006023	III B.SC(CS) II BATCH	23	
	222106390 – 222106428	II B.SC(CS) II BATCH	06	
	222106468 - 222103794	II B.SC(CS) II BATCH	05	

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UNIT TEST –II- INVIGILATION DUTY SCHEDULE (EVEN SEM – APRIL 2023)

CLASS ROOM	10/04/23 V	Staff sign	11/04/23 VI	Staff sign	12/04/23 I	Staff sign	13/04/23 II	Staff sign
302 (MBA BLOCK)	TAM		VSH		KN		MAT	
304 (MBA BLOCK)	VS		VS		DG		TP KN.	
202 (MBA BLOCK)	TAM		DRJ		DB		MAT	
JAMES GOSLING LAB – I (MBA BLOCK)	MS		KN VPN		TP VSH		VPN	
RASMUS LERDORF LAB – II (MBA BLOCK)	TP		DB		MS		DRJ	
102	DG		TAM		MAT		RM	
103	RM		TAM		MAT		MS	

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II - UNIT TEST, APRIL 2023

DEPARTMENT OF COMPUTER SCIENCE

Date :12.04.23 **Duration : 1 hour** **Class : I BSc CS(Batch I)**

Subject Name & Code : Computer Organization & SE22A

Section A (5 x 2 = 10)

(Answer any **FIVE** questions)

CO2	BL1	1. Enumerate the instructions that perform the logical operations
CO1	BL6	2. Write about data types
CO2	BL1	3. State about RISC
CO4	BL2	4. Demonstrate op-code and operand
CO6	BL4	5. Categorize buses in 8085
CO3	BL1	6. Define instruction set
CO5	BL2	7. Discuss any four features of 8257 DMA controller

Section B (1 x 5 = 5)

(Answer any **ONE** question)

CO5	BL2	8. Explain the types of interrupts in 8085
CO4	BL6	9. Write an 8085 program to convert ASCII code to binary code

Section C (1 x 10 = 10)

(Answer any **ONE** question)

CO2	BL2	10. Discuss about various addressing modes in 8085
CO6	BL1	11. Describe about DMA controller

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II UNIT TEST – April 2023
Department of Computer Science

Date: **Duration: 1 hour** **Class: I BSc CS (Batch I)**

Subject Name & Code : Computer Organization

ANSWER KEY

Section A (5 x 2 = 10)

(Answer any **FIVE** questions)

CO2 BL1 1. Enumerate the instructions that perform the logical operations

OPCODE	OPERAND	DESTINATION	EXAMPLE
ANA	R	A = A AND R	ANA B
ANI	8-bit data	A = A AND 8-bit data	ANI 50
ORA	R	A = A OR R	ORA B
ORI	8-bit data	A = A OR 8-bit data	ORI 50
XRA	R	A = A XOR R	XRA B
XRI	8-bit data	A = A XOR 8-bit data	XRI 50
CMA	none	A = 1's complement of A	CMA
CMP	R	Compares R with A and triggers the flag register	CMP B
RRC	none	Rotate accumulator right without carry	RRC

CO1 BL6 2. Write about data types

A data type, in programming, is a classification that specifies which type of value a variable has and what type of mathematical, relational or logical operations can be applied to it without causing an error. Ex: Integer, Float, String, Character etc.

Section B

(1 x 5 = 5)

(Answer any **ONE** question)

CO5 BL2 8. Explain the types of interrupts in 8085

Interrupts are the signals generated by the external devices to request the microprocessor to perform a task. There are 5 interrupt signals, i.e. TRAP, RST 7.5, RST 6.5, RST 5.5, and INTR.

Interrupt are classified into following groups based on their parameter –

- **Vector interrupt** – In this type of interrupt, the interrupt address is known to the processor. **For example:** RST7.5, RST6.5, RST5.5, TRAP.
- **Non-Vector interrupt** – In this type of interrupt, the interrupt address is not known to the processor so, the interrupt address needs to be sent externally by the device to perform interrupts. **For example:** INTR.
- **Maskable interrupt** – In this type of interrupt, we can disable the interrupt by writing some instructions into the program. **For example:** RST7.5, RST6.5, RST5.5.
- **Non-Maskable interrupt** – In this type of interrupt, we cannot disable the interrupt by writing some instructions into the program. **For example:** TRAP.
- **Software interrupt** – In this type of interrupt, the programmer has to add the instructions into the program to execute the interrupt. There are 8 software interrupts in 8085, i.e. RST0, RST1, RST2, RST3, RST4, RST5, RST6, and RST7.
- **Hardware interrupt** – There are 5 interrupt pins in 8085 used as hardware interrupts, i.e. TRAP, RST7.5, RST6.5, RST5.5, INTA.

CO4 BL6 9. Write an 8085 program to convert ASCII code to binary code

Address	HEX Codes	Labels	Mnemonics	Comments
F000	21, 00, 80		LXI H, 8000H	Load address of the number
F003	7E		MOV A, M	Load ASCII data to Acc from memory
F004	FE, 58		CPI 58H	Compare withASCII(9) + 1
F006	D2, 0E, F0		JNC NUM	The input is numeric
F009	D6, 37		SUI 37H	Subtract offset to get Alphabetic character
F00B	C3, 10, F0		JMP STORE	Store the result
F00E	D6, 30	NUM	SUI 30H	Subtract 30to get numeric value
F010	23	STORE	INX H	Point to next location

MOV A, M (move the contents of the memory location pointed by the H-L pair to the accumulator)

LDAX B (move contents of B-C register to the accumulator)

STAX B (store accumulator contents in memory pointed by register pair B-C)

Implied/Implicit Addressing Mode –

In implied/implicit addressing mode the operand is hidden and the data to be operated is available in the instruction itself.

Examples:

CMA (finds and stores the 1's complement of the contents of accumulator A in A)

RRC (rotate accumulator A right by one bit)

RLC (rotate accumulator A left by one bit)

Relative Addressing Mode: In this mode, the operand is a memory location specified by the contents of the program counter plus a constant value.

Example:

```
    MOV R0,#05H
AGAIN:
    MVI A,#55H
    ADD A,R0
    JMP AGAIN
```

In this example, the instruction JMP AGAIN uses the Relative Addressing Mode. The instruction jumps to the label AGAIN by adding the contents of the program counter with the specified constant value. The constant value is calculated based on the distance between the current instruction and the label AGAIN. In this case, the instruction JMP AGAIN is executing a loop that loads the accumulator with the value 55H, adds the contents of the register R0 to the accumulator, and then jumps back to the label AGAIN to repeat the loop.

CO6 BL1 11. Describe about DMA controller

Direct Memory Access (DMA) :

DMA Controller is a hardware device that allows I/O devices to directly access memory with less participation of the processor. DMA controller needs the same old circuits of an interface to communicate with the CPU and Input/output devices.

Fig-1 below shows the block diagram of the DMA controller. The unit communicates with the CPU through data bus and control lines. Through the use of the address bus and allowing the DMA and RS register to select inputs, the register within the DMA is chosen by the CPU. RD and WR are two-way inputs. When BG (bus grant) input is 0, the CPU can communicate with DMA registers. When BG (bus grant) input is 1, the CPU has relinquished the buses and DMA can communicate directly with the memory.

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II - UNIT TEST, APRIL 2023

DEPARTMENT OF COMPUTER SCIENCE

Date : 12.04.2023 **Duration : 1 Hr** **Class : I BSc (CS) - II**

Subject Name & Code: COMPUTER ORGANIZATION (SE22A) **Max : 25 Marks**

Section A (5 x 2 = 10)

(Answer any **FIVE** questions)

CO2	BL1	1. Define Address Bus.
CO4	BL4	2. What is pipelining?
CO5	BL2	3. Define interrupt.
CO2	BL2	4. Distinguish between microcomputer and microprocessor.
CO5	BL1	5. List any two basic features of Pentinum – 13.
CO1	BL4	6. What is opcode and operand?
CO3	BL6	7. Write a 8085 program to convert ASCII to BCD

Section B (1 x 5 = 5)

(Answer any **ONE** question)

CO4	BL6	8. Write a note on DMA controller.
CO3	BL3	9. How will you perform BCD addition? Explain with simple example.

Section C (1 x 10 = 10)

(Answer any **ONE** question)

CO6	BL2	10.Explain the architecture of 8085 with block diagram.
CO3	BL2	11. Discuss 8085 instruction sets in detail.

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II UNIT TEST, APRIL 2023

DEPARTMENT OF COMPUTER SCIENCE

Date : 12.04.2023 **Duration : 1 Hr** **Class : I BSc (CS) - II**

Subject Name & Code: COMPUTER ORGANIZATION (SE22A) **Max : 25 Marks**

ANSWER KEY

SECTION A – (5 X 2 = 10 Marks)
Answer any FIVE questions

1. **Define Address Bus**

In 8085 microprocessor, Address bus is of 16 bits (A0-A15) and can transfer maximum 16 bit address and hence can address 65,536 different memory locations. • This bus is multiplexed with 8 bit data bus. So, the most significant bits (MSB) of address goes through Address bus and LSB goes through multiplexed data bus.

2. **What is pipelining?**

Pipelining is the process of storing and prioritizing computer instructions that the processor executes. The pipeline is a "logical pipeline" that lets the processor perform an instruction in multiple steps. The processing happens in a continuous, orderly, somewhat overlapped manner.

3. **Define interrupt.**

Interrupt is **the method of creating a temporary halt during program execution and allows peripheral devices to access the microprocessor**. There are 5 interrupt signals, i.e. TRAP, RST 7.5, RST 6.5, RST 5.5, and INTR.

4. **Distinguish between microcomputer and microprocessor.**

Microcontroller	Microprocessor
A microcontroller is a specialized form of a microprocessor	The microprocessor is designed to be general-purpose.
It is cost-effective.	It is a silicon chip
It is self-sufficient.	It is a dependent unit
Its power consumption is low.	Its power consumption is high.

5. **List any two basic features of Pentinum – 13.**

- It is a highly integrated device containing about 1.2 million transistors.
- **Wider Data Bus Width**: The Pentium processors have a wider data bus width. The data bus width has been increased from 32-bit to 64-bit to improve the data transfer rate.

- When the transfer is completed, DMA informs the processor by raising an interrupt.
- The typical block diagram of the DMA controller is shown in the figure 10.2(b) below.

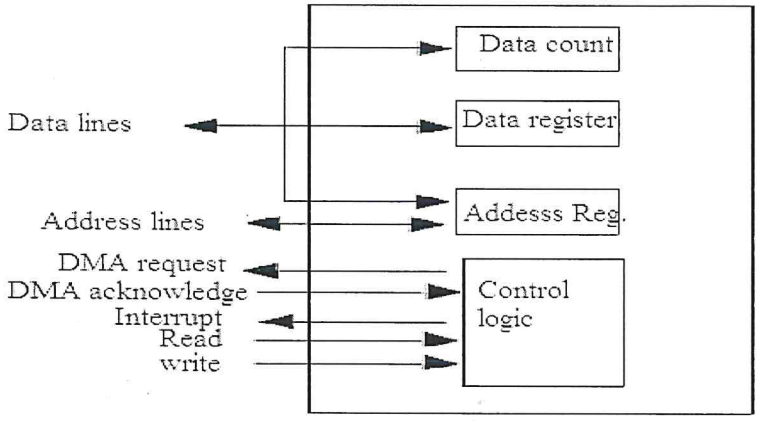


Figure 10.2(b) Block Diagram of DMA Controller

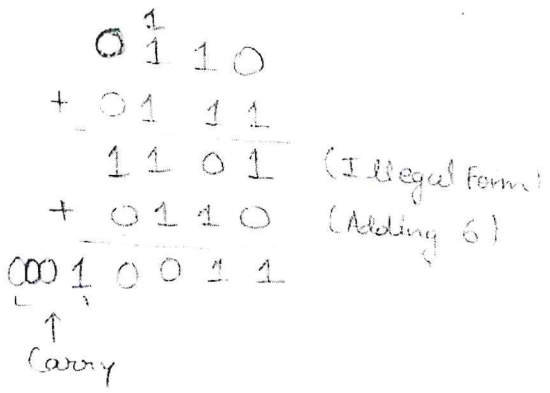
9. How will you perform BCD addition? Explain with simple example.

BCD Addition

The **addition of BCD numbers** is slightly different from **binary addition**. Here, the rules of binary addition are partially applicable only to the individual 4-bit groups. The **BCD addition**, is thus carried out by individually adding the corresponding 4-bit groups starting from the LSB side and if there is a carry to the next group, or if the result belongs to any of the 6 illegal states than we add 6_{10}**(0110)** to the sum term of that group and resulting carry is added in the next group.

Example: Perform BCD Addition of 6 and 7.

Solution: BCD representation of **6** is given as **0110** and for **7** it is **0111**.

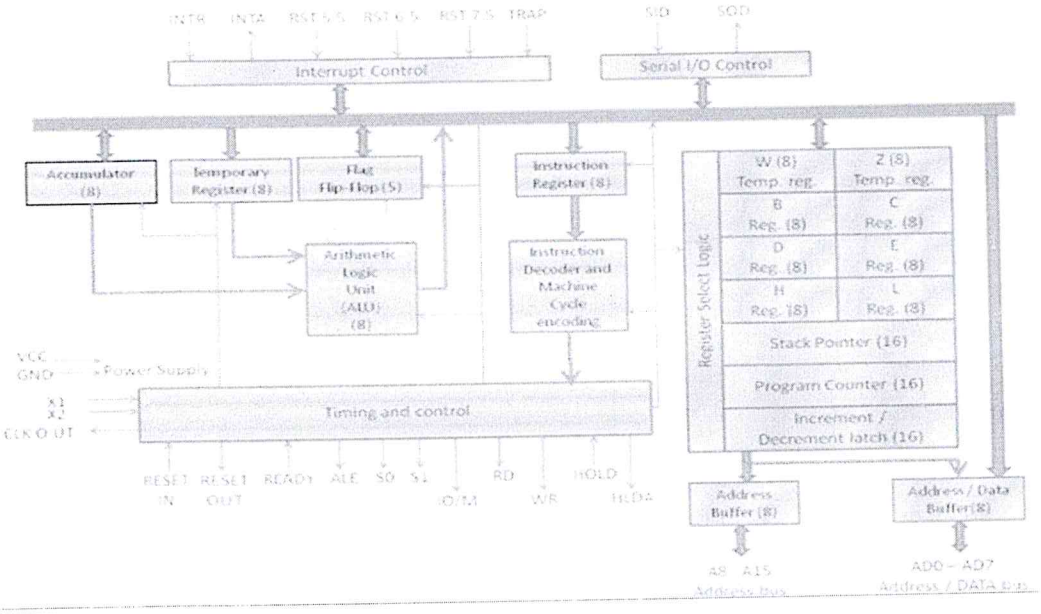


When we add **6** and **7** in **BCD**, we get **1101** which is an invalid state therefore, we add **0110 (6)** to the sum to get correct result which is **0001 0011 (13)**.

SECTION C – (1 X 10 = 10 Marks)
Answer any ONE question

10. Explain the architecture of 8085 with block diagram.

The **microprocessor** is the CPU (Central Processing Unit) of a computer. It is the heart of the computer. Here, we will describe Intel 8085 as it is one of the most popular 8-bit microprocessor.



ALU

The **Arithmetic and Logic Unit**, ALU performs the arithmetic and logical operations:

- Addition ,Subtraction
- Logical AND, Logical OR ,Logical EXCLUSIVE OR
- Complement (Logical NOT), Increment (add 1), Decrement (subtract 1)
- Left shift, Rotate left, Rotate right, Clear, etc.

Registers

Registers are used for temporary storage and manipulation of data and instructions by the microprocessor. Data remain in the registers till they are sent to the I/O devices or memory. Intel 8085 microprocessor has the following registers:

- One 8-bit accumulator (ACC) i.e. register A, Six general purpose registers of 8-bit, these are B,C, D, E, H and L, One 16-bit stack pointer, SP, One 16-bit Program Counter, PC, Instruction register , Temporary register

a. **Accumulator (ACC):** The accumulator is an 8-bit register associated with the ALU. The register 'A' is an accumulator in the 8085. It is used to hold one of the operands of an arithmetic and logical operation.

The final result of an arithmetic or logical operation is also placed in the accumulator.

b. **General-Purpose Registers:** The 8085 microprocessor contains six 8-bit general purpose registers. They are: B, D, C, E, H and L register..

c. **Program Counter (PC):** It is a 16-bit special purpose register. It is used to hold the address of memory of the next instruction to be executed. It keeps the track of the instruction in a program while they are being executed.

d. **Stack Pointer (SP):** It is a 16-bit special function register used as memory pointer. A stack is nothing but a portion of RAM. In the stack, the contents of only those registers are saved, which are needed in the later part of the program.

e. **Instruction Register:** The instruction register holds the opcode (operation code or instruction code) of the instruction which is being decoded and executed.

f. **Temporary Register:** It is an 8-bit register associated with the ALU. It holds data during an arithmetic/logical operation. It is used by the microprocessor. It is not accessible to programmer.

g. **Flags:** The Intel 8085 microprocessor contains five flip-flops to serve as a status flags. The flip-flops are reset or set according to the conditions which arise during an arithmetic or logical operation.

The five status flags of Intel 8085 are:

- Carry Flag (CS)
- Parity Flag (P)
- Auxiliary Carry Flag (AC)
- Zero Flag(Z)
- Sign Flag(S)

If a flip-flop for a particular flag is set, then it indicates 1. When it is reset, it indicates 0.

11. Discuss 8085 Instruction Sets in detail.

Instruction sets are instruction codes to perform some task. It is classified into five categories.

Control Instructions

Opcode	Operand	Meaning	Explanation
NOP	None	No operation	No operation is performed, i.e., the instruction is fetched and decoded.
HLT	None	Halt and enter wait state	The CPU finishes executing the current instruction and stops further execution.
EI	None	Enable interrupts	The interrupt enable flip-flop is set and all the interrupts

JC	Jump on Carry	CY=1	in the operand based on the specified flag of the PSW. PSW – Program Status Word
JNC	Jump on no Carry	CY=0	
JP	Jump on positive	S=0	
JM	Jump on minus	S=1	
JZ	Jump on zero	Z=1	
JNZ	Jump on no zero	Z=0	

Opcode	Description	Flag Status			
CC	Call on Carry	CY=1	**16-bit address**	Unconditional subroutine call	The program sequence is transferred to the memory address given in the operand. Before transferring, the address of the next instruction after CALL is pushed onto the stack.
CNC	Call on no Carry	CY=0			
CP	Call on positive	S=0			
CM	Call on minus	S=1			
CZ	Call on zero	Z=1			
CNZ	Call on no zero	Z=0			

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II - UNIT TEST, APRIL 2023

DEPARTMENT OF COMPUTER SCIENCE

Date : 12.04.2023 **Duration : 01:00** **Class :II B.Sc**

Subject Code & Name :SE24A & Webtechnology

Section A (5 x 2 = 10)

(Answer any **FIVE** questions)

CO1	BL1	1. Define Function.
CO3	BL1	2.Differentiate Classes and Objects.
CO 6	BL2	3. Define MySQL.
CO4	BL1	4. Write a procedure to Read a File.
CO5	BL2	5. Define DOM.
CO3	BL2	6. Define ArrayIterator.
CO6	BL1	7.List any three DML Commands.

Section B (1 x 5 = 5)

(Answer any **ONE** question)

CO1	BL2	8. Discuss various array functions .
CO5	BL2	9. Write short notes on Advanced OOPs concepts .

Section C (1 x 10 = 10)

(Answer any **ONE** question)

CO4	BL2	10. Explain in detail Exception Handling in PHP
CO4	BL2	11. Describe File Handling concepts in PHP .

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ANSWER KEY

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Date : 25.01.2023 **Duration : 01:00** **Class :II B.Sc**

Subject Code & Name :SE24A & Webtechnology

Section A **(5 x 2 = 10)**
(Answer any FIVE questions)

CO1 BL1 1. Define Function.

A PHP Function feature is a piece of code that can be used over and over again and accepts argument lists as input, and returns a value.

CO3 BL1 2.Differentiate Classes and Objects.

Class is a detailed description, the definition, and the template of what an object will be. But it is not the object itself. Also, what we call, a class is the building block that leads to Object-Oriented Programming. Object is an instance of a class. All data members and member functions of the class can be accessed with the help of objects. When a class is defined, no memory is allocated, but memory is allocated when it is instantiated.

CO 6 BL2 3. Define MySQL.

MySQL is a widely used relational database management system (RDBMS). MySQL is free and open-source. MySQL is ideal for both small and large applications.

CO4 BL1 4. Write a procedure to Read a File.

PHP Open File - fopen() ... A better method to open files is with the fopen() function. This function gives you more options than the readfile() function.

CO5 BL2 5. Define DOM.

The built-in DOM parser makes it possible to process XML documents in PHP. The XML DOM Parser. The DOM parser is a tree-based parser.

CO3 BL2 6. Define ArrayIterator.

This iterator allows to unset and modify values and keys while iterating over Arrays and Objects. When you want to iterate over the same array multiple times.

CO6 BL1 7.List any three DML Commands.

SELECT,INSERT,UPDATE and DELETE Command

Section B (1 x 5 = 5)

(Answer any ONE question)

CO1 BL2 8. Discuss various array functions .

PHP Array Functions ; array_push(), Inserts one or more elements to the end of an array ; array_rand(), Returns one or more random keys from an array. array_change_key_case — Changes the case of all keys in an array · array_chunk — Split an array into chunks · array_column — Return the values from a single. PHP array() function creates and returns an array. It allows you to create indexed, associative and multidimensional arrays

CO5 BL2 9. Write short notes on Advanced OOPs concepts .

Object-oriented programming in PHP helps developers build reusable and complex web applications. Object-oriented programming is a programming style that refers to the association of various components and revolves around the inheritance, polymorphism, encapsulation, and abstraction concepts.

Section C (1 x 10 = 10)

(Answer any ONE question)

CO4 BL2 10. Explain in detail Exception Handling in PHP.

Exception handling is used to change the normal flow of the code execution if a specified error (exceptional) condition occurs. An exception is an unexcepted outcome of a program, which can be handled by the program itself. Basically, an exception disrupts the normal flow of the program.An exception can be throw n, and caught (" catch ed") within PHP. Code may be surrounded in a try block, to facilitate the catching of potential exceptions. Error handling is the process of catching errors raised by your program and then taking appropriate action. The PHP's exception handling system has basically four parts: try , throw , catch , and the Exception class.

CO4 BL2 11. Describe File Handling concepts in PHP .

The fopen() function is used to open a file. The first parameter contains the name of the file to be opened and the second parameter tells in which mode the file should be opened. fopen() function creates a pointer which points to the file mentioned. PHP File System allows us to create file, read file line by line, read file character by character, write file, append file, delete file and close file. HP provides a convenient way of working with files via its rich collection of built in functions.

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II - UNIT TEST, APRIL 2023

DEPARTMENT OF COMPUTER SCIENCE

Date : 10.04.2023 **Duration : 01 HR** **Class : III B.Sc CS I &II**

Subject Name & Code : SOFTWARE ENGINEERING

Section A (5 x 2 = 10)

(Answer any **FIVE** questions)

CO1	BL1	1. List out the software metrics and define it.
CO2	BL2	2. Difference between verification and validation?
CO3	BL2	3. Classify the function oriented design strategies.
CO1	BL1	4. List out the different terms related to object design.
CO2	BL1	5. Identify DFD diagram?
CO4	BL2	6. Describe OO Design.
CO2	BL1	7. Define UML diagram.

Section B (1 x 5 = 5)

(Answer any **ONE** question)

CO6	BL2	8. Explain the Object Oriented Software Design.
CO1	BL1	9. Explain the Layered design model in software design.

Section C (1 x 10 = 10)

(Answer any **ONE** question)

CO4	BL2	10. Discuss Cohesion & Coupling.
CO3	BL2	11. Explain the Use case,UML and Class diagram, Sequence diagram.

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Department of Computer Science

Unit Test-II

Date : 10.04.2023 **Duration : 01HR** **Class :III B.Sc CS I&II**

Subject Name & Code : **Software Engineering**

Section A (5 x 2 = 10)

(Answer any **FIVE** questions)

CO1 BL1 1. List out the software metrics and define it.

A software metric is a measure of software characteristics which are measurable or countable. Software metrics are valuable for many reasons, including measuring software performance, planning work items, measuring productivity, and many other uses

CO2 BL2 2. Difference between verification and validation?

Verification is a process of determining if the software is designed and developed as per the specified requirements. Validation is the process of checking if the software (end product) has met the client's true needs and expectations

CO1 BL1 4. List out the different terms related to object design.

In the object-oriented design method, the system is viewed as a collection of objects (i.e., entities). The state is distributed among the objects, and each object handles its state data. For example, in a Library Automation Software, each library representative may be a separate object with its data and functions to operate on these data

CO2 BL1 5. Identify DFD diagram?

A data flow diagram (DFD) maps out the flow of information for any process or system. It uses defined symbols like rectangles, circles and arrows, plus short text labels, to show data inputs, outputs, storage points and the routes between each destination.

CO4 BL2 6. Describe OO Design.

Object-oriented design (OOD) is the process of using an object-oriented methodology to design a computing system or application. This technique enables the implementation of a software

solution based on the concepts of objects. OOD serves as part of the object-oriented programming (OOP) process or lifecycle.

CO2 BL1 7. Define UML diagram.

A UML diagram is a diagram based on the UML (Unified Modeling Language) with the purpose of visually representing a system along with its main actors, roles, actions, artifacts or classes, in order to better understand, alter, maintain, or document information about the system.

Section B (1 x 5 = 5)

(Answer any **ONE** question)

CO6 BL2 8. Explain the Object Oriented Software Design.

1. Objects: All entities involved in the solution design are known as objects. For example, person, banks, company, and users are considered as objects. Every entity has some attributes associated with it and has some methods to perform on the attributes

. 2. Classes: A class is a generalized description of an object. An object is an instance of a class. A class defines all the attributes, which an object can have and methods, which represents the functionality of the object.

3. Messages: Objects communicate by message passing. Messages consist of the integrity of the target object, the name of the requested operation, and any other action needed to perform the function. Messages are often implemented as procedure or function calls.

4. Abstraction In object-oriented design, complexity is handled using abstraction. Abstraction is the removal of the irrelevant and the amplification of the essentials.

5. Encapsulation: Encapsulation is also called an information hiding concept. The data and operations are linked to a single unit. Encapsulation not only bundles essential information of an object together but also restricts access to the data and methods from the outside world.

6. Inheritance: OOD allows similar classes to stack up in a hierarchical manner where the lower or subclasses can import, implement, and re-use allowed variables and functions from their immediate superclasses. This property of OOD is called an inheritance. This makes it easier to define a specific class and to create generalized classes from specific ones.

7. Polymorphism: OOD languages provide a mechanism where methods performing similar tasks but vary in arguments, can be assigned the same name. This is known as polymorphism, which allows a single interface is performing functions for different types. Depending upon how the service is invoked, the respective portion of the code gets executed.

CO1 BL1 9. Explain the software design Approaches.

A good system design strategy is to organize the program modules in such a method that are easy to develop and latter too, change. Structured design methods help developers to deal with the size and complexity of programs. Analysts generate instructions for the developers about how code should be composed and how pieces of code should fit together to form a program. To design a system, there are two possible approaches:

1. Top-down Approach
2. Bottom-up Approach

1. Top-down Approach: This approach starts with the identification of the main components and then decomposing them into their more detailed sub-components. We know that a system is composed of more than one sub-systems and it contains a number of components. Further, these sub-systems and components may have their on set of sub-system and components and creates hierarchical structure in the system. Top-down design takes the whole software system as one entity and then decomposes it to achieve more than one sub-system or component based on some characteristics. Each subsystem or component is then treated as a system and decomposed further. This process keeps on running until the lowest level of system in the top-down hierarchy is achieved. Top-down design starts with a generalized model of system and keeps on defining the more specific part of it. When all components are composed the whole system comes into existence. Top-down design is more suitable when the software solution needs to be designed from scratch and specific details are unknown.

2. Bottom-up Approach:
A bottom-up approach begins with the lower details and moves towards up the hierarchy, as shown in fig. This approach is suitable in case of an existing system. The bottom up design model starts with most specific and basic components. It proceeds with composing higher level of components by using basic or lower level components. It keeps creating higher level components until the desired system is not evolved as one single component. With each higher level, the amount of abstraction is increased. Bottom-up strategy is more suitable when a system needs to be created from some existing system, where the basic primitives can be used in the newer system.

Section C (1 x 10 = 10)

(Answer any **ONE** question)

CO4 BL2 10. Discuss Cohesion & Coupling.

Module Coupling In software engineering, the coupling is the degree of interdependence between software modules. Two modules that are tightly coupled are strongly dependent on each other. However, two modules that are loosely coupled are not dependent on each other. Uncoupled modules have no interdependence at all within them. The various types of coupling techniques are shown in fig: A good design is the one that has low coupling. Coupling is measured by the number of relations between the modules. That is, the coupling increases as the number of calls between modules increase or the amount of shared data is large. Thus, it can be said that a design with high coupling will have more errors. Types of Module Coupling 1. No Direct Coupling: There is no direct coupling between M1 and M2. In this case, modules are subordinates to different modules. Therefore, no direct coupling.

2. Data Coupling: When data of one module is passed to another module, this is called data coupling.

3. Stamp Coupling: Two modules are stamp coupled if they communicate using composite data items such as structure, objects, etc. When the module passes non-global data structure or entire structure to another module, they are said to be stamp coupled. For example, passing structure variable in C or object in C++ language to a module.

4. Control Coupling: Control Coupling exists among two modules if data from one module is used to direct the structure of instruction execution in another.

5. External Coupling: External Coupling arises when two modules share an externally imposed data format,communication protocols, or device interface. This is related to communication to external tools and devices.

6. Common Coupling: Two modules are common coupled if they share information through some global data items.

7. Content Coupling: Content Coupling exists among two modules if they share code, e.g., a branch from one module into another module. Module Cohesion In computer programming, cohesion defines to the degree to which the elements of a module belong together. Thus, cohesion measures the strength of relationships between pieces of functionality within a given module. For example, in highly cohesive systems, functionality is strongly related. Cohesion is an ordinal type of measurement and is generally described as "high cohesion" or "low cohesion."

Types of Modules Cohesion 1. Functional Cohesion: Functional Cohesion is said to exist if the different elements of a module, cooperate to achieve a single function.

2. Sequential Cohesion: A module is said to possess sequential cohesion if the element of a module form the components of the sequence, where the output from one component of the sequence is input to the next.

3. Communicational Cohesion: A module is said to have communicational cohesion, if all tasks of the module refer to or update the same data structure, e.g., the set of functions defined on an array or a stack.

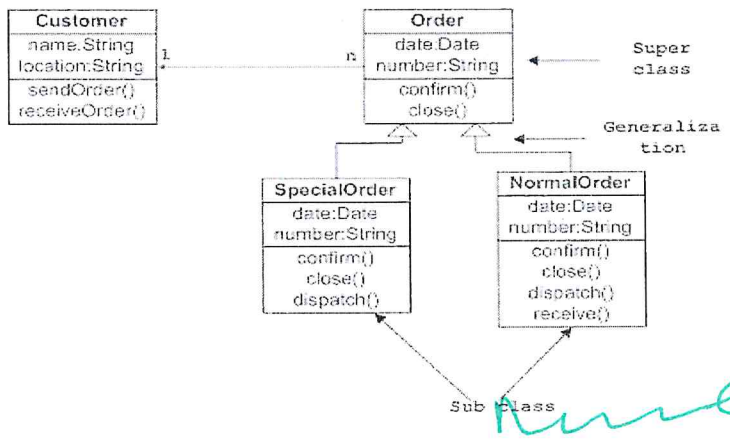
4. Procedural Cohesion: A module is said to be procedural cohesion if the set of purpose of the module are all parts of a procedure in which a particular sequence of steps has to be carried out for achieving a goal, e.g., the algorithm for decoding a message.

5. Temporal Cohesion: When a module includes functions that are associated by the fact that all the methods must be executed in the same time, the module is said to exhibit temporal cohesion.

CO3 BL2 11. Explain the Use case,UML and Class diagram, Sequence diagram.

In UML, use-case diagrams model the behavior of a system and help to capture the requirements of the system. Use-case diagrams describe the high-level functions and scope of a system. These diagrams also identify the interactions between the system and its actors.

Sample Class Diagram



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II - UNIT TEST, APRIL 2023

DEPARTMENT OF COMPUTER SCIENCE

Date: 12.04.2023 **Duration: 1 Hr** **Class: III BSc (CS) - I**

Subject Name & Code: INTRODUCTION TO CLOUD COMPUTING – SE26C **Max: 25 Marks**

SECTION – A

Answer any FIVE Questions **(5 x 1 = 5)**

CO	4	**BL**	B1	**1.** Define Cloud Storage
CO	5	**BL**	B4	**2.** Analyze the Cloud Computing
CO	6	**BL**	B2	**3.** Classify the cloud service of SaaS.
CO	3	**BL**	B2	**4.** List the main characteristics of cloud computing
CO	3	**BL**	B1	**5.** List the popular Web Mail Services
CO	5	**BL**	B4	**6.** Differentiate Grid computing and Cloud computing
CO	2	**BL**	B1	**7.** Identify twitter

SECTION – B

Answer any TWO Questions **(2 x 5 = 10)**

CO	5	**BL**	B4	**8.** Differentiate between private, public and hybrid clouds
CO	2	**BL**	B1	**9.** Describe On – Data Storage Management Tools.
CO	1	**BL**	B3	**10.** Illustrate the various types of Cloud File System
CO	4	**BL**	B2	**11.** Exploring the Cloud Computing Model.

SECTION – C

Answer any ONE Question **(1 x 10 = 10)**

CO	1	**BL**	B1	**12.** Explain the cloud architecture with a neat diagram.
CO	3	**BL**	B3	**13.** Discuss the risks of Cloud Computing.

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II - UNIT TEST, APRIL 2023

DEPARTMENT OF COMPUTER SCIENCE

Date: 12.04.2023 **Duration: 1 Hr** **Class: III BSc (CS) - I**

Subject Name & Code: INTRODUCTION TO CLOUD COMPUTING – SE26C **Max: 25 Marks**

Answer Key

SECTION – A

Answer any FIVE Questions **(5 x 1 = 5)**

CO 4 **BL** B1 **1.** Define Cloud Storage

Ans: Cloud storage is a cloud computing model that enables storing data and files on the internet through a cloud computing provider that you access either through the public internet or a dedicated private network connection.

CO 5 **BL** B4 **2.** Analyze the Cloud Computing

Ans: Cloud Computing is the delivery of computing services such as servers, storage, databases, networking, software, analytics, intelligence, and more, over the Cloud (Internet).

CO 6 **BL** B2 **3.** Classify the cloud service of SaaS.

Ans: SaaS(Software as a Service) is also known as "**On-Demand Software**". It is a software distribution model in which services are hosted by a cloud service provider.

CO 3 **BL** B2 **4.** List the main characteristics of cloud computing

Ans: Lists five essential characteristics of cloud computing: **on-demand self-service, broad network access, resource pooling, rapid elasticity, and measured service**.

CO 3 **BL** B1 **5.** List the popular Web Mail Services

Ans:

- Gmail.
- Outlook.
- ProtonMail.
- AOL.
- Zoho Mail.
- iCloud Mail.
- Yahoo! Mail.
- GMX.

using a private cloud), whereas other services can be hosted outside the organization's network (by using a public cloud). Users can them interchangeably use private as well as public cloud services in every day operations.

The biggest differences between public, private and hybrid cloud are described in the table below.

Difference	Private	Public	Hybrid
Tenancy	Single tenancy: there's only the data of a single organization stored in the cloud.	Multi-tenancy: the data of multiple organizations in stored in a shared environment.	The data stored in the public cloud is usually multi-tenant, which means the data from multiple organizations is stored in a shared environment. The data stored in private cloud is kept private by the organization.
Exposed to the Public	No: only the organization itself can use the private cloud services.	Yes: anyone can use the public cloud services.	The services running on a private cloud can be accessed only the organization's users, while the services running on public cloud can be accessed by anyone.
Data Center Location	Inside the organization's network.	Anywhere on the Internet where the cloud service provider's services are located.	Inside the organization's network for private cloud services as well as anywhere on the Internet for public cloud services.
Cloud Service Management	The organization must have their own administrators managing their private cloud services.	The cloud service provider manages the services, where the organization merely uses them.	The organization itself must manage the private cloud, while the public cloud is managed by the CSP.
Hardware Components	Must be provided by the organization itself, which has to buy physical servers to build the private cloud on.	The CSP provides all the hardware and ensures it's working at all times.	The organization must provide hardware for the private cloud, while the hardware of CSP is used for public cloud services.
Expenses	Can be quite expensive, since the hardware, applications and network have to be provided and managed by the organization itself.	The CSP has to provide the hardware, set-up the application and provide the network accessibility according to the SLA.	The private cloud services must be provided by the organization, including the hardware, applications and network, while the CSP manages the public cloud services.

and stable cloud fi le systems is provided by ghost cloud fi le system. GFS (Ghost File System) run over Amazon's S3, EC2 and SimpleDB web services. When using GFS, user can have complete control of the data and can be accessed as a standard network disk drive.

Benefi ts of Ghost CFS

- Elastic and cost effi cient: Pay for what you use from 1 GB to hundreds of terabytes.
- Multi-region redundancy: Aiming to take advantage of AWS's 99.99% availability
- Highly secure: Uses your own AWS account (ghost cannot access your data).
- No administration: Scales elastically with built in redundancy—no provisioning or backup.
- Anywhere: Mount on a server or client or access fi les via a web page or from a mobile phone.

Features of Ghost CFS

- Mature elastic fi le system in the cloud.
- All fi les and metadata duplicated across multiple AWS availability regions.

Gluster File System

GlusterFS is an open source, distributed fi le system capable of handling multiple clients and large data. GlusterFS clusters storage devices over network, aggregating disk and memory resources and managing data as a single unit. GlusterFS is based on a stackable user space design and delivers good performance for even heavier workloads.

GlusterFS supports clients with valid IP address in network. Users no longer locked with legacy storage platforms which are costly and monolithic. GlusterFS gives users the ability to deploy scale-out, virtualized storage, centrally managed pool of storage.

Attributes of GlusterFS include scalability and performance, high availability, global namespace, elastic hash algorithm, elastic volume manager, gluster console manager, and standards-based.

Hadoop File System

A distributed fi le system designed to run on commodity hardware is known as Hadoop Distributed File System (HDFS). In HDFS, fi les are stored in blocks ranging from 64 MB to 1024 MB. The default size is 64 MB. The blocks will be distributed across the cluster and replicated for fault tolerance.

Front End

The front end is used by the client. It contains client-side interfaces and applications that are required to access the cloud computing platforms. The front end includes web servers (including Chrome, Firefox, internet explorer, etc.), thin & fat clients, tablets, and mobile devices.

Back End

The back end is used by the service provider. It manages all the resources that are required to provide cloud computing services. It includes a huge amount of data storage, security mechanism, virtual machines, deploying models, servers, traffic control mechanisms, etc.

Components of Cloud Computing Architecture

There are the following components of cloud computing architecture -

1. Client Infrastructure

Client Infrastructure is a Front end component. It provides GUI (Graphical User Interface) to interact with the cloud.

2. Application

The application may be any software or platform that a client wants to access.

3. Service

A Cloud Services manages that which type of service you access according to the client's requirement.

Cloud computing offers the following three type of services:

i. Software as a Service (SaaS) – It is also known as **cloud application services**. Mostly, SaaS applications run directly through the web browser means we do not require to download and install these applications. Some important example of SaaS is given below –

Example: Google Apps, Salesforce Dropbox, Slack, Hubspot, Cisco WebEx.

ii. Platform as a Service (PaaS) – It is also known as **cloud platform services**. It is quite similar to SaaS, but the difference is that PaaS provides a platform for software creation, but using SaaS, we can access software over the internet without the need of any platform.

Example: Windows Azure, Force.com, Magento Commerce Cloud, OpenShift.

iii. Infrastructure as a Service (IaaS) – It is also known as **cloud infrastructure services**. It is responsible for managing applications data, middleware, and runtime environments.

implementation of cloud services and applications that use them and coordination of stakeholders and vying schemes to get agreement for storage, computing, mesh and applications to bypass isles of demand usage.

- Risk #3—The solution may be tough to evolve due to the adversity of incorporating the cloud services involved: There is a risk which will not be probable to include in cloud services with the current system and with each other. The service integration risk can be considered by contemplating interface alteration cost, proficiency to change the existing system and available skills.
- Risk #4—A catastrophe may occur from which the solution will not recover: As part of a risk investigation, it should recognize the unplanned happenings that could damage and assess their probabilities and impacts. One may also wish to make general provision for unforeseen happenings that disturb the cloud services that use or impair the data.
- Risk #5—System value may be insufficient, in order that it does not meet the users' needs: The value of an external service can be considered utilizing the identical components as for the value of the solution. In addition, look at the track records of suppliers very carefully.
- Risk #6 —There may be an existing need for service orientation: Not having full-fl edged SOA isn't inevitably strategic in itself when opting for cloud. But the incompetence to precede methods from present interfaces and inherent applications to more agile cloud services could actually mess up things. Finally it will make cloud more costly than leaving things as it is.

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II - UNIT TEST, APRIL 2023

DEPARTMENT OF COMPUTER SCIENCE

Date: 13.04.2023 **Duration: 1 Hour** **Class: I M.Sc. (CS)**

Subject Name & Code: Internet of Things & CS42B

Section A (5 x 1 = 5)

(Answer any **FIVE** questions)

CO5	BL1	1. List five main IoT Business Models.
CO2	BL1	2. Define old business models.
CO1	BL3	3. Demonstrate Peer to peer networks.
CO4	BL2	4. How will you identify the Small World Phenomenon?
CO1	BL1	5. List the WoT applications
CO3	BL1	6. List three layers of CUBIQ architecture.
CO4	BL1	7. List the different components of the middleware platform.

Section B (2 x 5 = 10)

(Answer any **TWO** questions)

CO1	BL2	8. Describe the IoT Business Models.
CO2	BL1	9. Explain the Structural Models.
CO2	BL2	10. Describe the Standards for M2M.
CO5	BL2	11. Explain the Frameworks for WSN.

Section C (1 x 10 = 10)

(Answer any **ONE** question)

CO4	BL2	12.Explain an Integrated Billing solution in the IoT.
CO3	BL2	13. Explain about Two Pillars of the Web.

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Department of Computer Science

Unit test II

Answer Key

Date: 13.04.2023 **Duration: 1 Hour** **Class: I M.Sc. (CS)**

Subject Name & Code: IoT, CS42B

Section A (5 x 1 = 5)

1. List five main IoT Business Models.

   Platform business model.

   Subscription model.

   Pay-per-usage model.

   Asset-sharing model.

   Asset-tracking model.

   Outcome-based model.

   Compliance model.

   Data-driven model.

2. Define old business models.

   The oldest business model is called the **bait and hook Business model**. This business model consists of offering a product at incredibly low cost (bait) and then making periodic surcharges for similar services (bait).

   The basic business models that currently exist in the IoT and IIoT space are:

   1. Retail sales : Equipment or device manufacturer expends its own money or raises financing to build products which are then sold to customers. The equipment or device manufacturer only captures value during that one transaction, the expectation is that there is a positive margin between revenue and expenses and that customers will buy more of the same product or other products.

   2. Product lease/Subscription : Instead of selling the machine/device. the vendor leases the product to the customer

3. Demonstrate Peer to peer networks.

   In a P2P network, computing devices use software to connect with each other over a private network, such as a home local area network (LAN) or a public network, such as the Internet. This direct connection allows each device to share files without requiring the assistance of a remote server.

services. This model charges the customer a fixed monthly fee based on the tier of service the customer chooses. IoT businesses benefit from the recurring revenue stream, and users appreciate that the costs are disbursed over time with no (or minimal) up-front cost. This model allows for flexible and creative monetization.

2. Pay-for-Usage Model

Thanks to sensors on your IoT device, you can monitor your customer's environment and track how much they use the product. This business model monitors devices to track usage and charges customers for that usage, instead of focusing on monetizing the sale of the device. The device is provided at a low cost, or even free of charge. An example is a smart scooter — the user pays a fee based on the length of time they are using the scooter.

3. Service Model

An IoT product can be used to provide a new service or enhance an existing one. With this type of model, you use your IoT product to gather data, and then provide a service based on the insights you collected. For example, you could use an IoT product to monitor machinery and predict maintenance, while offering a maintenance contract for regular service of the machinery. Keep in mind that the service model can also be combined with some of the other business models where you can sell the product, monetize the data, and also offer a value-added service based on its insights.

4. Outcome Model

A model that can be especially helpful if the device's cost is high is the outcome model, where customers pay for the benefits derived from the device and not for the device itself. This way, customers don't view the transaction as a high cost for a depreciating asset but rather focus on the value they're getting as a result of using the product. An outcome model allows for flexibility, such as the opportunity to lease the devices along with an outcome charge.

5. Asset-Sharing Model

The asset-sharing model is also effective when the device's cost is high or when customers aren't sure how high their usage will be. Any extra capacity can be sold to another customer, maximizing the device's utilization across multiple

interwork and interconnect to the communications networks. ▪ M2M communications networks: Communications networks between M2M gateways and M2M applications servers. They can be further broken down into access, transport, and core networks. Examples include xDSL, PLC, satellite, LTE, GERAN, UTRAN, eUTRAN, W-LAN, WiMAX, and others. ▪ M2M application server: The middleware layer where data goes through the various application services and is used by the specific business-processing engines

11. Frameworks for WSN.

SWE is a suite of standard encodings and web services that enable [106] the following: ▪ Discovery of sensors, processes, and observations ▪ Tasking of sensors or models ▪ Access to observations and observation streams ▪ Publish–subscribe capabilities for alerts ▪ Robust sensor system and process descriptions The following web service specifications have been produced by the OGC SWE Working Group (in addition to the encoding specifications described in Chapter 6): ▪ Sensor observation service—standard web interface for accessing observations ▪ Sensor planning service—standard web interface for tasking sensor systems and model and requesting acquisitions ▪ Sensor alert service—standard web interface for publishing and subscribing to sensor alerts ▪ Web notification service—standard web interface for asynchronous notification The USN (Ubiquitous Sensor Networks) standardization of ITU-T is another effort being carried out under the auspices of the Next-Generation Network Global Standards Initiative (NGN-GSI). USN is a conceptual network or framework built over existing physical networks that makes use of sensed data and provide knowledge services. Its main components are as follows: ▪ USN applications and services platform: technology framework to enable the effective use of a USN in a given application or service ▪ USN middleware: including functionalities for sensor network management and connectivity, event processing, sensor data mining, and so forth ▪ Network infrastructure: mainly based on NGNs, USN is not a physical network but rather a conceptual network making use of existing network

Section C (1 x 10 = 10)

12. Explain an Integrated Billing solution in the IoT.

UNIT - II

SRM ARTS AND SCIENCE COLLEGE

Department of Computer Science

Date: 13.04.2023 **Class: III B.Sc. (CS)**

Subject Name & Code: Internet of Things **Duration: 1 Hour**

Section A (5 x 2 = 10)

(Answer any **FIVE** questions)

CO2	BL1	1. List the four challenges of IoT industrial applications
CO3	BL1	2. Define a Smart product.
CO4	BL6	3. Design the Cost-effective Process Integration of IoT Devices.
CO5	BL2	4. Indicate the three layers of sensor networks.
CO6	BL6	5. List the Four Aspects of the Internet of Things & Services.
CO4	BL1	6. List the requirements of IoT application capabilities for industrial application.
CO5	BL2	7. Identify the AIDC technologies.

Section B (1 x 5 = 5)

(Answer any **ONE** question)

CO4	BL2	8. Summarize the concepts of Future Factory.
CO5	BL2	9. Explain Brownfield IoT: Technologies for Retrofitting.

Section C (1 x 10 = 10)

(Answer any **ONE** question)

CO4	BL2	10. Explain the IoT Applications for Industry — Value Creation and Challenges.
CO6	BL2	11. Explain the Contribution From FP7 Projects.

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Answer Key - ***Internet of Things***

1. challenges for IoT industrial applications.
   - IoT device technical challenges
   - Lifetime and energy challenge
   - Data and information challenge
   - Humans and business
2. Smart product

   a smart product primarily stores information about its production history and can actively adapt its production sequence based on the current status of production.

3. Cost-effective Process Integration of IoT Devices.

   1. Opportunistic data collection through local infrastructures and adhoc mobile access
   2. Context-aware interlinking of heterogeneous data starting from existing processes.
   3. Human agility and expertise supported by a human-centered information design.
4. three layers of sensor networks.

   Communication as part of the basic functions layer: describes the communication protocol for the interaction of a smart object with other smart objects, an infrastructure or backbone networks. • Service Layer: represents a set of functions commonly required, such as sensor information gathering, filtering by various policies and rules, data comparison and analysis, data mining, context modeling, context-aware processing, self-localization, context-aware decision and estimation. • Application Layer: realizes the use case of a smart object by a set of functions to users to meet defined requirements
5. Four Aspects of the Internet of Things & Services
   - Technology Business Innovation Market Competencies
6. The IoT application capabilities for industrial application should meet requirements.
   - Reliability Robustness. Reasonable cost Security and safety.
7. AIDC technologies

   •Automated Information Data Collection (AIDC) technologies including optical scanning of printed linear or 2D bar codes, radio frequency "reads" of passive RFID tags together with new telemetry technologies, provide a powerful portfolio of tools for product lifecycle visibility. Whether sensors are connected in an 'Internet of Things' via M2M protocols, via Enterprise applications or via the Cloud, leveraging AIDC standards is important to making data accessible for value creation

8. Summarize the concepts of Future Factory.

   a. Lever Mechanisms for the IoT in Future Factories The term "Internet of Things" describes a wide variety of concepts and applications in the context of equipping everyday items with computing and networking resources. Even if a common definition of the IoT might not exist, IoT implementations mainly focus three aspects.

   b. The SmartFactoryKL Initiative In order to transfer the central paradigms of the IoT to factory automation, many technologies working well in the consumer world have to be applied under industrial conditions. One of the biggest obstacles keeping responsibles away from the application of new technologies is missing trust and the lack of best practice examples.

   c. From Technologies to Technology Concepts Often the discussion about the IoT in the context of industry applications is of technological nature. However, as stated before technology is only a means to an end. Experience with the SmartFactoryKL shows that instead of losing oneself in the discussion of technical implementation details one should focus on the application type of IoT technology. Regarding the future factory this are basically the smart product, the smart equipment, the smart infrastructure and the augmented operator. These concepts can be implemented using a wide range of technology depending on the concrete scenario.

9. Brownfield IoT: Technologies for Retrofitting:

The Internet of Things aims to be a disruptive technology in many ways and may change how future industry will work. However, enabling technologies like RFID or Wireless Sensor Networks are in place, it is often hindered by the fact that huge investments are needed and the local value is considered too low for adoption. The creation of a global network of various ubiquitous networks is one of the driving technological vision behind the Internet of Things. The economical vision of creating domain-and network-wide business fields and usage scenarios by pervasive information networking uses the "Internet" both as a technical and economical analogon. On one hand, as the global IP-based network that connects over 5 billion devices of different networks, and on the other the resulting economic growth and business cases. The interesting fact is, however, that a lot of the enabling technology of the Internet of Things is made to work in a very resource efficient way that hinders such efforts. Novel applications are often enabled only by proprietary technology that uses local optimizations and does not primarily consider inter-networking aspects. Industrial infrastructures are often older that the networks that formed the initial Internet. They can by no means be considered a green field, but consists of a large installed

base with machinery that has lifetimes of up to 40 years. Thus many of the applications of IoT technology.

10. IoT Applications for Industry — Value Creation and Challenges:

IoT Applications Throughout the entire document the following pragmatic definition for IoT applications was used in order to focus the scope and to have a common understanding: IoT applications in the sense of this paper are solutions using IoT technologies capable to improve and easy adapt industrial manufacturing processes, enable new and efficient ways to do operate and interact in production plants, create new service or supervision means for industrial installations, offer an optimized infrastructure, reduce operational cost and energy consumption or improve human safety in industrial areas.

There is no value but "values" each contributing to the total benefit such as: • Value from visibility identification, location tracking • Value form IoT-supported safety in hard industrial environments • Value from right information providing or collecting • Value form improved industrial operation and flows in industry • Value from reduced production losses • Value from reduced energy consumption • Value from new type of processes made possible by IoT applications • Value form new type of maintenance and lifetime approaches • Value enabled by smart objects, connected aspects • Value from sustainability

11. Contribution From FP7 Projects.

a. FP7 iCore Access Framework (iCore Contribution) The iCore cognitive framework is based on the principle that any real world object and any digital object that is available, accessible, observable or controllable can have a virtual representation in the "Internet of Things", which is called Virtual Object (VO). The virtual objects (VOs) are primarily targeted to the abstraction of technological heterogeneity and include semantic description of functionality that enables situation-aware selection and use of objects. Composite virtual objects (CVOs) use the services of virtual objects. A CVO is a cognitive mash-up of semantically interoperable VOs that renders services in accordance with the user/stakeholder perspectives and the application requirements.

b. IoT@Work Capability Based Access Control System (IoT@Work Contribution) The Internet of Things (IoT) envisages new security challenges, including in the area of access control that can hardly be met by existing security solutions. Indeed, IoT is a more demanding environment in terms of scalability and manageability due both to the potentially unbounded number of things (resources and subjects), the expected most relevant need to

support the orchestration and integration of different services, the relevance of short-lived, often casual and/ or spontaneous interaction patterns, the relevance of contexts, etc

c. GAMBAS Adaptive Middleware (GAMBAS Contribution) The GAMBAS project develops an innovative and adaptive middleware to enable the privacy-preserving and automated utilization of behaviour-driven services that adapt autonomously to the context of users. In contrast to today's mobile information access, which is primarily realized by on-demand searches via mobile browsers or via mobile apps, the middleware envisioned by GAMBAS will enable proactive access to the right information at the right point in time. As a result, the context-aware automation enabled by the GAMBAS middleware will create a seamless and less distractive experience for its users while reducing the complexity of application development

d. IoT-A Architecture (IoT-A Contribution) Security is an important cornerstone for the Internet of Things (IoT). This is why, in the IoT-A project, we deemed as very important to thoroughly address security and privacy issues in various aspects. A set of requirements based on the input of external and internal stakeholders was used as a basis for the identification of the mechanisms and functionalities that guarantee user data privacy and integrity, user authentication, and trustworthiness of the system.

e. Governance, Security and Privacy in the Butler Project (Butler Contribution) The goal of the BUTLER project is the creation of an experimental technical platform to support the development of the Internet of Things. The main specificity of the BUTLER approach is its targeted "horizontality": The vision behind BUTLER is that of a ubiquitous Internet of Things, affecting several

f. domains of our lives (health, energy, transports, cities, homes, shopping and business) all at once. The BUTLER platform must therefore be able to support different "Smart" domains, by providing them with communication, location and context awareness abilities, while guaranteeing their security and the privacy of the end users. The issue of security and privacy is therefore central in the BUTLER project and develops in several requirements, the main requirements relate to: • Standard issues of data security, both at data storage level as at data communication level exists in IoT application. The diversity and multiplicity of the "things" connected by the internet of things, and of the data exchanged further amplifies and complicate these requirements. • The application enabled by the Internet of Things may pose additional privacy issues in the use that is made of the data.

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II - UNIT TEST, APRIL 2023
DEPARTMENT OF COMPUTER SCIENCE

Date : 11.04.2023 **Duration :1 Hr** **Class : III B.Sc.CS**

Subject Name &Code: Introduction to Data Science & SE26B **Marks: 25**

Section A (5 x 2 = 10)

(Answer any **FIVE** questions)

CO 3 BL 1 1. Define machine learning.

CO 3 BL 4 2. List out the advantages for Machine learning in data science.

CO 4 BL 1 3. State Atomicity.

CO 5 BL 1 4. Define map reduce.

CO 5 BL 6 5. Write down the use of NoSQL.

CO 1 BL 1 6. Define data science process.

CO 5 BL 4 7. List down the NoSQL database types.

Section B (1 x 5 = 5)

(Answer any **ONE** question)

CO 3 BL 6 8. Discuss about Spark.

CO 4 BL 3 9. Describe the Python tools used in machine learning.

Section C (1 x 10 = 10)

(Answer any **ONE** question)

CO 2 BL 2 10. Explain in detail about modeling process.

CO 4 BL 6 11. Discuss Hadoop framework.

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Department of Computer Science

Unit Test II – April 2023

Date : 11.04.2023 **Duration :1 Hr** **Class : III B.Sc.CS**

Subject Name &Code: Introduction to Data Science SE26B **Marks: 25**

Section A (5 x 2 = 10)

(Answer any **FIVE** questions)

CO 3 BL 1 1. Define machine learning.

Machine learning is a branch of artificial intelligence (AI) and computer science which focuses on the use of data and algorithms to imitate the way that humans learn, gradually improving its accuracy.

CO 3 BL 4 2. List out the advantages for Machine learning in data science.

Finding oil fields, gold mines, or archeological sites based on existing sites (class ification and regression)

Finding place names or persons in text (classification)

Identifying people based on pictures or voice recordings (classification)

CO 4 BL 1 3. State Atomicity.

The "all or nothing" principle. If a record is put into a database, it's put in completely or not at all. If, for instance, a power failure occurs in the middle of a database write action, you wouldn't end up with half a record; it wouldn't be there at all.

CO 5 BL 2 4. Define map reduce.

MapReduce is a programming paradigm that enables massive scalability across hundreds or thousands of servers in a Hadoop cluster.

CO 5 BL 1 5. Write down the use of NoSQL.

NoSQL present fundamentally different ways to model the data at hand to fit its structure to its use case and not to how a relational database requires it to be modeled.

CO 1 BL 1 6. Define data science process.

Data science is the study of data to extract meaningful insights for business. It is a multidisciplinary approach that combines principles and practices from the fields of mathematics, statistics, artificial intelligence, and computer engineering to analyze

large amounts of data.

CO 5 BL 6 7. List down the NoSQL database types.

Key-value store, document store, column-oriented database, and graph database.

Section B (1 x 5 = 5)

(Answer any **ONE** question)

CO 3 BL 6 8. Discuss about Spark.

Spark is a cluster computing framework similar to MapReduce. Spark, however, doesn't handle the storage of files on the (distributed) file system

itself, nor does it handle the resource management. For this it relies on systems such as the Hadoop File System, YARN, or Apache Mesos. Hadoop and Spark are thus complementary systems. For testing and development, you can even run Spark on your local system.

Spark has four other large components, as listed below

1. Spark streaming is a tool for real-time analysis.
2. Spark SQL provides a SQL interface to work with Spark.
3. MLLib is a tool for machine learning inside the Spark framework.
4. GraphX is a graph database for Spark.

CO 4 BL 3 9. Describe the Python tools used in machine learning.

SciPy is a library that integrates fundamental packages often used in scientific computing such as NumPy, matplotlib, Pandas, and SymPy.

NumPy gives you access to powerful array functions and linear algebra functions.

Matplotlib is a popular 2D plotting package with some 3D functionality.

Pandas is a high-performance, but easy-to-use, data-wrangling package. It intro

duces dataframes to Python, a type of in-memory data table. It's a concept that should sound familiar to regular users of R.

SymPy is a package used for symbolic mathematics and computer algebra.

StatsModels is a package for statistical methods and algorithms.

Scikit-learn is a library filled with machine learning algorithms.

RPy2 allows you to call R functions from within Python. R is a popular open source statistics program.

NLTK (Natural Language Toolkit) is a Python toolkit with a focus on text analytics.

Section C (1 x 10 = 10)

(Answer any **ONE** question)

CO 2 BL 2 10. Explain in detail about modeling process.

The modeling phase consists of four steps:

1. Feature engineering and model selection
2. Training the model
3. Model validation and selection
4. Applying the trained model to unseen data

CO 4 BL 6 11. Discuss Hadoop framework.

Apache Hadoop is a framework that simplifies working with a cluster of computers. It aims to be all of the following things and more:

- Reliable—By automatically creating multiple copies of the data and redeploying processing logic in case of failure.
- Fault tolerant—It detects faults and applies automatic recovery.
- Scalable—Data and its processing are distributed over clusters of computers (horizontal scaling).
- Portable—Installable on all kinds of hardware and operating systems.

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Date: 10-04-2023 **Duration: 1 Hour** **Class: I M.Sc. (CS)**
Subject Name & Code: Machine Learning

Section A **(5 x 1 = 5)**
(Answer any FIVE questions)

CO4	BL1	1. State perceptron
CO2	BL1	2. List down the issues of handling imbalanced dataset
CO1	BL1	3. Define probabilistic learning
CO2	BL6	4. Write about correlation and its types
CO6	BL1	5. State about ensemble learning
CO5	BL6	6. Write about KNN algorithm
CO3	BL6	7. Enumerate few applications of clustering

Section B **(2 x 5 = 10)**
(Answer any TWO questions)

CO3	BL6	8. Write short notes of kernel functions
CO1	BL2	9. Discuss about design, analysis and evaluation of machine learning experiments
CO1	BL2	10. Explain about finite and infinite hypothesis space
CO4	BL2	11. Explain about voting and error-correcting output codes

Section C **(1 x 10 = 10)**
(Answer any ONE question)

CO6	BL2	12. Explain Naive Bayes classifier with example.
CO5	BL2	13. Describe Random tree and forest with example.

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Date: 10-04-2023 **Duration: 1 Hour** **Class: I M.Sc. (CS)**
Subject Name & Code: Machine Learning

Answer Key

Section A **(5 x 1 = 5)**
(Answer any FIVE questions)

CO4 BL1 1. State perceptron

A neural network link that contains computations to track features and uses Artificial Intelligence in the input data is known as perceptron.

CO2 BL1 2. List down the issues of handling imbalanced dataset

- ✓ Choose Proper Evaluation Metric
- ✓ Resampling (Oversampling and Under-sampling)
- ✓ Threshold moving

CO1 BL1 3. Define probabilistic learning

One principled way to choose a model is choose a model that is most likely, given the data. That is, given a data set E, choose a model m that maximizes the probability of the model given the data, $P(m \mid E)$. The model that maximizes $P(m \mid E)$ is called the maximum a posteriori probability model, or the MAP model.

The probability of model m given examples E is obtained by using Bayes' rule:

$$P(m \mid E) = \frac{P(E \mid m) * P(m)}{P(E)}.$$

CO2 BL6 4. Write about correlation and its types

A correlation reflects the strength and/or direction of the association between two or more variables. A positive correlation means that both variables change in the same direction. A negative correlation means that the variables change in opposite directions.

CO6 BL1 5. State about ensemble learning

Ensemble learning is a general meta approach to machine learning that seeks better predictive performance by combining the predictions from multiple models.

CO5 BL6 6. Write about KNN algorithm

The k-nearest neighbours algorithm, also known as KNN or k-NN, is a non-parametric, supervised learning classifier, which uses proximity to make classifications or predictions about the grouping of an individual data point.

CO3 BL6 7. Enumerate few applications of clustering

- **Market Segmentation**
- Statistical data analysis
- Social network analysis
- Image segmentation
- Anomaly detection, etc.

Section B (2 x 5 = 10)
(Answer any TWO questions)

CO3 BL6 8. Write short notes of kernel functions

The function of kernel is to take data as input and transform it into the required form. Different SVM algorithms use different types of kernel functions. These functions can be different types. For example linear, nonlinear, polynomial, radial basis function (RBF), and sigmoid.

CO1 BL2 9. Discuss about design, analysis and evaluation of machine learning experiments

How can we evaluate a learning algorithm on a particular problem?

Given two learning algorithms, how can we compare them, for a given application?

How can we evaluate the significance of the obtained results?

CO1 BL2 10. Explain about finite and infinite hypothesis space

The hypothesis is defined as the supposition or proposed explanation based on insufficient evidence or assumptions.

Finite hypothesis space: Countable number of hypothesis

Infinite hypothesis space: Unbounded number of hypothesis

CO4 BL2 11. Explain about voting and error-correcting output codes

The **Error-Correcting Output Codes** method is a technique that allows a multi-class classification problem to be reframed as multiple binary classification problems, allowing the use of native binary classification models to be used directly.

- ✓ Error-correcting output codes is a technique for using binary classification models on multi-class classification prediction tasks.
- ✓ How to fit, evaluate, and use error-correcting output codes classification models to make predictions.

- ✓ How to tune and evaluate different values for the number of bits per class hyper parameter used by error-correcting output codes.

Section C **(1 x 10 = 10)**

(Answer any ONE question)

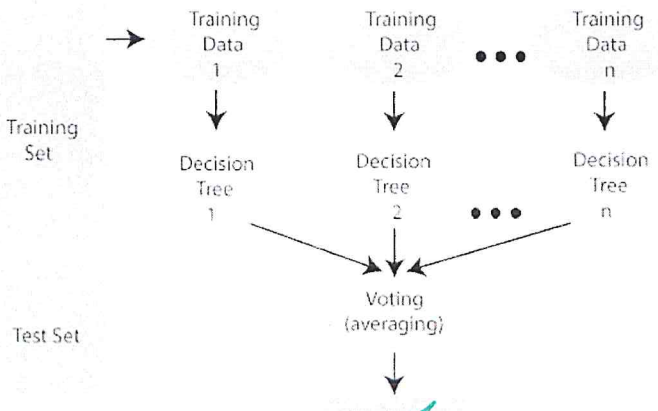
CO6 BL2 12. Explain Naive Bayes classifier with example.

Naïve Bayes Classifier Algorithm

- Naïve Bayes algorithm is a supervised learning algorithm, which is based on **Bayes theorem** and used for solving classification problems.
- It is mainly used in *text classification* that includes a high-dimensional training dataset.
- Naïve Bayes Classifier is one of the simple and most effective Classification algorithms which helps in building the fast machine learning models that can make quick predictions.
- **It is a probabilistic classifier, which means it predicts on the basis of the probability of an object.**
- Some popular examples of Naïve Bayes Algorithm are **spam filtration, Sentimental analysis, and classifying articles.**

CO5 BL2 13. Describe Random tree and forest with example.

Random Forest is a supervised machine learning algorithm made up of decision trees. "Random Forest is a classifier that contains a number of decision trees on various subsets of the given dataset and takes the average to improve the predictive accuracy of that dataset." Random Forest is used for both classification and regression—for example, classifying whether an email is "spam" or "not spam"



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II UNIT TEST
Department of Computer Science

Date : 11-04-2023 **Class :I MSC CS**
Duration : I Hour

Subject Name &Code :ADVANCED NETWORKS

Section A (5 x 1 = 5)
(Answer any **FIVE** questions)

CO4	BL6	1.Write the uses of IP version 6.
CO4	BL1	2.List the importance of acknowledgement and Timeout.
CO3	BL1	3. What is congestion in networks.
CO6	BL4	4.Distinguish public key and private key in cryptography.
CO1	BL1	5. Write about DNS?
CO3	BL6	6.Write any two taxonomy of congestion control.
CO3	BL1	7.Define the term - UDP.

Section B (2 x 5 = 10)
(Answer any **TWO** questions)

CO1	BL6	8.Summarize the properties of Ethernet. Draw its frame format.
CO3	BL1	9. Explain the resource allocation issues in congestion.
CO6	BL4	10.Describe about Cryptographic building blocks.
CO6	BL2	11. Explain about trust and threats.

Section C (1 x 10 = 10)
(Answer any **ONE** question)

CO2	BL2	11.Describe the QOS Approaches
CO5	BL3	12. Discuss about Overlay networks.

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II UNIT TEST
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Date : 11-04-2023 **Class :I MSC CS**
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Subject Name &Code :ADVANCED NETWORKS

Section A (5 x 1 = 5)
(Answer any **FIVE** questions)

CO4 BL6 1.Write the uses of IP version 6.

Internet Protocol version 6 (IPv6) is the most recent version of the Internet Protocol (IP), the communications protocol that provides an identification and location system for computers on networks and routes traffic across the Internet.

- No more NAT (Network Address Translation)
- Auto-configuration.
- No more private address collisions.
- Better multicast routing.
- Simpler header format.
- Simplified, more efficient routing.
- True quality of service (QoS), also called "flow labeling"
- Built-in authentication and privacy support.

CO4 BL1 2.List the importance of acknowledgement and Timeout.

The receipt of an acknowledgment indicates to the sender of the original frame that its frame was successfully delivered. If the sender does not receive an acknowledgment after a reasonable amount of time, then it retransmits the original frame. This action of waiting a reasonable amount of time is called a timeout.

CO3 BL1 3. What is congestion in networks.

Network congestion refers to a reduction in quality of service (QOS) that causes packet loss, queueing delay, or the blocking of new connections. Typically, network congestion occurs in cases of traffic overloading when a link or network node is handling data in excess of its capacity.

CO6 BL4 4.Distinguish public key and private key in cryptography.

Private Key	Public Key
Symmetric encryption	Asymmetric encryption.
Remains in the confidential use of two individuals.	Available to everyone through the publicly accessible directory.
The possibility of key getting lost, which will render the system void.	Key is publicly held so no possibility of loss.

CO1 BL1 5. Write about DNS?

The domain name system (DNS) is a naming database in which internet domain names are located and translated into Internet Protocol (IP) addresses. The domain name system maps the name people use to locate a website to the IP address that a computer uses to locate that website.

CO3 BL6 6.Write any two taxonomy of congestion control.

Router-centric - hosts at the edges of the network (transport protocol)

Host-centric - routers inside the network (queuing discipline)

CO3 BL1 7.Define the term - UDP.

User Datagram Protocol (UDP) is a communications protocol that is primarily used to establish low-latency and loss-tolerating connections between applications on the internet.

Section B (2 x 5 = 10)

(Answer any **TWO** questions)

CO1 BL6 8.Summarize the properties of Ethernet. Draw its frame format.

Physical Properties

Ethernet segments were originally implemented using coaxial cable of length up to 500 m. (Modern Ethernets use twisted copper pairs, usually a particular type known as "Category 5," or optical fibers, and in some cases can be quite a lot longer than 500 m.) This cable was similar to the type used for cable TV. Hosts connected to an Ethernet segment by tapping into it. A *transceiver*, a small device directly attached to the tap, detected when the line was idle and drove the signal when the host was transmitting. It also received incoming signals. The transceiver, in turn, connected to an Ethernet adaptor, which was plugged into the host. This configuration is shown in Figure 39.

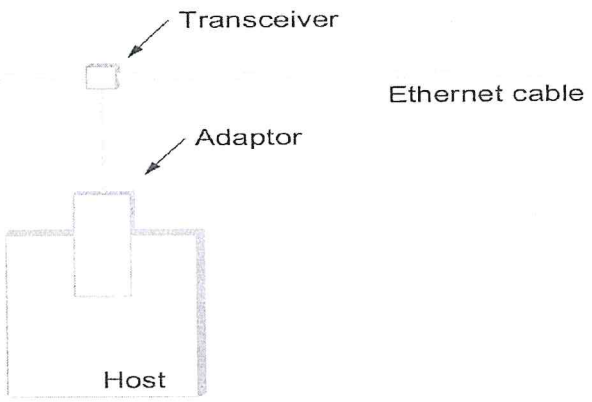


Figure 39. *Ethernet transceiver and adaptor.*

Multiple Ethernet segments can be joined together by *repeaters* (or a multi-port variant of a repeater, called a *hub*). A repeater is a device that forwards digital signals, much like an amplifier forwards analog signals; repeaters do not understand bits or frames. No more than four repeaters could be positioned between any pair of hosts, meaning that a classical Ethernet had a total reach of only 2500 m. For example, using just two repeaters between any pair of hosts supports a configuration similar to the one illustrated in Figure 40; that is, a segment running down the spine of a building with a segment on each floor.

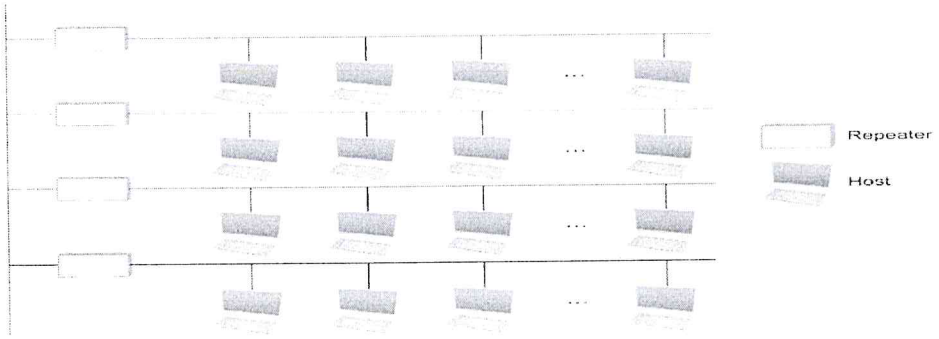


Figure 40. *Ethernet repeater, interconnecting segments to form a larger collision domain.*

Frame Format

Each Ethernet frame is defined by the format given in Figure 41. The 64-bit preamble allows the receiver to synchronize with the signal; it is a sequence of alternating 0s and 1s. Both the source and destination hosts are identified with a 48-bit address. The packet type field serves as the demultiplexing key; it identifies to which of possibly many higher-level protocols this frame should be delivered. Each frame contains up to 1500 bytes of data. Minimally, a frame must contain at least 46 bytes of data, even if this means the host has to pad the frame before transmitting it. The reason for this minimum frame size is that the frame must be long enough to detect a collision; we discuss this more below. Finally, each frame includes a 32-bit CRC. Like the HDLC protocol described in an earlier section, the Ethernet is a bit-oriented framing protocol. Note that from the host's perspective, an Ethernet frame has a 14-byte header: two 6-byte addresses and a 2-byte type field. The sending adaptor attaches the preamble and CRC before transmitting, and the receiving adaptor removes them.



Figure 41. *Ethernet frame format.*

CO3 BL1 9. Explain the resource allocation issues in congestion.

Issues in Allocating Resources

We now turn to a problem that spans the entire protocol stack—how to effectively and fairly allocate resources among a collection of competing users. The resources being shared include the bandwidth of the links and the buffers on the routers or switches where packets are queued awaiting transmission. When too many packets are contending for the same link, the queue fills and two undesirable things happen: packets experience increased end-to-end delay, and in the worst case, the queue overflows and packets have to be dropped. When long queues persist and drops become common, the network is said to be congested. Most networks provide a congestion-control mechanism to deal with just such a situation.

Congestion control and resource allocation involve both hosts and network elements such as routers. In network elements, various queuing disciplines can be used to control the order in which packets get transmitted and which packets get dropped. The queuing discipline can alsosegregate traffic to keep one user's packets from unduly affecting another user's packets. At the end hosts, the congestion-control mechanism paces how fast sources are allowed to send packets.

This is done in an effort to keep congestion from occurring in the first place and, should it occur,

to help eliminate the congestion.

1. Network Model□

a. Packet-Switched Network□

Resource allocation in a packet-switched network (or internet) consisting of multiple links and switches (or routers). In such an environment, a given source may have more than enough capacity on the immediate outgoing link to send a packet, but somewhere in the middle of a network its packets encounter a link that is being used by many different traffic sources. Figure 152 illustrates this situation—two high-speed links are feeding a low-speed link. To see this, we need look no further than the simple network depicted in Figure 152, where all traffic has to flow through the same router to reach the destination. Although this is an extreme example, it is common to have a certain router that it is not possible to route around. This router can become congested, and there is nothing the routing mechanism can do about it. Thiscongested router is sometimes called the bottleneck router.

b. Connectionless Flows

One of the powers of the flow abstraction is that flows can be defined at different granularities.For example, a flow can be host-to-host (i.e., have the same source/destination host addresses) or process-to-process (i.e., have the same source/destination host/port pairs). In the latter case, a flow is essentially the same as a channel, as we have been using that term throughout this book. The reason we introduce a new term is that a flow is visible to the routers inside the network, whereas a channel is an end-to-end abstraction. Figure 153 illustrates several flows passing through a series of routers.

□

c. Service Model□

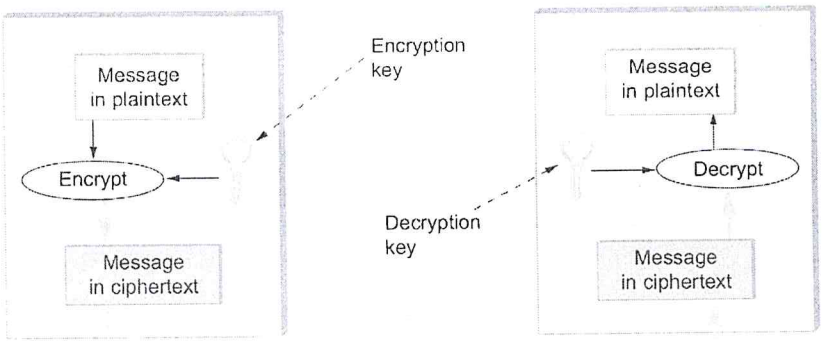
In the early part of this chapter, we will focus on mechanisms that assume the best-effort service model of the Internet. With best-effort service, all packets are given essentially equal treatment,with end hosts given no opportunity to ask the network that some packets or flows be given certain guarantees or preferential service. Defining a service model that supports some kind of preferred service or guarantee—for example, guaranteeing the bandwidth needed for a video stream—is the subject of a later section. Such a service model is said to provide multiple qualities of service (QoS). As we will see, there is actually a spectrum of possibilities, ranging from a purely best-effort service model to one in which individual flows receive quantitative guarantees of QoS. One of the greatest challenges is to define a service model that meets the needs of a wide range of applications and even allows for the applications that will be invented in the future.

CO6 BL4 10.Describe about Cryptographic building blocks.

We introduce the concepts of cryptography-based security step by step. The first step is the cryptographic algorithms—ciphers and cryptographic hashes—that are introduced in this section. They are not a solution in themselves, but rather building blocks from which a solution can be built. Cryptographic algorithms are parameterized by *keys*, and a later section then addresses the problem of distributing the keys.

1. Principles of Ciphers

Encryption transforms a message in such a way that it becomes unintelligible to any party that does not have the secret of how to reverse the transformation. The sender applies an *encryption* function to the original *plaintext* message, resulting in a *ciphertext* message that is sent over the network.The receiver applies a secret *decryption* function—the inverse of the encryption function—to recover the original plaintext. The ciphertext transmitted across the network is unintelligible to any eavesdropper, assuming the eavesdropper doesn't know the decryption function. The transformation represented by an encryption function and its corresponding decryption function is called a *cipher*.

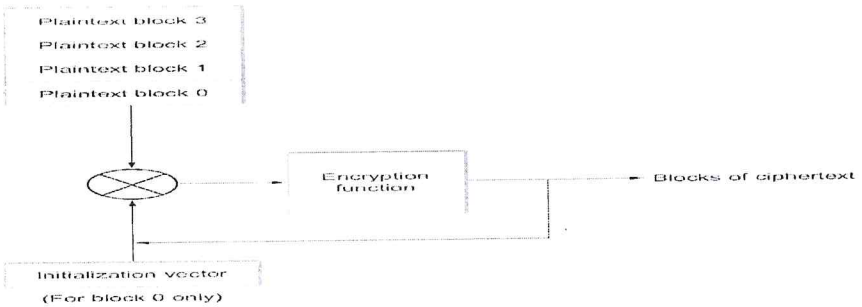


The basic requirement for an encryption algorithm is that it turns plaintext into ciphertext in such a way that only the intended recipient—the holder of the decryption key—can recover the plaintext. What this means is that encrypted messages cannot be read by people who do not hold the key.

It is important to realize that when a potential attacker receives a piece of ciphertext, he may have more information at his disposal than just the ciphertext itself. For example, he may know that the plaintext was written in English, which means that the letter *e* occurs more often in the plaintext that any other letter; the frequency of many other letters and common letter combinations can also be predicted.

Most ciphers are *block ciphers*; they are defined to take as input a plaintext block of a certain fixed size, typically 64 to 128 bits. Using a block cipher to encrypt each block independently—known as *electronic codebook (ECB) mode* encryption—has the weakness that a given plaintext block value will always result in the same ciphertext block. Hence, recurring block values in the plaintext are recognizable as such in the ciphertext, making it much easier for a cryptanalyst to break the cipher.

To prevent this, block ciphers are always augmented to make the ciphertext for a block vary depending on context. Ways in which a block cipher may be augmented are called *modes of operation*. A common mode of operation is *cipher block chaining* (CBC), in which each plaintext block is XORed with the previous block's ciphertext before being encrypted. The result is that each block's ciphertext depends in part on the preceding blocks (i.e., on its context). Since the first plaintext block has no preceding block, it is XORed with a random number. That random number, called an *initialization vector* (IV), is included with the series of ciphertext blocks so that the first ciphertext block can be decrypted.



2. Secret-Key Ciphers

Data Encryption Standard (DES) was the first, and it has stood the test of time in that no cryptanalytic attack better than brute force search has been discovered. Brute force search,

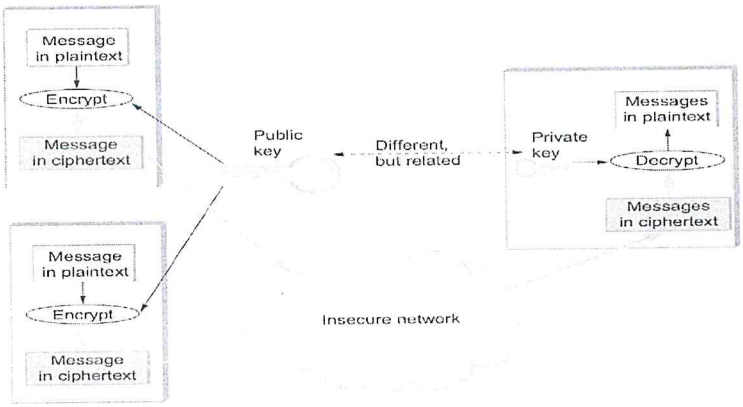
however, has gotten faster. DES's keys (56 independent bits) are now too small given current processor speeds. DES keys have 56 independent bits (although they have 64 bits in total; the last bit of every byte is a parity bit). As noted above, you would, on average, have to search half of the space of 256 possible keys to find the right one, giving $255 = 3.6 \times 1016$ keys. That may sound like a lot, but such a search is highly parallelizable, so it's possible to throw as many computers at the task as you can get your hands on—and these days it's easy to lay your hands on thousands of computers. (Amazon will rent them to you for a few cents an hour.) By the late 1990s, it was already possible to recover a DES key after a few hours. Consequently, NIST updated the DES standard in 1999 to indicate that DES should only be used for legacy systems.

NIST also standardized the cipher *Triple DES* (3DES), which leverages the cryptanalysis resistance of DES while in effect increasing the key size. A 3DES key has 168 ($= 3 \times 56$) independent bits, and is used as three DES keys; let's call them DES-key1, DES-key2, and DES-key3. 3DES encryption of a block is performed by first DES encrypting the block using DES-key1, then DES *de*crypting the result using DES-key2, and finally DES encrypting that result using DES-key3. Decryption involves decrypting using DES-key3, then encrypting using DES-key2, then decrypting using DES-key1.

The reason 3DES encryption uses DES *de*cryption with DES-key2 is to interoperate with legacy DES systems. If a legacy DES system uses a single key, then a 3DES system can perform the same encryption function by using that key for each of DES-key1, DES-key2, and DES-key3; in the first two steps, we encrypt and then decrypt with the same key, producing the original plaintext, which we then encrypt again.

3.Public-Key Ciphers

An alternative to secret-key ciphers is public-key ciphers. Instead of a single key shared by two participants, a public-key cipher uses a pair of related keys, one for encryption and a different one for decryption. The pair of keys is "owned" by just one participant. The owner keeps the decryption key secret so that only the owner can decrypt messages; that key is called the *private key*. The owner makes the encryption key public, so that anyone can encrypt messages for the owner; that key is called the *public key*. Obviously, for such a scheme to work, it must not be possible to deduce the private key from the public key. Consequently, any participant can get the public key and send an encrypted message to the owner of the keys, and only the owner has the private key necessary to decrypt it.

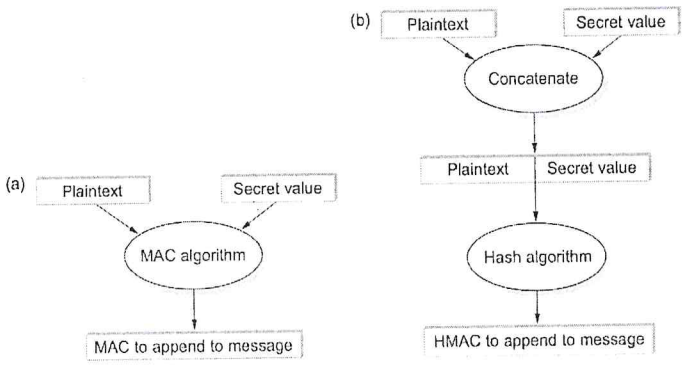


4.Authenticators

Encryption alone does not provide data integrity. For example, just randomly modifying a ciphertext message could turn it into something that decrypts into valid-looking plaintext, in which case the tampering would be undetectable by the receiver. Nor does encryption alone provide authentication. It is not much use to say that a message came from a certain participant if the contents of the message have been modified after that participant created it. In a sense, integrity and authentication are fundamentally inseparable.

An *authenticator* is a value, to be included in a transmitted message, that can be used to verify simultaneously the authenticity and the data integrity of a message. We will see how authenticators can be used in protocols. For now, we focus on the algorithms that produce authenticators.

One kind of authenticator combines encryption and a *cryptographic hash function.* Cryptographic hash algorithms are treated as public knowledge, as with cipher algorithms. A cryptographic hash function (also known as a *cryptographic checksum*) is a function that outputs sufficient redundant information about a message to expose any tampering. Just as a checksum or CRC exposes bit errors introduced by noisy links, a cryptographic checksum is designed to expose deliberate corruption of messages by an adversary. The value it outputs is called a *message digest* and, like an ordinary checksum, is appended to the message. All the message digests produced by a given hash have the same number of bits regardless of the length of the original message. Since the space of possible input messages is larger than the space of possible message digests, there will be different input messages that produce the same message digest, like collisions in a hash table.



Key Predistribution

To use ciphers and authenticators, the communicating participants need to know what keys to use. In the case of a secret-key cipher, how does a pair of participants obtain the key they share? In the case of a public-key cipher, how do participants know what public key belongs to a certain participant? The answer differs depending on whether the keys are short-lived *session keys* or longer-lived pre-distributed keys.

A session key is a key used to secure a single, relatively short episode of communication: a session. Each distinct session between a pair of participants uses a new session key, which is always a secret key for speed. The participants determine what session key to use by means of a protocol—a session key establishment protocol. A session key establishment protocol needs its own security (so that, for example, an adversary cannot learn the new session key); that security is based on the longer-lived pre-distributed keys.

There are two primary motivations for this division of labor between session keys and pre distributed keys:

- Limiting the amount of time a key is used results in less time for computationally intensive attacks, less ciphertext for cryptanalysis, and less information exposed should the key be broken.
- Public key ciphers are generally superior for authentication and session key establishment but too slow to use for encrypting entire messages for confidentiality.

1. Predistribution of Public Keys

The algorithms to generate a matched pair of public and private keys are publicly known, and software that does it is widely available. So, if Alice wanted to use a public-key cipher, she could generate her own pair of public and private keys, keep the private key hidden, and publicize the public key. But, how can she publicize her public key—assert that it belongs to her—in such a way that other participants can be sure it really belongs to her? Not

via email or Web, because an adversary could forge an equally plausible claim that key x belongs to Alice when x really belongs to the adversary.

A complete scheme for certifying bindings between public keys and identities—what key belongs to whom—is called a *Public Key Infrastructure* (PKI). A PKI starts with the ability to verify identities and bind them to keys out of band. By "out of band," we mean something outside the network and the computers that comprise it, such as in the following If Alice and Bob are individuals who know each other, then they could get together in the same room and Alice could give her public key to Bob directly, perhaps on a business card. If Bob is an organization, Alice the individual could present conventional identification, perhaps involving a photograph or fingerprints. If Alice and Bob are computers owned by the same company, then a system administrator could configure Bob with Alice's public key.

One of the major standards for certificates is known as X.509. This standard leaves a lot of details open, but specifies a basic structure. A certificate clearly must include:

- The identity of the entity being certified
- The public key of the entity being certified
- The identity of the signer
- The digital signature
- A digital signature algorithm identifier (which cryptographic hash and which cipher)

2.Predistribution of Secret Keys

If Alice wants to use a secret-key cipher to communicate with Bob, she can't just pick a key and send it to him because, without already having a key, they can't encrypt this key to keep it confidential and they can't authenticate each other. As with public keys, some predistribution scheme is needed. Predistribution is harder for secret keys than for public keys for two obvious reasons:

- While only one public key per entity is sufficient for authentication and confidentiality, there must be a secret key for each pair of entities who wish to communicate. If there are N entities, that means N(N-1)/2 keys.
- Unlike public keys, secret keys must be kept secret.

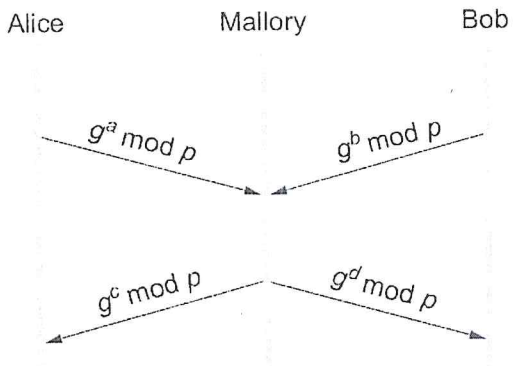
In summary, there are a lot more keys to distribute, and you can't use certificates that everyone can read.

The most common solution is to use a *Key Distribution Center* (KDC). A KDC is a trusted entity that shares a secret key with each other entity. This brings the number of keys down to a more manageable N-1, few enough to establish out of band for some applications. When Alice wishes to communicate with Bob, that communication does not travel via the KDC. Rather, the KDC participates in a protocol that authenticates Alice and Bob—using the keys that the KDC already shares with each of them—and generates a new session key for them to use. Then Alice and Bob communicate directly using their session key. Kerberos is a widely used system based on this approach. We describe Kerberos (which also provides authentication) in the next section. The following subsection describes a powerful alternative.

3.Diffie-Hellman Key Exchange

Another approach to establishing a shared secret key is to use the Diffie-Hellman key exchange protocol, which works without using any pre-distributed keys. The messages exchanged between Alice and Bob can be read by anyone able to eavesdrop, and yet the eavesdropper won't know the secret key that Alice and Bob end up with.

There is the problem of Diffie-Hellman's lack of authentication. One attack that can take advantage of this is the *man-in-the-middle attack.* Suppose Mallory is an adversary with the ability to intercept messages. Mallory already knows p and g since they are public, and she generates random private values c and d to use with Alice and Bob, respectively. When Alice and Bob send their public values to each other, Mallory intercepts them and sends her own public values. The result is that Alice and Bob each end up unknowingly sharing a key with Mallory instead of each other.



CO6 BL2 11. Explain about trust and threats.

Trust and threats are two sides of the same coin. A threat is a potential failure scenario that you design your system to avoid, and trust is an assumption you make about how external actors and internal components you build upon will behave. For example, if you are transmitting a message over WiFi on an open campus, you would likely identify an

eavesdropper that can intercept the message as a threat (and adopt some of the methods discussed in this chapter as a countermeasure), but if you are transmitting a message over a fiber link between two machines in a locked datacenter, you might trust that channel is secure, and so take no additional steps.

These sorts of calculations happen all the time, although they are often implicit and unstated. For example, you may run the world's most secure encryption algorithm on a message before transmitting it, but you've implicitly trusted that the server you're running on is both faithfully executing that algorithm and not leaking a copy of your unencrypted message to an adversary. Do you treat this as a threat or do you trust that the server does not misbehave? At the end of the day, the best you can do is mitigate risk: identify those threats that you can eliminate in a cost effective way, and be explicit about what trust assumptions you are making so you aren't caught off-guard by changing circumstances, such as an ever more determined or sophisticated adversary.

In this particular example, the threat of an adversary compromising a server has become quite real as more of our computations move from local servers into the cloud, and so research is now going into building a *Trusted Computing Base* (TCB), an interesting topic, but one that is in the realm of computer architecture rather than computer networks. For the purpose of this chapter, our recommendation is to pay attention to the words *trust* and *threat* (or adversary), as they are key to understanding the context in which security claims are made.

Section C (1 x 10 = 10)

(Answer any **ONE** question)

CO2 BL2 11.Describe the QOS Approaches

These can be divided into two broad categories:

- *Fine-grained* approaches, which provide QoS to individual applications or flows
- *Coarse-grained* approaches, which provide QoS to large classes of data or aggregated traffic.

In the first category, we find *Integrated Services*, a QoS architecture developed in the IETF (Internet Engineering Task Force) with the Resource Reservation Protocol (RSVP). In the second category lies *Differentiated Services*, which is probably the most widely deployed QoS mechanism today.

2. Integrated Services (RSVP)

RSVP is a transport layer protocol that is used to reserve resources in a computer network to get different quality of services (QoS) while accessing Internet applications. It operates over Internet protocol (IP) and initiates resource reservations from the receiver's end.

Features

- RSVP is a receiver oriented signalling protocol. The receiver initiates and maintains resource reservation.
- It is used both for unicasting (sending data from one source to one destination) and multicasting (sending data simultaneously to a group of destination computers).
- RSVP supports dynamic automatic adaptation to changes in network.
- It provides a number of reservation styles. It also provides support for addition of future styles.

RSVP Messages

There are two types of RSVP messages –

- **Path Messages (path):** A path message is sent by the sender to all receivers by multicasting storing the path state at each node in its path. It stores the necessary information so that the receivers can make the reservation.
- **Reservation messages (resv):** The resv message is sent by the receiver to the sender along the reverse path of the path message. It identifies the resources that is requires by the data flow.

Differentiated Services (EF & AF)

The assured forwarding (AF) model is used to provide priority values to different data applications. The Expedited Forwarding (EF) model is used to provide resources to latency (delay) sensitive real-time, interactive traffic.

One of the simplest PHBs to explain is known as *expedited forwarding* (EF). Packets marked for EF treatment should be forwarded by the router with minimal delay and loss. The only way that a router can guarantee this to all EF packets is if the arrival rate of EF packets at the router is strictly limited to be less than the rate at which the router can forward EF packets.

The *assured forwarding* (AF) PHB has its roots in an approach known as *RED* with In and Out (RIO) or Weighted RED, both of which are enhancements to the basic RED algorithm

CO5 BL3 12. Discuss about Overlay networks.

Music-sharing applications like Napster and KaZaA introduced the term "peer-to-peer" into the popular vernacular. But what exactly does it mean for a system to be "peer-to-peer"? Certainly in the context of sharing MP3 files it means not having to download music from a central site, but instead being able to access music files directly from whoever in the Internet happens to have a copy stored on their computer. More generally then, we could say that a peer-to-peer network allows a community of users to pool their resources (content, storage, network bandwidth, disk bandwidth, CPU), thereby providing access to a larger archival store, larger video/audio conferences, more complex searches and computations, and so on than any one user could afford individually.

Quite often, attributes like *decentralized* and *self-organizing* are mentioned when discussing peer-to-peer networks, meaning that individual nodes organize themselves into a network without any centralized coordination. If you think about it, terms like these could be used to describe the Internet itself. Ironically, however, Napster was not a true peer-to-peer system by this definition since it depended on a central registry of known files, and users had to search this directory to find what machine offered a particular file. It was only the last step—actually downloading the file—that took place between machines that belong to two users, but this is little more than a traditional client/server transaction. The only difference is that the server is owned by someone just like you rather than a large corporation.

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SRM ARTS AND SCIENCE COLLEGE
Department of Computer Science

Date: **Duration: 1 Hour** **Class: I M.Sc. (CS)**
Subject Name & Code: FullStackWebDevelopment, PSDED

Section A **(5 x 1 = 5)**
(Answer any FIVE questions)

CO1	BL1	1. Define Dynamic Web Content.
CO3	BL1	2. Differentiate Three Tier and Client-Server Architecture.
CO1	BL1	3. Define HTML5.
CO2	BL2	4. Define CSS.
CO6	BL1	5. Compare CSS vs CSS3.
CO2	BL1	6. State JavaScript.
CO2	BL6	7. Write down the functions of JavaScript.

Section B **(2 x 5 = 10)**
(Answer any TWO questions)

CO3	BL5	8. Summarize the Client-Server Applications.
CO1	BL6	9. Write short notes on Structural Elements of HTML5.
CO2	BL2	10. Discuss advanced CSS with CSS3.
CO3	BL2	11. Explain the Control Flow Statements in JavaScript.

Section C **(1 x 10 = 10)**
(Answer any ONE question)

CO1	BL2	12. Discuss HTML5 form elements.
CO2	BL2	13. Explain Cascading Style Sheet types.

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SRM ARTS AND SCIENCE COLLEGE
Department of Computer Science

Date: **Duration: 1 Hour** **Class: I M.Sc. (CS)**
Subject Name & Code: FullStackWebDevelopment, PSDED

Section A **(5 x 1 = 5)**
(Answer any FIVE questions)

CO1 BL1 1. Define Dynamic Web Content.

Dynamic content (aka adaptive content) refers to web content that changes based on the behaviour, preferences, and interests of the user. It refers to websites as well as e-mail content and is generated at the moment a user requests a page.

CO3 BL1 2. Differentiate Three Tier and Client-Server Architecture.

It mainly contains three layers- the Data Layer, the Business Layer, and the Client Layer. A two-tier DB architecture either buries the application logic within the server database, on the client (inside the UI), or both of them. A three-tier DB architecture buries the process or application logic in the middle-tier.

CO1 BL1 3. Define HTML5.

Hypertext Markup Language revision 5 (HTML5) is markup language for the structure and presentation of World Wide Web contents. HTML5 supports the traditional HTML and XHTML-style syntax and other new features in its markup, New APIs, XHTML and error handling.

CO2 BL2 4. Define CSS.

CSS stands for Cascading Style Sheets.CSS describes how HTML elements are to be displayed on screen, paper, or in other media.CSS saves a lot of work. It can control the layout of multiple web pages all at once.External stylesheets are stored in CSS files

CO6 BL1 5. Compare CSS vs CSS3.

CSS does not support responsive design.	CSS3 is the latest version and supports the responsive design.
CSS is slower.	CSS3 is faster than CSS.
CSS provides unique color schemas and standard color.	CSS3 supports HSL RGBA, HSLA and the gradient colors.

CO2 BL1 6. State JavaScript.

javaScript is a dynamic programming language that's used for web development, in web applications, for game development, and lots more. It allows you to implement dynamic features on web pages that cannot be done with only HTML and CSS.

CO2 BL6 7. Write down the functions of JavaScript.

A JavaScript function is defined with the function keyword, followed by a name, followed by parentheses ().Function names can contain letters, digits, underscores, and dollar signs (same rules as variables).The parentheses may include parameter names separated by commas: (*parameter1, parameter2, ...*).The code to be executed, by the function, is placed inside curly brackets: {}

Section B **(2 x 5 = 10)**

(Answer any TWO questions)

CO3 BL5 8. Summarize the Client-Server Applications.

In principle, a client/server application consists of a *client* program that consumes services provided by a *server* program. The client requests services from the server by calling functions in the server application. In a distributed computing environment, where the client program and the server program execute on different machines and possibly even on different platforms, the client and server communicate through a communications layer that is often called *middleware*.

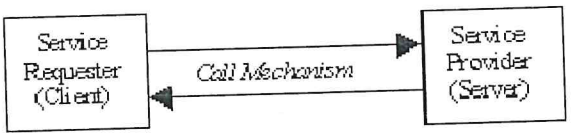

Figure 2-1: Basic client/server architecture

The following are typical features of a client/server application:

- A client program can request services from multiple server programs
- A client program does not need to be aware of the actual subprograms that provide a service
- Multiple subprograms can work together to provide the service
- Multiple client programs can request services from a single server program
- A server program can provide multiple services

- Typically, the server program runs on a machine that is remote from the machine running the client program

CO1 BL6 9. Write short notes on Structural Elements of HTML5.

There are a group of HTML elements that are created to broadly give our documents more structure.
Body -The body element contains all of the content of our document.This typically encompasses everything except the meta element and its sub elements.
Main-Most webpages contain a lot of information that is repeated across the site. This includes branding, navigation, advertisements and copyright information.
Article & Section-The article and section elements are both used similarly to represent thematic parts of a document. The primary difference between the two is that articles are meant to encapsulate content that is self-contained.A section on the other hand, is only a part of a greater whole and does not stand on its own.
Nav-The nav element is used to indicate areas of the page used for primary navigation.
Header & Footer-The header and footer elements are both used within the context of their containing element.The most common form is when the containing element is the body element.

CO2 BL2 10. Discuss advanced CSS with CSS3.

CSS stands for Cascading Style Sheets.Cascading" means that one or more style sheets can be applied on the HTML document one after the other using some rules.So, the same tag can use one or more styles.In short, for Styling the HTML document, you have to use CSS.HTML simply creates the structure or skeleton while CSS will make the website colorful,better and clear.CSS stands for *Cascading Style Sheets*.For Styling the HTML document, you have to use CSS.You can create CSS files in the HTML document as well as an external files.The external CSS files are more popular and widely used.Mostly, we apply CSS by creating Ids and Classes but there are other ways as well. At the time of writing the 1st version of this tutorial, CSS3 is most popular version of CSS.

CO3 BL2 11. Explain the Control Flow Statements in JavaScript.

Every programming language, basically, has two types of control statements as follows:**Conditional Statements:** based on an expression passed, a conditional statement makes a decision, which results in either YES or NO.**Iterative Statements (Loop):** Until and unless the expression or the condition given is satisfied, these statements repeat themselves.

Section C (1 x 10 = 10)

(Answer any ONE question)

CO1 BL2 12. Discuss HTML5 form elements.

There are five new form elements in the HTML5 forms specification: datalist, output, keygen, progress, nd meter. We covered datalist above. We introduced you to progress and meter in the last chapter as they are often useful outside of forms.

CO2 BL2 13. Explain Cascading Style Sheet types.

CSS (Cascading Style Sheet) describes the HTML elements which are displayed on screen, paper, or in other media. It saves a lot of time. It controls the layout of multiple web pages at one time. It sets the font-size, font-family, color, background color on the page.It allows us to add effects or animations to the website. We use CSS to display animations like buttons, effects, loaders or spinners, and also animated backgrounds.Without using CSS, the website will not look attractive. There are 3 types of CSS which are below:

- Inline CSS
- Internal/ Embedded CSS
- External CSS

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Department of Electronics and Communication Science

Date :12.09.2022 **Duration : 1 hr** **Class : III B.Sc.,**

Subject Name & Code : Microcontroller

Section A (5 x 2 = 10)

(Answer any **FIVE** questions)

CO1	BL4	1.Compare Microprocessors and microcontrollers
CO1	BL1	2.List the salient features of microcontroller 8051 .
CO1	BL1	3.Tell about the flags of 8051.
CO1	BL2	4.Classify the register banks of 8051.
CO1	BL1	5.Name the interrupts of 8051
CO2	BL2/4	6.Differentiate single tasking and multitasking
CO2	BL2	7.State the applications of the microcontroller 8051.

Section B (1 x 5 = 5)

(Answer any **ONE** question)

CO1	BL3	8.Sketch the pin out functional diagram of 8051 and explain the functions of different pins
CO1	BL2	9. Discuss the internal RAM organisation of 8051.

Section C (1 x 10 = 10)

(Answer any **ONE** question)

CO1	BL2/4	10.Explain the Special Function Registers of 8051.
CO1	BL2	11.Describe the internal architecture of 8051 with a neat diagram.

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Date :12.09.2022 **Duration : 1 hr** **Class : III B.Sc.,**

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Department of Electronics and Communication Science

Date: 12.09.2022 **Duration: 1 hr** **Class: II B.Sc.,**

Subject Name & Code: Analog Electronics/SG23A

Section A (5 x 2 = 10)

(Answer any **FIVE** questions)

CO 1 BL 1 1. Define a single stage amplifier
CO 1 BL 3 2. Construct a Single stage amplifier and label the various currents and voltages.
CO 1 BL 4 3. Classify amplifiers.
CO 3 BL 3 4. Sketch the block diagram of a multistage amplifier and define it.
CO 3 BL 1 5. Define Bandwidth
CO 3 BL 1 6. List the advantages of RC coupled amplifier
CO 3 BL 2 7. Infer why RC or transformer coupled amplifiers are not used for amplifying extremely low frequencies

Section B (1 x 5 = 5)

(Answer any **ONE** question)

CO 1 BL 2 8. Discuss the various types of amplifiers.
CO 3 BL 3 9. Construct a Direct coupled amplifier and explain its working

Section C (1 x 10 = 10)

(Answer any **ONE** question)

CO 3 BL 3 10. Sketch the RC Coupled amplifier and explain its working
CO 3 BL 2/4 11. Explain the working of Transformer coupled amplifier with a neat diagram.

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Department of Electronics and Communication Science

Date: 12.09.2022 **Duration: 1 hr** **Class: II B.Sc.,**

Subject Name & Code: Analog Electronics/SG23A

Section A (5 x 2 = 10)

(Answer any **FIVE** questions)

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Department of Electronics and Communication Science

Date: 13.09.22 **Duration: 1 hour** **Class: III B.Sc**

Subject name and Code: Electrical and Electronics Instrumentation

Section A (Answer any **FIVE** questions)

CO4 BL1 1. Define a CRO?

CO3 BL2 2. Define deflection sensitivity of a CRO

CO3 BL1 3. Tell the use of Aquadag

CO3 BL1 4.State the function of Focussing anode

CO3 BL1 5.List the applications of CRO

CO4 BL4 6.Distinguish a fundamental CRO and a Storage Oscilloscope.

CO4 BL3 7. Infer: CRO is a versatile device

Section B (Answer any **ONE** question)

CO3 BL3 8. Sketch the block diagram of CRT and label its parts

CO4 BL2 9. Describe the working of storage oscilloscope

Section C (Answer any **ONE** questions)

CO3 BL2/4 10.Explain the block diagram of CRO with a neat diagram.

CO3 BL3 11.Demonstrate the working of a Sampling Oscilloscope with necessary waveforms

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Department of Electronics and Communication Science

Date: 13.09.22 **Duration: 1 hour** **Class: III B.Sc.,**

Subject name and Code: Electrical and Electronics Instrumentation

Section A (Answer any **FIVE** questions)

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Department of Electronics and Communication Science

Date: 14.09.2022 **Duration: 1 hr** **Class: II B.Sc.,**

Subject Name & Code: Digital Electronics & SG23C

Section A (5 x 1 = 5)

(Answer any **FIVE** questions)

CO 1 BL 2 1. Convert 11100.11_2 to Decimal

CO 1 BL 3 2. Change $69B_H$ to Binary

CO 1 BL 2 3. Convert 589_D to Octal

CO 1 BL 2 4. Express 10001101_2 in Hexadecimal

CO 2 BL 3 5. Sketch the half subtractor using basic gates

CO 2 BL 3 6. Construct a half adder using NAND gates

CO 2 BL 3 7. Sketch the logic circuit and truth table of an X-OR gate.

Section B (2 x 5 = 10)

(Answer any **ONE** question)

CO 2 BL 1 8. State and prove Demorgan's theorems

CO 2 BL 2 9. Discuss Boolean laws.

Section C (1 x 10 = 10)

(Answer any **ONE** question)

CO 2 BL 2/4 10. Explain NAND as an Universal building block

CO 2 BL 3 11. Show how NOR acts as an Universal gate.

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Department of Electronics and Communication Science

Date: 14.09.2022 **Duration: 1 hr** **Class: II B.Sc.,**

Subject Name & Code: Digital Electronics & SG23C

Section A (5 x 1 = 5)

(Answer any **FIVE** questions)

CO 1 BL 2 1. Convert 11100.11_2 to Decimal

CO 1 BL 3 2. Change $69B_H$ to Binary

CO 1 BL 2 3. Convert 589_D to Octal

CO 1 BL 2 4. Express 10001101_2 in Hexadecimal

CO 2 BL 3 5. Sketch the half subtractor using basic gates

CO 2 BL 3 6. Construct a half adder using NAND gates

CO 2 BL 3 7. Design a full adder using Basic gates.

Section B (2 x 5 = 10)

(Answer any **ONE** question)

CO 2 BL 3 8. Illustrate and prove Demorgan's theorems

CO 2 BL 2 9. Discuss Boolean laws.

Section C (1 x 10 = 10)

(Answer any **ONE** question)

CO 2 BL 2/4 10. Explain NAND as an Universal building block

CO 2 BL 3 11. Show how NOR acts as an Universal gate.

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Date: 15.09.2022 **Duration: 1 hr** **Class: III ECS**

Subject Name & Code: Sensor Technology

Section A (5 x 1 = 5)

(Answer any **FIVE** questions)

CO 3 BL 1 1. Define transducer and its types.
CO 4 BL 4 2. Compare precision and repeatability
CO 4 BL 1 3. List the main parameters characterizing the static characteristics of sensor.
CO 4 BL 3 4. Illustrate Minimum detectable change
CO 3 BL 2 5. Differentiate Active and Passive transducers
CO 3 BL 1 6. Define sensor.
CO 3 BL 1 7. List the various advantages of sensors

Section B (2 x 5 = 10)

(Answer any **ONE** question)

CO 4 BL 4 8. Explain the characteristics of transducers
CO 4 BL 2 9. Summarize the Mechanical, thermal and electrical characteristics of sensors

Section C (1 x 10 = 10)

(Answer any **ONE** question)

CO 3 BL 2 10. Describe the various types of Transducers.
CO 4 BL 2 11.Discuss the Static and dynamic characteristics of sensors

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Department of Electronics and Communication Science

Date: 15.09.2022 **Duration: 1 hr** **Class: III ECS**

Subject Name & Code: Sensor Technology

Section A (5 x 1 = 5)

(Answer any **FIVE** questions)

CO 3 BL 1 1. Define transducer and list its types.
CO 4 BL 4 2. Compare precision and repeatability
CO 4 BL 1 3. List the main parameters characterizing the static characteristics of sensor.
CO 4 BL 3 4. Illustrate Minimum detectable change
CO 3 BL 2 5. Differentiate Active and Passive transducers
CO 3 BL 1 6. Define sensor.
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Section B (2 x 5 = 10)

(Answer any **ONE** question)

CO 4 BL 4 8. Explain the characteristics of transducers
CO 4 BL 2 9. Summarize the Mechanical, thermal and electrical characteristics of sensors

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CO 4 BL 2 11.Discuss the Static and dynamic characteristics of sensors

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Date:15.09.2022 **Duration: 1 hour** **Class: II B.Sc**

Subject name and Code: Basic Physics I, SG33A

Section A (Answer any **FIVE** questions) **(5x2=10)**

CO3 BL1 1.Define Coefficient of viscosity

CO3 BL1 2.State the unit of Surface Tension and its expansion

CO3 BL2 3.Infer: Soap bubble appears in circle

CO3 BL3 4.Use of Stokes method is applicable only to high viscous liquids- Why?

CO3 BL1 5.List out Poisullies formulae

CO3 BL1 6.Define critical velocity

CO3 BL1 7.Define terminal velocity

Section A (Answer any **ONE** question) **(1x5=5)**

CO3 BL4 8.Derive an expression for excess pressure in a liquid drop

CO3 BL2 9.Discuss: Molecular theory of Surface Tension

Section C (Answer any **ONE** question) **(1x10=10)**

CO3 BL2 10. Describe the Stokes method to determine coefficient of viscosity of a given liquid

CO3 BL2/3 11.Demonstrate an experiment to determine surface tension of a given liquid

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Department of Electronics and Communication Science

Date:15.09.2022 **Duration: 1 hour** **Class: II B.Sc**

Subject name and Code: Basic Physics I, SG33A

Section A (Answer any **FIVE** questions) **(5x2=10)**

CO3 BL1 1.Define Coefficient of viscosity

CO3 BL1 2.State the unit of Surface Tension and its expansion

CO3 BL2 3.Infer: Soap bubble appears in circle

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Section A (Answer any **ONE** question) **(1x5=5)**

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Department of Electronics and Communication Science

Subject name and Code: Basic Physics - I, SG33A

ANSWR KEY

1. The property to oppose sudden change in motion or rest of an object

2. Kgm^2 (Kilogram. Square meter)

3. Due to centripetal force

4. Linear and Circular

5. $F= (m v^2/ r)$ m = mass of the object. v = velocity of the object, r = radius of the object

6. $I = M K^2$, K is radius of gyration

7. A car moving is stopped suddenly, driver jerks in the seat, dust coming out of mat when beaten

8. Diagram with markings of r,$\angle$AOB: 2

   Derivation: 3

9. Determination of F_1 and F_2: 2

   Equating centripetal force : 1

   Final formulae: 2

10. Formula of KE and PE: 2

    Law of conservation of Energy equation: 5

    Equation of motion substitution : 3

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Department of Electronics and Communication Science

Subject name and Code: Basic Physics - I, SG33A

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7. A car moving is stopped suddenly, driver jerks in the seat, dust coming out of mat when beaten

8. Diagram with markings of r,$\triangle$AOB: 2

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9. Determination of F_1 and F_2: 2

   Equating centripetal force : 1

   Final formulae: 2

10. Formula of KE and PE: 2

    Law of conservation of Energy equation: 5

    Equation of motion substitution : 3

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Department of Electronics and Communication Science

Subject name and Code: Electrical and Electronics Instrumentation

ANSWR KEY

1. Device that converts one form of Physical quantity into other
2. Inductive, Capacitive and Resistive
3. Since it has no source of light of its own
4. When the area between the plates of a parallel plate capacitor changes, its capacitance changes
5. offshore platforms, Desalination systems etc
6. A junction of two dissimilar metals constitute a thermocouple
7. LCD – fluorescent backlight : LED : Emitting diodes
   LCD – Less power consumption: LED: More power consumption
8. Diagram with bridge circuit; 2
   Working with deform of the gauge: 3
9. Photo electricity definition: 2
   Working with input of light: 3
10. Principle of Resistive transducer: 3
    Diagram: 2
    Working: 5
11. pixels:3, Matrix: 3, Scanning:4

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Department of Electronics and Communication Science

Subject name and Code: Electrical and Electronics Instrumentation

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Department of Electronics and Communication Science

Date: 01.11.22 **Duration: 1 hour** **Class: III B.Sc**

Subject name and Code: Electrical and Electronics Instrumentation

Section A (Answer any **FIVE** questions) (5x2=10)

CO4 BL1 1. Define a transducer?

CO4 BL1 2. Name the types of the transducer.

CO4 BL2 3. Infer: LCD require an external source of light

CO4 BL1 4. State the principle of a capacitive transducer.

CO4 BL1 5. List any two applications of LVDT

CO4 BL1 6. Define a thermocouple.

CO4 BL2 7. Distinguish a LED and LCD.

Section B (Answer any **ONE** question) (1x5=5)

CO3 BL3 8. Sketch the diagram of a strain gauge and explain its function.

CO4 BL2 9. Describe the working of photo electric transducer

Section C (Answer any **ONE** question) (1x10=10)

CO3 BL2 10.Explain the working of a Resistance thermometer with a neat diagram.

CO3 BL2 11.Demonstrate the working of Liquid crystal display

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Department of Electronics and Communication Science

Date: 01.11.22 **Duration: 1 hour** **Class: III B.Sc**

Subject name and Code: Electrical and Electronics Instrumentation

Section A (Answer any **FIVE** questions) (5x2=10)

CO4 BL1 1. Define a transducer?

CO4 BL1 2. Name the types of the transducer.

CO4 BL2 3. Infer: LCD require an external source of light

CO4 BL1 4. State the principle of a capacitive transducer.

CO4 BL1 5. List any two applications of LVDT

CO4 BL1 6. Define a thermocouple.

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CO3 BL2 10.Explain the working of a Resistance thermometer with a neat diagram.

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Department of Electronics and Communication Science

Date: 01.11.22 **Duration: 1 hour** **Class: III B.Sc**

Subject name and Code: Electrical and Electronics Instrumentation

Section A (Answer any **FIVE** questions) (5x2=10)

CO1 BL1 1. Define a transducer?

CO4 BL1 2. Name the types of the transducer.

CO4 BL2 3. Infer: LCD require an external source of light

CO1 BL1 4. State the principle of a capacitive transducer.

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Date: 01.11.22 **Duration: 1 hour** **Class: III B.Sc**

Subject name and Code: Electrical and Electronics Instrumentation

Section A (Answer any **FIVE** questions) (5x2=10)

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Answer Key
Unit Test - I
Analog Electronics – SG23A

1. An electronic device which produces oscillations of desired frequency is known as an Oscillator.
2. Damped Oscillations: oscillations whose amplitude goes on decreasing with time
   Undamped oscillations: Oscillations whose amplitude remains constant with time.
3. Tank circuit, amplifier and a feedback circuit.
4. Diagram – 1 mark. A circuit which produces electrical oscillations of any desired frequency is called as tank circuit.
5. The values of the components changes with temperature thereby changing the frequency of oscillations.
   If the value of the components are changed the operating frequency change.
6. When a a.c voltage is applied across a crystal the crystal starts to vibrate at the frequency of the applied voltage.
7. To provide a stable output.
8. Diagram – 2 marks
   Explanation – 3 marks
9. Diagram – 2 marks
   Explanation – 3 marks
10. Diagram – 3 marks
    Explanation of RC network– 3 marks
    Explanation of operating circuit – 4 marks
11. Diagram – 4 marks
    Explanation – 6 marks

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Department of Electronics and Communication Science

Date: 01.11.22 **Duration: 1 hour** **Class: III B.Sc**

Subject name and Code: Electrical and Electronics Instrumentation

Section A (Answer any **FIVE** questions) (5x2=10)

CO4 BL1 1. Define a transducer?

CO4 BL1 2. Name the types of the transducer.

CO4 BL2 3. Infer: LCD require an external source of light

CO4 BL1 4. State the principle of a capacitive transducer.

CO4 BL1 5. List any two applications of LVDT

CO4 BL1 6. Define a thermocouple.

CO4 BL2 7. Distinguish a LED and LCD.

Section B (Answer any **ONE** question) (1x5=5)

CO3 BL3 8. Sketch the diagram of a strain gauge and explain its function.

CO4 BL2 9. Describe the working of photo electric transducer

Section C (Answer any **ONE** question) (1x10=10)

CO3 BL2 10.Explain the working of a Resistance thermometer with a neat diagram.

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Date: 01.11.22 **Duration: 1 hour** **Class: III B.Sc**

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Department of Electronics and Communication Science

Subject name and Code: Electrical and Electronics Instrumentation

ANSWR KEY

1. Device that converts one form of Physical quantity into other
2. Inductive, Capacitive and Resistive
3. Since it has no source of light of its own
4. When the area between the plates of a parallel plate capacitor changes, its capacitance changes
5. offshore platforms, Desalination systems etc
6. A junction of two dissimilar metals constitute a thermocouple
7. LCD – fluorescent backlight : LED : Emitting diodes
   LCD – Less power consumption: LED: More power consumption
8. Diagram with bridge circuit: 2
   Working with deform of the gauge: 3
9. Photo electricity definition: 2
   Working with input of light: 3
10. Principle of Resistive transducer: 3
    Diagram: 2
    Working: 5
11. pixels:3, Matrix: 3, Scanning:4

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Date : 02.11.2022 **Duration : One Hour** **Class : I B.Sc**

Subject Name & Code: Basic Circuit Theory

Section A (5 x 2 = 10)

(Answer any **FIVE** questions)

CO 6	BL 1	1.	Define inductor.
CO 4	BL 1	2.	Name the types of Transformer.
CO 6	BL 2	3.	Identify the inductance of an inductor.
CO 4	BL 3	4.	Illustrate the step up transformer coil.
CO 6	BL 1	5.	State the variable inductors.
CO 3	BL 1	6.	Define a parallel circuit.
CO 2	BL 1	7.	State an ohm's law.

Section B (1 x 5 = 5)

(Answer any **ONE** question)

CO 6	BL 2	8.	Discuss on the factor controlling of capacitance.
CO 4	BL 2	9.	Explain in details of transformer.

Section C (1 x 10 = 10)

(Answer any **ONE** question)

CO 3	BL 2	10.	Describe voltage division rule with an example.
CO 6	BL 6	11.	Write a short notes on Inductor.

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Date : 02.11.2022 **Duration : One Hour** **Class : I B.Sc**

Subject Name & Code: Basic Circuit Theory

Section A (5 x 2 = 10)

(Answer any **FIVE** questions)

CO 6	BL 1	1.	Define inductor.
CO 4	BL 1	2.	Name the types of Transformer.
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Answer key

1. The inductor is a passive component which stores the electrical energy in the magnetic field when the electric current passes through it. Or we can say that the inductor is an electrical device which possesses the inductance. –(2)
2. Step-Up and Step-down. – (2)
3. Inductance is a property of an electrical conductor that causes it to resist changes in the electric current passing through it. The flow of electric current generates a magnetic field around a conductor. The field strength is proportional to the current magnitude and is unaffected by current fluctuations. According to Faraday's law of induction, any change in the magnetic field via a circuit generates an electromotive force (EMF) (voltage) in the conductors, a process known as electromagnetic induction. –(2)
4. Diagram. –(2)
5. Probably the most common type of variable inductor today is one with a moveable ferrite magnetic core, which can be slid or screwed in or out of the coil. Moving the core farther into the coil increases the permeability, increasing the magnetic field and the inductance. –(2)
6. A circuit which have different branches – (2)
7. V=IR –(2)
8. Diagram 2
   Explanation -3
9. Diagram 2
   Explanation -3
10. Rule -2
    Diagram -3
    Explanation – 5
11. Derivation -2
    Diagram -3
    Explanation – 5

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Date : 02.11.22 **Duration : 1 hr** **Class : II B.Sc.,**

Subject Name & Code : Digital Electronics/SG23C

Section A (5 x 2 = 10)

(Answer any **FIVE** questions)

CO 1,2 BL 2 1. Predict the binary equivalent of the gray code 111011

CO 1,2 BL 3 2. Show the number $(123)_{10}$ in BCD.

CO 1,2 BL 2 3. Convert gray code 1011 to binary

CO 1,2 BL 2 4. Express the number $(37)_{10}$ in Excess – 3 code

CO 3 BL 2 5. Estimate $Y = \overline{A}\,B + A\,\overline{B} + AB$

CO 3 BL 2 6. Outline SOP and POS

CO 3 BL 1 7. Define K-map

Section B (1 x 5 = 5)

(Answer any **ONE** question)

CO 3,4 BL 3 8. Solve $Y = A + \overline{A}BC + A\overline{B}C + AB\overline{C} + ABC = AB + BC + CA$

CO 3,4 BL 2 9. Obtain the simplified expression using K- map

$F(A, B, C) = \Sigma(3, 4, 5, 6, 7)$

Section C (1 x 10 = 10)

(Answer any **ONE** question)

CO 3,4 BL 3 10. Solve the expression using K- map

$F(A, B, C, D) = \Sigma(0,3, 4, 7, 8) + \Sigma_d(10, 11, 12, 13, 14, 15)$

CO3,4 BL 3 11. Solve the Boolean function using K- map

$F(A,B,C,D) = \pi(0,2,4,6,8)+\pi_d(10,12,14)$

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Digital Electronics - Answer Key

Unit test II

1. The binary equivalent of gray code 111011 is $(101101)_2$
2. 123_{10} in BCD is 0001 0010 0011
3. 1011 in gray is equivalent to 1101 in binary
4. 37_{10} is 0110 1010 in excess-3
5. Y = A + B
6. SOP – Sum of Product expression the standard product should produce a logical 1 and in POS Product of Sum, the standard sum should produce a 0.
7. K-map is used for the simplification of the Boolean expressions and hence used to get a simplified circuit.
8. The solution is Y = AB+BC+CA---(5)
9. The simplified expression is Y = A+BC
   Marking the minterms in k-map - (2)
   Grouping and simplification – (3)
10. K-map diagram – (3)
    Filling the map with the given minterms and don't cares (3)
    Grouping and reduced expression – (4)
11. K-map diagram – (3)
    Filling the map with the given maxterms and don't cares (3)
    Grouping and reduced expression(4)

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Date : 02.11.2022 **Duration : One Hour** **Class : III B.Sc**

Subject Name & Code: Antennas Theory and Radar System

Section A (5 x 2 = 10)

(Answer any **FIVE** questions)

CO 2	BL 1	1.	Name the types of Parabolic Antenna.
CO 2	BL 2	2.	Identify the frequency use in horn antenna.
CO 2	BL 3	3.	Illustrate the discone antenna.
CO 2	BL 1	4.	State the electromagnetic radiation?
CO 1	BL 1	5.	Define polarization of an antenna.
CO 2	BL 6	6.	Write the applications of rhombic antenna.
CO 3	BL 1	7.	Define line-of-sight of communication.

Section B (1 x 5 = 5)

(Answer any **ONE** question)

CO 2	BL 2	8.	Discuss on the Lens antenna.
CO 2	BL 2	9.	Explain in details of Parabolic Antenna.

Section C (1 x 10 = 10)

(Answer any **ONE** question)

CO 2	BL 2	10.	Classify the Horn Antenna.
CO 2	BL 6	11.	Write a short notes on Rhombic antenna.

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Date : **Duration : One Hour** **Class : III B.Sc**

Subject Name & Code :Antennas Theory and Radar System

Section A (5 x 2 = 10)

(Answer any **FIVE** questions)

CO 2	BL 1	1.	Name the types of Parabolic Antenna.
CO 2	BL 2	2.	Identify the frequency use in horn antenna.
CO 2	BL 3	3.	Illustrate the discone antenna.
CO 2	BL 1	4.	State the electromagnetic radiation?
CO 1	BL 1	5.	Define polarization of an antenna.
CO 2	BL 6	6.	Write the applications of rhombic antenna.
CO 3	BL 1	7.	Define line-of-sight of communication.

Section B (1 x 5 = 5)

(Answer any **ONE** question)

CO 2	BL 2	8.	Discuss on the Lens antenna.
CO 2	BL 2	9.	Explain in details of Parabolic Antenna.

Section C (1 x 10 = 10)

(Answer any **ONE** question)

CO 2	BL 2	10.	Classify the Horn Antenna.
CO 2	BL 6	11.	Write a short notes on Rhombic antenna.

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Answer key

1. Paraboloidal or dish , Shrouded, Cylindrical Shaped-beam antennas, Shaped reflectors, Orange peel antenna, Arrays of feeds Axial, prime focusOff-axis, Cassegrain, Gregorian –(2)
2. The usable bandwidth of horn antennas is typically of the order of 10:1, and can be up to 20:1 (for example allowing it to operate from 1 GHz to 20 GHz). The input impedance is slowly varying over this wide frequency range, allowing low voltage standing wave ratio (VSWR) over the bandwidth. – (2)
3. Electromagnetic radiation is an electric and magnetic disturbance traveling through space at the speed of light –(2)
4. In physics, electromagnetic radiation (EMR) consists of waves of the electromagnetic (EM) field, which propagate through space and carry electromagnetic radiant energy. It includes radio waves, microwaves, infrared, (visible) light, ultraviolet, X-rays, and gamma rays. –(2)
5. The polarization of an antenna is loosely defined as the direction of the electromagnetic fields produced by the antenna as energy radiates away from it. These directional fields determine the direction in which the energy moves away from or is received by an antenna. –(2)
6. Rhombic antennas are used in high frequency and very high-frequency signal transmission. Generally, these are suitable for point to point communication in case of long-distance skywave propagation. –(2)
7. Line of sight (LOS) is the imaginary line between an observer and the target. In communication, line of sight is the direct path from a transmitter to the receiver and the obstructions that may fall in that path. A clear line of sight is important to high-speed communication. –(2)
8. Diagram 2
   Explanation -3
9. Diagram 2
   Explanation -3
10. Derivation -2
    Diagram -3
    Explanation – 5
11. Derivation -2
    Diagram -3
    Explanation – 5

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Department of Electronics and Communication Science

Date: 03.11.2022 **Duration: 1 hour** **Class: II B.Sc**

Subject name and Code: Basic Physics – I / SG33A

Section A (Answer any **FIVE** questions) 5X2=10

CO1,2 BL1 1. Define Inertia

CO1,2 BL1 2. State the unit of Moment of Inertia and its expansion

CO4 BL2 3. Infer: A train will topple if the rails are not properly banked at the curves.

CO1 BL1 4. Name the different types of motion of an object.

CO4 BL1 5. List out formulae for centripetal force and expand.

CO1,4 BL1 6. Define: Radius of gyration

CO1,4 BL1 7. Tell any two examples for Inertia

Section B (Answer any **ONE** question) 1X5=5

CO4 BL4 8. Deduce an expression for moment of inertia of a circular disc

CO1 BL6 9. Write the theory of banking of curves of curves with necessary equations.

Section C (Answer Any **ONE** question) 1X10=10

CO4 BL4 10. Derive an expression for the moment of inertia of a solid sphere.

CO4 BL4 11. Deduce the formulae for acceleration of a ball rolling down in an inclined plane.

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Date: 03.11.2022 **Duration: 1 hour** **Class: II B.Sc**

Subject name and Code: Basic Physics – I / SG33A

Section A (Answer any **FIVE** questions) 5X2=10

CO1,2 BL1 1. Define Inertia

CO1,2 BL1 2. State the unit of Moment of Inertia and its expansion

CO4 BL2 3. Infer: A train will topple if the rails are not properly banked at the curves.

CO1 BL1 4. Name the different types of motion of an object.

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Subject name and Code: Basic Physics - I, SG33A

ANSWR KEY

1. The property to oppose sudden change in motion or rest of an object

2. Kgm^2 (Kilogram. Square meter)

3. Due to centripetal force

4. Linear and Circular

5. $F= (m v^2/ r)$ m = mass of the object. v = velocity of the object, r = radius of the object

6. $I = M K^2$, K is radius of gyration

7. A car moving is stopped suddenly, driver jerks in the seat, dust coming out of mat when beaten

8. Diagram with markings of r,$\triangle$AOB: 2

   Derivation: 3

9. Determination of F_1 and F_2: 2

   Equating centripetal force : 1

   Final formulae: 2

10. Formula of KE and PE: 2

    Law of conservation of Energy equation: 5

    Equation of motion substitution : 3

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Class : II B.Sc.,

Date : 03.11.22 **Duration :1 hr**

Subject Name & Code : Sensor Technology

(5 x 2 = 10)

Section A

(Answer any **FIVE** questions)

CO 1 BL 1 1. State the principle of moving magnet type velocity transducer
CO 6 BL 1 2. Define a Seismic transducer
CO 1 BL 1 3. List the advantages of inductive type tachometer
CO 6 BL 4 4. Classify Seismic transducers.
CO 6 BL 1 5. Define relative humidity
CO 2 BL 4 6. Categorize the various types of liquid level measuring techniques.
CO 2 BL 1 7. Recall the working principle of Pirani gauges

(1 x 5 = 5)

Section B

(Answer any **ONE** question)

CO 2 BL 3 8. Explain the construction and working principle of Pirani gauges
CO 6 BL 2 9. Discuss the working principle of Gas Analyzer.

(1 x 10 = 10)

Section C

(Answer any **ONE** question)

CO 1 BL 2 10. Summarize the measurement of angular velocity with necessary diagrams.
CO 6 BL 2 11. Paraphrase the various methods of measuring the liquid level

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Sensor Technology - Answer Key

Unit test II

1. When a permanent magnet moves inside a coil, the change in the length of the air gap varies the reluctance. Hence the output voltage is directly proportional to the rate of change of the length of the air gap (change in length produced by velocity).
2. The seismic transducer is used for measuring the vibration of the ground. The spring mass damper element and the displacement transducer are the two main component of the seismic transducer.
3. Proximity sensors to measure position, touch pads, dynamic motion, etc.
   For detecting the kind of metal, to find miss lost parts otherwise counts the objects.
4. Vibrometer, Accelerometer
5. Is a ratio, expressed in percent, of the amount of atmospheric moisture present relative to the amount that would be present if the air were saturated. Since the latter amount is dependent on temperature, relative humidity is a function of both moisture content and temperature. Relative Humidity is derived from the associated Temperature and Dew Point for the indicated hour.
6. Continuous float level transmitters.
   Differential pressure transmitters.
   Load cells.
   Radar level transmitters.
   Radio Frequency (RF capacitive level transmitters)
   Ultrasonic level transmitter.
7. The Pirani gauge measures the vacuum pressure dependent thermal conductivity from the heated wire to the surrounding gas. The heated Pirani sensor filament is typically made of a thin (<25 µm) Tungsten, Nickel or Platium wire.As gas molecules collide with the filament wire, heat is transported from the hot wire.
8. Diagram – 1 mark, construction – 2 mark , Explanation – 2 mark
9. Diagram – 1 mark, construction – 2 mark , Explanation – 2 mark
10. DC Tachometer – diagram – 2 marks Construction and working – 3 marks
    Digital method - diagram – 2 marks Construction and working – 3 marks
11. Types of liquid level – 2 marks
    Explanation with diagrams – 8 marks

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Date: 12.09.2022 **Duration: 1 hr** **Class: II B.Sc.,**

Subject Name & Code: Analog Electronics/SG23A

Section A (5 x 2 = 10)

(Answer any **FIVE** questions)

CO 1 BL 1 1. Define a single stage amplifier
CO 1 BL 3 2. Construct a Single stage amplifier and label the various currents and voltages.
CO 1 BL 4 3. Classify amplifiers.
CO 3 BL 3 4. Sketch the block diagram of a multistage amplifier and define it.
CO 3 BL 1 5. Define Bandwidth
CO 3 BL 1 6. List the advantages of RC coupled amplifier
CO 3 BL 2 7. Infer why RC or transformer coupled amplifiers are not used for amplifying extremely low frequencies

Section B (1 x 5 = 5)

(Answer any **ONE** question)

CO 1 BL 2 8. Discuss the various types of amplifiers.
CO 3 BL 3 9. Construct a Direct coupled amplifier and explain its working

Section C (1 x 10 = 10)

(Answer any **ONE** question)

CO 3 BL 3 10. Sketch the RC Coupled amplifier and explain its working
CO 3 BL 2/4 11. Explain the working of Transformer coupled amplifier with a neat diagram.

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Department of Electronics and Communication Science

Date: 12.09.2022 **Duration: 1 hr** **Class: II B.Sc.,**

Subject Name & Code: Analog Electronics/SG23A

Section A (5 x 2 = 10)

(Answer any **FIVE** questions)

CO 1 BL 1 1. Define a single stage amplifier
CO 1 BL 3 2. Construct a Single stage amplifier and label the various currents and voltages.
CO 1 BL 4 3. Classify amplifiers.
CO 3 BL 3 4. Sketch the block diagram of multistage amplifier and define it.
CO 3 BL 1 5. Define Bandwidth
CO 3 BL 1 6. List the advantages of RC coupled amplifier
CO 3 BL 2 7. Infer why RC or transformer coupled amplifiers are not used for amplifying extremely low frequencies

Section B (1 x 5 = 5)

(Answer any **ONE** question)

CO 1 BL 2 8. Discuss the various types of amplifiers.
CO 3 BL 3 9. Construct a Direct coupled amplifier and explain its working

Section C (1 x 10 = 10)

(Answer any **ONE** question)

CO 3 BL 3 10. Sketch the RC Coupled amplifier and explain its working
CO 3 BL 2/4 11. Explain the working of Transformer coupled amplifier with a neat diagram.

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Answer Key
Unit Test - I
Analog Electronics – SG23A

1. If only one transistor with its associative circuits is used for amplification the circuit is known as single stage transistor amplifier.
2. Diagram - 2 mark
3. Voltage amplifiers, Power amplifiers, transformer coupled amplifier, direct coupled amplifier, RC coupled amplifier, CB, CE, CC, Class A, Class B, Class C – Any two
4. A transistor circuit containing more than one stage of amplification is known as multistage amplifiers- 1 mark, Diagram – 1 mark.
5. The range of frequency over which the voltage gain is equal to or greater than 70.7% of the maximum gain is known as bandwidth.
6. Excellent frequency response, low cost, circuit is compact
7. The reactance of C_c is high allowing only very small part of the signal from one stage to next stage; C_E cannot shunt the emitter the emitter resistance due to its large reactance at low frequencies.
8. List of various amplifiers – 5 marks
9. Diagram – 2 marks, Explanation – 3 marks
10. Diagram – 2 marks , construction – 2 marks, working – 4 marks, Frequency response explanation – 2 marks
11. Diagram – 2 marks , construction – 2 marks, working – 4 marks, Frequency response explanation – 2 marks

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Department of Electronics and Communication Science

Date :12.09.2022 **Duration : 1 hr** **Class : III B.Sc.,**

Subject Name & Code : Microcontroller

Section A (5 x 2 = 10)

(Answer any **FIVE** questions)

CO1	BL4	1.Compare Microprocessors and microcontrollers
CO1	BL1	2.List the salient features of microcontroller 8051 .
CO1	BL1	3.Tell about the flags of 8051.
CO1	BL2	4.Classify the register banks of 8051.
CO1	BL1	5.Name the interrupts of 8051
CO2	BL2/4	6.Differentiate single tasking and multitasking
CO2	BL2	7.State the applications of the microcontroller 8051.

Section B (1 x 5 = 5)

(Answer any **ONE** question)

CO1	BL3	8.Sketch the pin out functional diagram of 8051 and explain the functions of different pins
CO1	BL2	9. Discuss the internal RAM organisation of 8051.

Section C (1 x 10 = 10)

(Answer any **ONE** question)

CO1	BL2/4	10.Explain the Special Function Registers of 8051.
CO1	BL2	11.Describe the internal architecture of 8051 with a neat diagram.

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Date :12.09.2022 **Duration : 1 hr** **Class : III B.Sc.,**

Subject Name & Code : Microcontroller

Section A (5 x 2 = 10)

(Answer any **FIVE** questions)

CO1	BL4	1.Compare Microprocessors and microcontrollers
CO1	BL1	2.List the salient features of microcontroller 8051 .
CO1	BL1	3.Tell about the flags of 8051.
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Section B (1 x 5 = 5)

(Answer any **ONE** question)

CO1	BL3	8.Sketch the pin out functional diagram of 8051 and explain the functions of different pins
CO1	BL2	9. Discuss the internal RAM organisation of 8051.

Section C (1 x 10 = 10)

(Answer any **ONE** question)

CO1	BL2/4	10.Explain the Special Function Registers of 8051.
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DEPT OF ELECTRONICS & COMMUNICATION SCIENCE

CLASS : III ECS

SUB CODE: Microcontrollers

Unit Test – I

Answer key

1. Microprocessor 8085 does not have RAM or ROM inside and they need a programmable peripheral interface to communicate with the peripherals. Also the clock frequency cannot be varied.

Microcontroller 8051 has an internal memory of 4KB of ROM and 128 bytes of RAM.As this controller is capable of multi tasking it does not need another PPI to communicate with the peripherals. The frequency of the clock can be varied between 1.1 MHz and 12 Mhz.

2. (i) 128 byes of internal RAM

(ii) 4KB internal ROM

(iii) Two 16 bit counters/timers

(iv) 64KB of extended program memory

(v) 64 KB of extended data memory

(vi) 21 special function registers

3. 8051 has 4 flags. They are Parity, Carry, Overflow and Auxiliary carry. There is an user definable flag also.

4. There are 4 register banks in 128 bytes of RAM whose address is from 00_H to $1F_H$. They are B_0, B_1, B_2 and B_3. Each bank has 8 registers ranging from R_0 to R_7.

5. There are 5 source interrupts in 8051. They are

INT0

INT1

Timer 0 overflow

Timer 1 overflow

Serial Port - Completion of transmission and reception

6. If each pin is allotted to perform a single function at a time it is called single tasking. Inn the case of multi tasking each pin performs multiple tasks at the same time.

7. Microcontrollers are used to manipulate the given data and to interface with the peripherals. They are used in different types of interfacing like Digital to Analog Converter, Analog to digital converter and Stepper motor interface.

8. Pin out functional diagram of 8051 – 2

Functions of different pins – 3

9. RAM block diagram -2

Allotment for 128 bytes- register banks, bit and byte addressable memory locations and scratch pads – 3

10. Special function registers – bit and byte addressable diagram 3

Address allotted for various special function registers- 7

11. Block diagram – 3

Functions of various blocks – 7

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Department of Mathematics

Date : 13 – 09 – 2022 **Duration : One Hour** **Class : II – B.Sc., (ECS)**

Subject Name & Code : Numerical Methods & SG23B

Section A (5 x 2 = 10)

(Answer any **FIVE** questions)

CO2 BL1 1. Define Interpolation with example.

CO2 BL1 2. State Extrapolation give an example.

CO 2 BL1 3. State finite differences? Give an example.

CO2 BL1 4. What are the list of operators?

CO2 BL3 5. Show that $E = 1+\Delta$.

CO 2 BL6 6. Write the Newton's forward difference formula.

CO2 BL6 7. Write the Newton's backward difference formula.

Section B (1 x 5 = 5)

(Answer any **ONE** question)

CO1 BL3 8. Use Newton's forward formula, Estimate f (0.2) from the following table.

x:	0	1	2	3	4	5	6
y:	176	185	194	203	212	220	229

CO1 BL3 9. Construct a cubic polynomial which takes the following values and estimate f(0.5)

X:	0	1	2	3
Y:	1	0	1	10

Section C (1 x 10 = 10)

(Answer any **ONE** question)

CO1 BL3 10. Use Newton's backward formula to estimate y when x = 4.5 from the following table.

X:	0	1	2	3	4	5
Y:	1	14	15	5	6	19

CO1 BL5 11. Estimate the number of students whose height is between 80 cm and 90 cm. From the given data.

Height (in cm):	40 - 60	60 - 80	80 - 100	100 - 120	120 - 140
No. of students:	250	120	100	70	50

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Department of Electronics and Communication Science

Date: 14.09.22 Time: 12 to 1 pm **Duration: 1 hour**

Subject name and Code: **Electrical and Electronics Instrumentation**

Section A (Answer any **FIVE** questions)

CO4 BL1 1. Define a CRO?

CO3 BL2 2. Define deflection sensitivity of a CRO

CO3 BL1 3. Tell the use of Aquadag

CO3 BL1 4.State the function of Focussing anode

CO3 BL1 5.List the applications of CRO

CO4 BL4 6.Distinguish a fundamental CRO and a Storage Oscilloscope.

Section B (Answer any **ONE** question)

CO3 BL3 7. Sketch the block diagram of CRT and label its parts

CO4 BL2 8. Describe the working of storage oscilloscope

Section C (Answer any **FIVE** questions)

CO3 BL3 9.Explain the block diagram of CRO with a neat diagram.

CO3 BL3 10.Demonstrate the working of a Sampling Oscilloscope with necessary waveforms

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Department of Electronics and Communication Science

Date: 14.09.22 Time: 12 to 1 pm **Duration: 1 hour**

Subject name and Code: **Electrical and Electronics Instrumentation**

Section A (Answer any **FIVE** questions)

CO4 BL1 1. Define a CRO?

CO3 BL2 2. Define deflection sensitivity of a CRO

CO3 BL1 3.Tell the use of Aquadag

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CO4 BL4 6.Distinguish a fundamental CRO and a Storage Oscilloscope.

Section B (Answer any **ONE** question)

CO3 BL3 7. Sketch the block diagram of CRT and label its parts

CO4 BL2 8. Describe the working of storage oscilloscope

Section C (Answer any **FIVE** questions)

CO3 BL3 9.Explain the block diagram of CRO with a neat diagram.

CO3 BL3 10.Demonstrate the working of a Sampling Oscilloscope with necessary waveform

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SUB NAME & CODE: Electronics and Instrumentation
CLASS : III ECS
Unit Test – I (2022-23)

Answer Key

1. Vacuum tube of special geometrical shape and converts an electrical signal into visual one
2. Shift of spot of light on the screen per unit change in voltage across the deflection plates
3. Returns the electrons which accidentally strikes the walls of CRT, to the anode
4. Converges the electric pencil into a narrow beam, to be focused toward the CRT screen
5. Waveform examination, Voltage measurement, Frequency measurements
6. No storage in fundamental CRO, Storage facility in Storage CRO
7. Capable of giving a visual indication of a signal waveform
8. Block diagram with its parts: 5
9. Block digram:1
   Working: 2
10. Block diagram: 3
    Deflection plate assembly: 3
    Display of waveform: 4
11. Block digram:2
    Sampling Waveforms:3
    Sampling procedure: 5

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Department of Electronics and Communication Science

Class: II B.Sc.,

Date: 14.09.2022 **Duration: 1 hr**

Subject Name & Code: Digital Electronics & SG23C

Section A (5 x 1 = 5)

(Answer any **FIVE** questions)

CO 1 BL 2 1. Convert 11100.11_2 to Decimal

CO 1 BL 3 2. Change $69B_H$ to Binary

CO 1 BL 2 3. Convert 589_D to Octal

CO 1 BL 2 4. Express 10001101_2 in Hexadecimal

CO 2 BL 3 5. Sketch the half subtractor using basic gates

CO 2 BL 3 6. Construct a half adder using NAND gates

CO 2 BL 3 7. Sketch the logic circuit and truth table of an X-OR gate.

Section B (2 x 5 = 10)

(Answer any **ONE** question)

CO 2 BL 1 8. State and prove Demorgan's theorems

CO 2 BL 2 9. Discuss Boolean laws.

Section C (1 x 10 = 10)

(Answer any **ONE** question)

CO 2 BL 2/4 10. Explain NAND as an Universal building block

CO 2 BL 3 11. Show how NOR acts as an Universal gate.

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Department of Electronics and Communication Science

Date: 14.09.2022 **Duration: 1 hr** **Class: II B.Sc.,**

Subject Name & Code: Digital Electronics & SG23C

Section A (5 x 1 = 5)

(Answer any **FIVE** questions)

CO 1 BL 2 1. Convert 11100.11_2 to Decimal

CO 1 BL 3 2. Change $69B_H$ to Binary

CO 1 BL 2 3. Convert 589_D to Octal

CO 1 BL 2 4. Express 10001101_2 in Hexadecimal

CO 2 BL 3 5. Sketch the half subtractor using basic gates

CO 2 BL 3 6. Construct a half adder using NAND gates

CO 2 BL 3 7. Design a full adder using Basic gates.

Section B (2 x 5 = 10)

(Answer any **ONE** question)

CO 2 BL 3 8. Illustrate and prove Demorgan's theorems

CO 2 BL 2 9. Discuss Boolean laws.

Section C (1 x 10 = 10)

(Answer any **ONE** question)

CO 2 BL 2/4 10. Explain NAND as an Universal building block

CO 2 BL 3 11. Show how NOR acts as an Universal gate.

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SUB CODE: Digital Electronics SG23C **CLASS : II ECS**

Unit Test – I

Answer key

1. $11100.11_2 = 28.75_{10}$

2. $69B_H = 011010011011_B$

3. $589_D = 1115_O$

4. $10001101_2 = 8D_{16}$

5. Half subtractor circuit diagram using basic gates

6. Half adder circuit using NAND gates

7. Full adder circuit diagram using bacis gates.

8. De Morgan's theorem I and II statement (2)

Theorem proof using truth table (3)

9. Boolean laws (i) Commutative (ii) Associative (iii) Distributive Laws with circuit diagram and truth table (5)

10. NAND as NOT, OR, AND, X-OR and X-NOR with truth table – each 2 marks (10)

11. NOR as NOT, OR, AND, X-OR and X-NOR with truth table – each 2 marks (10)

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Department of Electronics and Communication Science

Date: 14.09.2022 **Duration: 1 hr** **Class: III B.Sc.,**

Subject Name & Code: Antennas Theory and Radar System

Section A (5 x 2 = 10)

(Answer any **FIVE** questions)

CO 1 BL 1	1. Define polarisation of an EM wave.
CO 1 BL 3/1	2. Illustrate the Beam width and label it.
CO 1 BL 2	3. Indicate the gain of an antenna.
CO 1 BL 3	4. Sketch the radiation pattern.
CO 1 BL 1	5. Define Bandwidth
CO 1 BL 4	6. Demonstrate the working of an antenna.
CO 1 BL 1	7. Enumerate the working of directivity of an antenna.

Section B (1 x 5 = 5)

(Answer any **ONE** question)

CO 1 BL 2	8. Discuss the current and voltage distribution of an antenna.
CO 1 BL 3	9. List the benefits of effects of antenna height.

Section C (1 x 10 = 10)

(Answer any **ONE** question)

CO 1 BL 2	10. Explain in detail the Grounded and Ungrounded antenna's.
CO 1 BL 2	11. Describe the fundamental of an antenna.

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Department of Electronics and Communication Science

Date: 14.09.2022 **Duration: 1 hr** **Class: III B.Sc.,**

Subject Name & Code: Antennas Theory and Radar System

Section A (5 x 2 = 10)

(Answer any **FIVE** questions)

CO 1 BL 1	1. Define polarisation of an EM wave.
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CO 1 BL 1	5. Define Bandwidth
CO 1 BL 4	6. Demonstrate the working of an antenna.
CO 1 BL 1	7. Enumerate the working of directivity of an antenna.

Section B (1 x 5 = 5)

(Answer any **ONE** question)

CO 1 BL 2	8. Discuss the current and voltage distribution of an antenna.
CO 1 BL 3	9. List the benefits of effects of antenna height.

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(Answer any **ONE** question)

CO 1 BL 2	10. Explain in detail the Grounded and Ungrounded antenna's.
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DEPT OF ELECTRONICS & COMMUNICATION

UNIT TEST – I **MAX.MARKS:25**

Antennas and Television Engineering

CLASS: III ECS

Answer KEY

1) Radiation path of polarisation (2)
2) Beamwidth diagram (2)
3) Efficiency of an antenna Formula -2
4) Diagram of radiation pattern. -2
5) Bandwidth diagram (2)
6) Converting Electrical Signal to Electromagnetic signal Vice versa. -2
7) Range of frequency over which the antenna maintain in SWR & directivity of an antenna, which represents an angular width measured on the radiation pattern.(1+1)
8) Diagram –2
   LCR resonance circuit to distribution current and voltage by shifting of electrons in an dipole antenna. -3
9) Derivation -2
   Diagram -1
   Explanation - 2
10) Diagram 4
    Explanation - 6
11) Derivation -2
    Diagram -3
    Explanation - 5

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Department of Electronics and Communication Science

Date: 15.09.2022 **Time: 12.00 to 1.00 pm** **Duration: 1 hour**

Subject name and Code: Basic Physics I, SG33A

Section A (Answer any **FIVE** questions)

CO1,4 BL1 1.Define Coefficient of viscosity

CO1,4 BL1 2.State the unit of Surface Tension and its expansion

CO1 BL2 3.Infer: Soap bubble appears in circle

CO4 BL3 4.Use of Stokes method is applicable only to high viscous liquids- Why?

CO1 BL1 5.List out Poisullies formulae

CO1 BL1 6. Define critical velocity

Section A (Answer any **FIVE** questions)

CO4 BL4 7. Derive an expression for excess pressure in a liquid drop

CO4 BL2 8. Discuss: Molecular theory of Surface Tension

Section C (Answer Any TWO questions)

CO1,4 BL2 10.Describe the Stokes method to determine coefficient of viscosity of a given liquid

CO1,4 BL2/3 11.Demonstrate an experiment to determine surface tension of a given liquid

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Department of Electronics and Communication Science

Date: 15.09.2022 **Time: 12.00 to 1.00 pm** **Duration: 1 hour**

Subject name and Code: Basic Physics I, SG33A

Section A (Answer any **FIVE** questions)

CO1,4 BL1 1.Define Coefficient of viscosity

CO1,4 BL1 2.State the unit of Surface Tension and its expansion

CO1 BL2 3.Infer: Soap bubble appears in circle

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Section A (Answer any **FIVE** questions)

CO4 BL4 7. Derive an expression for excess pressure in a liquid drop

CO4 BL2 8. Discuss: Molecular theory of Surface Tension

Section C (Answer Any TWO questions)

CO1,4 BL2 10.Describe the Stokes method to determine coefficient of viscosity of a given liquid

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SUB NAME & CODE: Basic Physics –I, SG33A
CLASS : II ECS
Unit Test – I (2022-23)

Answer key

1. Opposing force acting on unit surface of relative motion where the velocity gradient is unity
2. Newton/ square meter
3. due to surface tension
4. Iron balls will flow down very high speed
5. $V= \pi pa^4/8\eta l$
6. Velocity of a liquid at which stream lined flow converts into turbulent flow
7. Velocity at which the flow of iron ball comes to a constant in a liquid

8. Diagram withn two surface area :3
   Derivationof pressure: 2

9. Diagram: 1
   Cohesive and adhesive forces: 2
   Formation of ST: 2

10. Experimental setup: 2
    Stoke's formula derivation: 4
    Procedure : 4

11. Experimental setup: 2
    Procedure for drop weight method method: 5
    Tabulation and Applicaton of formula : 3

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Department of Electronics and Communication Science

Date: 15.09.2022 **Duration: 1 hr** **Class: III ECS**

Subject Name & Code: Sensor Technology

Section A (5 x 1 = 5)

(Answer any **FIVE** questions)

CO 3 BL 1 1. Define transducer and its types.
CO 4 BL 4 2. Compare precision and repeatability
CO 4 BL 1 3. List the main parameters characterizing the static characteristics of sensor.
CO 4 BL 3 4. Illustrate Minimum detectable change
CO 3 BL 2 5. Differentiate Active and Passive transducers
CO 3 BL 1 6. Define sensor.
CO 3 BL 1 7. List the various advantages of sensors

Section B (2 x 5 = 10)

(Answer any **ONE** question)

CO 4 BL 4 8. Explain the characteristics of transducers
CO 4 BL 2 9. Summarize the Mechanical, thermal and electrical characteristics of sensors

Section C (1 x 10 = 10)

(Answer any **ONE** question)

CO 3 BL 2 10. Describe the various types of Transducers.
CO 4 BL 2 11.Discuss the Static and dynamic characteristics of sensors

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Date: 15.09.2022 **Duration: 1 hr** **Class: III ECS**

Subject Name & Code: Sensor Technology

Section A (5 x 1 = 5)

(Answer any **FIVE** questions)

CO 3 BL 1 1. Define transducer and list its types.
CO 4 BL 4 2. Compare precision and repeatability
CO 4 BL 1 3. List the main parameters characterizing the static characteristics of sensor.
CO 4 BL 3 4. Illustrate Minimum detectable change
CO 3 BL 2 5. Differentiate Active and Passive transducers
CO 3 BL 1 6. Define sensor.
CO 3BL 1 7. List the various advantages of sensors

Section B (2 x 5 = 10)

(Answer any **ONE** question)

CO 4 BL 4 8. Explain the characteristics of transducers
CO 4 BL 2 9. Summarize the Mechanical, thermal and electrical characteristics of sensors

Section C (1 x 10 = 10)

(Answer any **ONE** question)

CO 3 BL 2 10. Describe the various types of Transducers.
CO 4 BL 2 11.Discuss the Static and dynamic characteristics of sensors

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Answer Key
Unit Test - I
Sensor Technology

1. A transducer is an electrical device that is used to convert one form of energy into another form – 1 mark. Any two types – 1 mark.
2. Precision – how close a measured value is to the true value and how far it is reproducible.

   Repeatability – capability of the sensor to provide the same output repeatedly when used each time to measure the same input.
3. Error, Accuracy, Precision, repeatability, reproducibility, sensitivity, resolution, minimum detectable change, threshold
4. It is the minimum signal that produces a detectable output in a sensor.
5. Active transducer – A device which can change the non electrical to electrical signal without external power. Example thermocouple

   Passive Transducer- A device which can change the non electrical to electrical signal with external power. Example differential transformer.
6. A device that gives an output by detecting the change in quantities. The device that generates an electrical signal corresponding to the variation in the input.
7. To measure temperature, distance, smoke, low energy waste.
8. Static characteristic parameters and its explanation – 3 marks

   Dynamic characteristics parameters and its explanation – 2 marks
9. Mechanical characteristics and thermal characteristics – 3 marks

   Electrical characteristics – 2 marks
10. Transducer types – 4 marks

    Explanation of types – 6 marks
11. Static characteristics parameters – 2 marks

    Parameter explanation – 3 marks

    Dynamic characteristics parameters – 2 marks

    Parameter explanation – 3 marks

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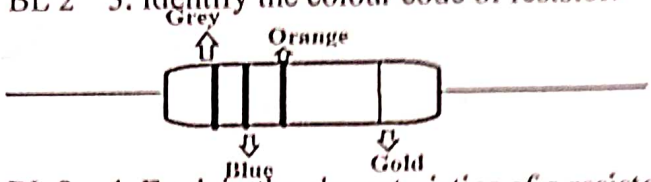
Date: 28.09.2022 **Duration: 1 hr** **Class: I B.Sc**

Subject Name & Code: Basics Circuit Theory & SG21A

Section A (5 x 2 = 10)

(Answer any **FIVE** questions)

CO 4 BL 1 1. Define resistor.
CO 4 BL 4 2. Distinguish fixed and variable resistors.
CO 4 BL 2 3. Identify the colour code of resistor.



CO 4 BL 2 4. Explain the characteristics of a resistor.
CO 4 BL 2 5. Differentiate the polarised and unpolarised capacitor.
CO 4 BL 3 6. Relate the electrolytic and non-electrolytic capacitors.
CO 4 BL 1 7. List the types of inductors.

Section B (1 x 5 = 5)

(Answer any **ONE** question)

CO 4 BL 3 8. sketch the circuit for resistors connected in series and parallel and find the resultant resistance.
CO 4 BL 3 9. Illustrate the circuit for capacitor connected in series and parallel and find the resultant capacitor.

Section C (1 x 10 = 10)

(Answer any **ONE** question)

CO 4 BL 2 10. Explain the various types of fixed resistors.
CO 4 BL 2 11. Distinguish the various types of capacitor.

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Department of Electronics and Communication Science

Date:31.10.22 **Duration: 1 hr** **Class: II B.Sc.,**

Subject Name & Code: Analog Electronics/SG23A

Section A (5 x 2 = 10)

(Answer any **FIVE** questions)

CO 3/4 BL 1 1. Define an Oscillator.
CO 4 BL 2 2. Differentiate damped and undamped oscillations.
CO 3/6 BL 2 3. Discuss the essentials of Transistor Oscillator.
CO 6 BL 3 4. Construct a tank circuit and define it.
CO 4 BL 1 5. State the limitations of LC and RC Oscillators.
CO 4 BL 1 6. Define piezoelectric effect.
CO 4 BL 2 7. Infer why negative feedback is provided in Wien's bridge oscillators.

Section B (1 x 5 = 5)

(Answer any **ONE** question)

CO 3/4 BL 3 8. Explain the working of a Transistor Crystal Oscillator with a neat diagram.
CO 3/4 BL 3 9. Brief the construction and working of Hartley Oscillator

Section C (1 x 10 = 10)

(Answer any **ONE** question)

CO 3/4 BL 3 10. Sketch the RC Phase Shift Oscillator and explain its working
CO 3/4 BL 2/4 11. Explain the working of Wien's Bridge Oscillator with a neat diagram.

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Date:31.10.22 **Duration: 1 hr** **Class: II B.Sc.,**

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Section A (5 x 2 = 10)

(Answer any **FIVE** questions)

CO 3/4 BL 1 1. Define an Oscillator.
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CO 4 BL 2 7. Infer why negative feedback is provided in Wien's bridge oscillators.

Section B (1 x 5 = 5)

(Answer any **ONE** question)

CO 3/4 BL 3 8. Explain the working of a Transistor Crystal Oscillator with a neat diagram.
CO 3/4 BL 3 9. Brief the construction and working of Hartley Oscillator

Section C (1 x 10 = 10)

(Answer any **ONE** question)

CO 3/4 BL 3 10. Sketch the RC Phase Shift Oscillator and explain its working
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Answer Key
Unit Test - I
Analog Electronics – SG23A

1. An electronic device which produces oscillations of desired frequency is known as an Oscillator.
2. Damped Oscillations: oscillations whose amplitude goes on decreasing with time
   Undamped oscillations: Oscillations whose amplitude remains constant with time.
3. Tank circuit, amplifier and a feedback circuit.
4. Diagram – 1 mark. A circuit which produces electrical oscillations of any desired frequency is called as tank circuit.
5. The values of the components changes with temperature thereby changing the frequency of oscillations.
   If the value of the components are changed the operating frequency change.
6. When a a.c voltage is applied across a crystal the crystal starts to vibrate at the frequency of the applied voltage.
7. To provide a stable output.
8. Diagram – 2 marks
   Explanation – 3 marks
9. Diagram – 2 marks
   Explanation – 3 marks
10. Diagram – 3 marks
    Explanation of RC network– 3 marks
    Explanation of operating circuit – 4 marks
11. Diagram – 4 marks
    Explanation – 6 marks

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Department of Electronics and Communication Science

Date :17.10.22 **Duration : 1 hr** **Class : III B.Sc.,**

Subject Name & Code : Microcontroller

Section A **(5 x 2 = 10)**

(Answer any **FIVE** questions)

CO2	BL2/4	1.Classify the instruction set of 8051.
CO2	BL1	2.List the flag related instructions of 8051.
CO2	BL4	3.Categorize the JUMP instructions of 8051.
CO2	BL1	4.Name the various CALL instructions of 8051.
CO3	BL6	5.Write an ALP to add two 8 bit numbers using 8051.
CO2	BL2/4	6.Explain SWAP and Rotate instructions.
CO3	BL6	7.Write an ALP to multiply two 8 bit numbers..

Section B **(1 x 5 = 5)**

(Answer any **ONE** question)

CO2	BL6	8.Write short notes on the data transfer group of instructions with example.
CO2	BL2	9. Discuss the addressing modes of 8051with suitable examples.

Section C **(1 x 10 = 10)**

(Answer any **ONE** question)

CO2	BL2/4	10.Explain the Arithmetic group of instructions in 8051by giving examples.
CO2	BL2	11.Describe the Logical group of instructions of 8051.

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Department of Electronics and Communication Science

Date :17.10.22 **Duration : 1 hr** **Class : III B.Sc.,**

Subject Name & Code : Microcontroller

Section A **(5 x 2 = 10)**

(Answer any **FIVE** questions)

CO2	BL2/4	1.Classify the instruction set of 8051.
CO2	BL1	2.List the flag related instructions of 8051.
CO2	BL4	3.Categorize the JUMP instructions of 8051.
CO2	BL1	4.Name the various CALL instructions of 8051.
CO3	BL6	5.Write an ALP to add two 8 bit numbers using 8051.
CO2	BL2/4	6.Explain SWAP and Rotate instructions.
CO3	BL6	7.Write an ALP to multiply two 8 bit numbers..

Section B **(1 x 5 = 5)**

(Answer any **ONE** question)

CO2	BL6	8.Write short notes on the data transfer group of instructions with example.
CO2	BL2	9. Discuss the addressing modes of 8051with suitable examples.

Section C **(1 x 10 = 10)**

(Answer any **ONE** question)

CO2	BL2/4	10.Explain the Arithmetic group of instructions in 8051by giving examples.
CO2	BL2	11.Describe the Logical group of instructions of 8051.

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Microcontroller - Answer Key

Unit test II

1. The instruction set of 8051 is classified as (i) data transfer (ii) arithmetic and logic group on bits and bytes (iii) branching group
2. STB C , CLR C and CPL
3. Unconditional Jump(AJMP,LJMP and SJMP) and Conditional Jump (JZ,JNZ, DJNZ and JNC)
4. Absolute CALL (ACALL), and Long Call (L-CALL)
5. 8 bit addition program
6. SWAP is used to swap the upper nibble with the lower nibble of the accumulator
   Rotate is used to rotate the contents of the Accumulator through one bit position towards right or left with or without carry
7. 8 bit multiplication program
8. .Data transfer group of instructions with examples – 5
9. Immediate, Direct, Register, Register indirect and Base register plus index register modes - 5 (each 1 mark)
10. Arithmetic group of instructions for (i) addition, subtraction, multiplication and division and (ii) Increment and decrement with examples – 10
11. Logical group of instructions on bits and bytes with examples – 10

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I UNIT TEST (2022-23)

Date: 01.03.2023 **Duration: 1 Hr** **Class: I BCA**

Subject Name & Code: Object Oriented Programming Concepts using C++ & SU22A

Section A (5 x 2 = 10)

(Answer any **FIVE** questions)

CO1	BL1	1. Define is Inheritance.
CO1,3	BL2	2. Describe any two features of object oriented program.
CO2	BL2	3. Discuss any two advantages of OOPs.
CO1	BL1	4. Define Control Structure.
CO1	BL1	5. Define Inline Function.
CO3	BL1	6. Define class and objects.
CO2	BL1	7. Define Constructor.

Section B (1 x 5 = 5)

(Answer any **ONE** question)

CO1	BL2	8. Describe the concepts of Function overloading with example.
CO1	BL2	9. Explain any five key concepts of object oriented programming.

Section C (1 x 10 = 10)

(Answer any **ONE** question)

CO1	BL2	10. Classify the different decision making statements in c++ with examples.
CO3	BL2	11. Explain the working of functions and defining the functions with example.

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I UNIT TEST (2022-23)

ANSWERKEY

Class: I BCA

Subject Name & Code: Object Oriented Programming Concepts using C++ & SU22A

Section A **(5 x 2 = 10)**
(Answer any FIVE questions)

CO1 BL1 1. Define is Inheritance.

Inheritance is the process by which objects of one class acquire the properties of another class. In the concept of inheritance provides the idea of reusablity. This mean that we can add additional features to an existing class without modifying it. This is possible by destining a new class will have the combined features of both the classes.

CO1,3 BL2 2. Describe any two features of object oriented program.

- Emphasis is on doing rather than procedure.
- programs are divided into what are known as objects.
- Data structures are designed such that they characterize the objects.
- Functions that operate on the data of an object are tied together in the data structure.

CO2 BL2 3. Discuss any two advantages of OOPs.

- It is easy to partition the work in a project based on objects.
- Object-oriented systems can be easily upgraded from small to large systems.
- Message passing techniques for communication between objects makes the interface description with external systems much simpler.
- Software complexity can be easily managed.

CO1 BL1 4. Define Control Structure.

Control Structures are just a way to specify flow of control in programs. Any algorithm or program can be more clear and understood if they use self-contained modules called as logic or control structures. It basically analyzes and chooses in which direction a program flows based on certain parameters or conditions. There are three basic types of logic, or flow of control, known as:

1. Sequence logic, or sequential flow
2. Selection logic, or conditional flow
3. Iteration logic, or repetitive flow

CO1 BL1 5. Define Inline Function.

When the program executes the function call instruction the CPU stores the memory address of the instruction following the function call, copies the arguments of the function on the stack and finally transfers control to the specified function. The CPU then executes the function code, stores the function return value in a predefined memory location/register and returns control to the calling function. This can become overhead if the execution time of function is less than the switching time from the caller function to called Inline function.

CO3 BL1 6. Define class and objects.

CLASS: A group of objects that share common properties for data part and some program part are collectively called as class. In C ++ a class is a new data type that contains member variables and member functions that operate on the variables.

OBJECTS: Objects are the basic run-time entities in an object-oriented system. They may represent a person, a place, a bank account, a table of data or any item that the program must handle. The fundamental idea behind object oriented approach is to combine both data and function into a single unit and these units are called objects.

CO2 BL1 7. Define Constructor.

In C++, constructor is a special method which is invoked automatically at the time of object creation. It is used to initialize the data members of new object generally. The constructor in C++ has the same name as class or structure.

In brief, A particular procedure called a constructor is called automatically when an object is created in C++. In general, it is employed to create the data members of new things. In C++, the class or structure name also serves as the constructor name. When an object is completed, the constructor is called. Because it creates the values or gives data for the thing, it is known as a constructor.

Section B **(1 x 5 = 5)**

(Answer any ONE question)

CO1 BL2 8. Describe the concepts of Function overloading with example.

FUNCTION OVERLOADING

Overloading may be operator overloading or function overloading.

It is able to express the operation of addition by a single operator say '+'. When this is possible you use the expression x + y to denote the sum of x and y, for many different types of x and y; integers , float and complex no. You can even define the + operation for two strings to mean the concatenation of the strings.

FUNCTION OVERLOADING

When there are multiple functions with same name but different parameters then these functions are said to be overloaded. Functions can be overloaded by change in number of arguments or/and change in type of arguments.

EXAMPLE of function overloading:

```
class addition
{
public:
void sum(char a, char b )
{
cout<<"a+b:"<<a+b;
}
void sum(int a, int b, int c)
{
cout<<"a+b+c:"<<a+b+c;
}
}
int main()
{
addition add;
add.sum(10.1,20.2455);
cout<<end;
add.sum(10,20,30);
}
```

CO1 BL2 9. Explain any five key concepts of object oriented programming.

BASIC CONCEPTS OF OBJECTS ORIENTED PROGRAMMING

- Objects
- Classes
- Data abstraction and encapsulation
- Inheritance
- Polymorphism
- Dynamic binding
- Message passing

OBJECTS

Objects are the basic run-time entities in an object-oriented system. They may represent a person, a place, a bank account, a table of data or any item that the program must handle.

The fundamental idea behind object oriented approach is to combine both data and function into a single unit and these units are called objects.

The term objects means a combination of data and program that represent some real word entity. For example: consider an example named Amit; Amit is 25 years old and his salary is 2500. The Amit may be represented in a computer program as an object. The data part of the object would be (name: Amit, age: 25, salary: 2500)

The program part of the object may be collection of programs (retrive of data, change age, change of salary). In general even any user –defined type-such as employee may be used. In the Amit object the name, age and salary are called attributes of the object.

CLASS:

A group of objects that share common properties for data part and some program part are collectively called as class.

In C ++ a class is a new data type that contains member variables and member functions that operate on the variables.

DATA ABSTRACTION :

Abstraction refers to the act of representing essential features without including the back ground details or explanations. Classes use the concept of abstraction and are defined as size, width and cost and functions to operate on the attributes.

DATA ENCAPSALATION :

The wrapping up of data and function into a single unit (called class) is known as encapsulation. The data is not accessible to the outside world and only those functions which are wrapped in the class can access it. These functions provide the interface between the objects data and the program.

Section C **(1 x 10 = 10)**

(Answer any ONE question)

CO1 BL2 10. Classify the different decision making statements in c++ with examples.

Decision making structures require that the programmer specify one or more conditions to be evaluated or tested by the program, along with a statement or statements to be executed if the condition is determined to be true, and optionally, other statements to be executed if the condition is determined to be false.

In C++ programming, if statement is used to test the condition. There are various types of if statements in C++.

- if statement
- if-else statement
- nested if statement
- if-else-if ladder

C++ IF Statement

The C++ if statement tests the condition. It is executed if condition is true.

```
if(condition){
//code to be executed
}
```

```
#include <iostream>
using namespace std;
    int main () {
      int num = 10;
            if (num % 2 == 0)
            {
               cout<<"It is even number";
            }
 return 0;
}
```

Output:

It is even number

C++ IF-else Statement

The C++ if-else statement also tests the condition. It executes if block if condition is true otherwise else block is executed.

```
if(condition){
//code if condition is true
}else{
//code if condition is false
}
```

```
#include <iostream>
using namespace std;
int main () {
  int num;
  cout<<"Enter a Number: ";
  cin>>num;
      if (num % 2 == 0)
      {
        cout<<"It is even number"<<endl;
      }
      else
      {
        cout<<"It is odd number"<<endl;
      }
  return 0;
}
```

Output:

Enter a number:11
It is odd number

C++ IF-else-if ladder Statement

The C++ if-else-if ladder statement executes one condition from multiple statements.

```
if(condition1){
//code to be executed if condition1 is true
```

```
}else if(condition2){
//code to be executed if condition2 is true
}
else if(condition3){
//code to be executed if condition3 is true
}
...
else{
//code to be executed if all the conditions are false
}
```

```
#include <iostream>
using namespace std;
int main () {
int num;
    cout<<"Enter a number to check grade:";
    cin>>num;
      if (num <0 || num >100)
      {
        cout<<"wrong number";
      }
      else if(num >= 0 && num < 50){
        cout<<"Fail";
}
      else if (num >= 50 && num < 60)
      {
        cout<<"D Grade";
      }
      else if (num >= 60 && num < 70)
      {
        cout<<"C Grade";
      }
      else if (num >= 70 && num < 80)
      {
        cout<<"B Grade";
      }
      else if (num >= 80 && num < 90)
      {
```

```
        cout<<"A Grade";
    }
        else if (num >= 90 && num <= 100)
        {
          cout<<"A+ Grade";
        }
}
```

Output:

```
Enter a number to check grade:66
C Grade
```

CO3 BL2 11. Explain the working of functions and defining the functions with example.

Function

A function is a block of code which only runs when it is called.

You can pass data, known as parameters, into a function.

Functions are used to perform certain actions, and they are important for reusing code: Define the code once, and use it many times.

Create a Function

C++ provides some pre-defined functions, such as main(), which is used to execute code. But you can also create your own functions to perform certain actions.

To create (often referred to as *declare*) a function, specify the name of the function, followed by parentheses ():

Syntax

```
void myFunction() {
  // code to be executed
}
```

Example Explained

- myFunction() is the name of the function
- void means that the function does not have a return value. You will learn more about return values later in the next chapter
- inside the function (the body), add code that defines what the function should do

Call a Function

Declared functions are not executed immediately. They are "saved for later use", and will be executed later, when they are called.

To call a function, write the function's name followed by two parentheses () and a semicolon ;

In the following example, myFunction() is used to print a text (the action), when it is called:

Example

Inside main, call myFunction():

```
//Create a function
void myFunction() {
  cout << "I just got executed!";
}

int main() {
  myFunction(); // call the function
  return 0;
}

// Outputs "I just got executed!
```

A function can be called multiple times:

Example

```
void myFunction() {
  cout << "I just got executed!\n";
}

int main() {
  myFunction();
  myFunction();
  myFunction();
  return 0;
}
```

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I UNIT TEST (2022-23)

Date: *27.02.2023* **Duration: 1 hr** **Class: II BCA**

Subject Name & Code: Computer Network & SZ24A

Section A (5 x 2 = 10)

(Answer any **FIVE** questions)

CO1	BL1	1. Define is Internet.
CO1,3	BL1	2. Define Computer Networks.
CO1	BL1	3. Define LAN.
CO1	BL1	4. Name any four Applications of computer network.
CO1	BL1	5. Define WAN.
CO3	BL1	6. Define Inter- Networks.
CO1,3	BL1	7. Define Protocol.

Section B (1 x 5 = 5)

(Answer any **ONE** question)

CO1	BL2	8. Describe the various types of Network Hardware.
CO1	BL2	9. Explain the Goals of Computer Networks.

Section C (1 x 10 = 10)

(Answer any **ONE** question)

CO1	BL2	10. Describe about OSI Reference Model with Diagrammatic representation.
CO3	BL2	11. Explain the working of telephone systems and its architecture.

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I UNIT TEST (2022-23)
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Class: II BCA
Subject Name & Code: Computer Network & SZ24A

Section A (5 x 2 = 10)
(Answer any **FIVE** questions)

CO1 BL1 1. Define is Internet.

The internet is a globally connected network system facilitating worldwide communication and access to data resources through a vast collection of private, public, business, academic and government networks. It is governed by agencies like the Internet Assigned Numbers Authority (IANA) that establish universal protocols.The terms internet and World Wide Web are often used interchangeably, but they are not exactly the same thing; the internet refers to the global communication system, including hardware and infrastructure, while the web is one of the services communicated over the internet.

CO1,3 BL1 2. Define Computer Networks.

A computer network is a group of computers linked to each other that enables the computer to communicate with another computer and share their resources, data, and applications.

CO1 BL1 3. Define LAN.

A LAN is a computer network that consists of access points, cables, routers, and switches that enable devices to connect to web servers and internal servers within a single building, campus, or home network, and to other LANs via Wide Area Networks (WAN) or Metropolitan Area Network (MAN). Devices on a LAN, typically personal computers and workstations, can share files and be accessed by each other over a single Internet connection.

CO1 BL1 4. Name any four Applications of computer network.

- Home applications
- Access to Remote Databases
- Information Sharing
- Resource Sharing

CO1 BL1 5. Define WAN.

WAN: Wide Area Networks are used in the wide geological range over a country and continent. These networks are used in military services, mobile operators, railways, and airlines reservations.

CO3 BL1 6. Define Inter- Networks.

Internetworking is the process or technique of connecting different networks by using intermediary devices such as routers or gateway devices. Internetworking ensures data communication among networks owned and operated by

different entities using a common data communication and the Internet Routing Protocol. The Internet is the largest pool of networks geographically located throughout the world but these networks are interconnected using the same protocol stack, TCP/IP.

CO1,3 BL1 7. Define Protocol.

A protocol is a set of rules and guidelines for communicating data. Rules are defined for each step and process during communication between two or more computers. Networks have to follow these rules to successfully transmit data.

Section B

(Answer any **ONE** question) (1 x 5 = 5)

CO1 BL2 8. Describe the various types of Network Hardware.

Types of network devices

Here is the common network device list:

- Hub
- Switch
- Router
- Bridge
- Gateway
- Modem
- Repeater
- Access Point

CO1 BL2 9. Explain the Goals of Computer Networks.

The main goals of computer networks are as follows –

Resource Sharing

The main goal of the computer network is Resource Sharing. It is to create all the programs, data and hardware accessible to anyone on the network without considering the resource's physical area and the client.

Saving Money

The second goal of a computer network is saving money. Small computers have a much excellent value proportion than higher ones. Mainframes are approximately a method ten times quicker than the quickest single-chip microprocessors, but they cost a huge number of times more.

This imbalance has made numerous system designers build systems, including dynamic personal computers, one per customer, with data kept on at least one shared document server machines. This objective prompts networks for specific computers situated in a similar building, including a network is known as LAN (Local Area Network).

High Reliability

The third goal is to support high reliability by acquiring a different authority of supply. For example, all files can be recreated on a few machines, and thus if one of them is nonexistent, the additional copies could be available.

Improve Performance

The fourth goal of a computer network is to improve accessibility and the performance of the system. A system's performance can be improved by inserting one or more processors into it as its workload grows.

For example, if the system is full, replacing it with a larger one at a large expense, it is better to add more processors to it at less cost and less disruption to the user. This improves both accessibilities as well as the performance of a system.

Communication Medium

The fifth goal of the computer network offers a powerful communication medium. The different user on the network can immediately identify a document that has been refreshed on a network.

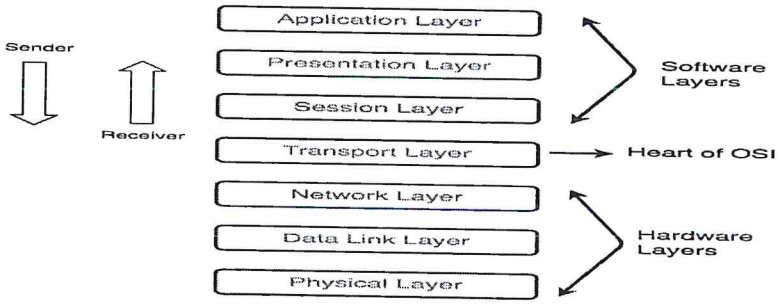
Section C

(1 x 10 = 10)

(Answer any **ONE** question)

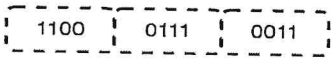
CO1 BL2 10. Describe about OSI Reference Model with Diagrammatic representation.

OSI stands for **Open Systems Interconnection**. It has been developed by ISO – '**International Organization for Standardization**', in the year 1984. It is a 7 layer architecture with each layer having specific functionality to perform. All these 7 layers work collaboratively to transmit the data from one person to another across the globe.



1. Physical Layer (Layer 1) :

The lowest layer of the OSI reference model is the physical layer. It is responsible for the actual physical connection between the devices. The physical layer contains information in the form of **bits.** It is responsible for transmitting individual bits from one node to the next. When receiving data, this layer will get the signal received and convert it into 0s and 1s and send them to the Data Link layer, which will put the frame back together.



The functions of the physical layer are :

1. **Bit synchronization:** The physical layer provides the synchronization of the bits by providing a clock. This clock controls both sender and receiver thus providing synchronization at bit level.
2. **Bit rate control:** The Physical layer also defines the transmission rate i.e. the number of bits sent per second.
3. **Physical topologies:** Physical layer specifies the way in which the different devices/nodes are arranged in a network i.e. bus, star, or mesh topology.
4. **Transmission mode:** Physical layer also defines the way in which the data flows between the two connected devices. The various transmission modes possible are Simplex, half-duplex and full-duplex.

Hub, Repeater, Modem, Cables are Physical Layer devices.
Network Layer, Data Link Layer, and Physical Layer are also known as **Lower Layers or Hardware layers**

2. Data Link Layer (DLL) (Layer 2) :

The data link layer is responsible for the node-to-node delivery of the message. The main function of this layer is to make sure data transfer is error-free from one node to another, over the physical layer. When a packet arrives in a network, it is the responsibility of DLL to transmit it to the Host using its MAC address. Data Link Layer is divided into two sub layers:

1. Logical Link Control (LLC)
2. Media Access Control (MAC)

The packet received from the Network layer is further divided into frames depending on the frame size of NIC(Network Interface Card). DLL also encapsulates Sender and Receiver's MAC address in the header.

The Receiver's MAC address is obtained by placing an ARP(Address Resolution Protocol) request onto the wire asking "Who has that IP address?" and the destination host will reply with its MAC address.



The functions of the Data Link layer are :

1. **Framing:** Framing is a function of the data link layer. It provides a way for a sender to transmit a set of bits that are meaningful to the receiver. This can be accomplished by attaching special bit patterns to the beginning and end of the frame.
2. **Physical addressing:** After creating frames, the Data link layer adds physical addresses (MAC address) of the sender and/or receiver in the header of each frame.
3. **Error control:** Data link layer provides the mechanism of error control in which it detects and retransmits damaged or lost frames.
4. **Flow Control:** The data rate must be constant on both sides else the data may get corrupted thus, flow control coordinates the amount of data that can be sent before receiving acknowledgement.
5. **Access control:** When a single communication channel is shared by multiple devices, the MAC sub-layer of the data link layer helps to determine which device has control over the channel at a given time.

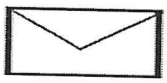
Packet in Data Link layer is referred to as **Frame**.
Data Link layer is handled by the NIC (Network Interface Card) and device drivers of host machines.
Switch & Bridge are Data Link Layer devices.

3. Network Layer (Layer 3) :

The network layer works for the transmission of data from one host to the other located in different networks. It also takes care of packet routing i.e. selection of the shortest path to transmit the packet, from the number of routes available. The sender & receiver's IP addresses are placed in the header by the network layer.
The functions of the Network layer are :

1. **Routing:** The network layer protocols determine which route is suitable from source to destination. This function of the network layer is known as routing.

2. **Logical Addressing:** In order to identify each device on internetwork uniquely, the network layer defines an addressing scheme. The sender & receiver's IP addresses are placed in the header by the network layer. Such an address distinguishes each device uniquely and universally.
   Segment inNetworklayerisreferredtoas **Packet**.



Network layer is implemented by networking devices such as routers.

4. Transport Layer (Layer 4) :

The transport layer provides services to the application layer and takes services from the network layer. The data in the transport layer is referred to as *Segments*. It is responsible for the End to End Delivery of the complete message. The transport layer also provides the acknowledgement of the successful data transmission and re-transmits the data if an error is found.

•Atsender'sside:

Transport layer receives the formatted data from the upper layers, performs **Segmentation**, and also implements **Flow & Error control** to ensure proper data transmission. It also adds Source and Destination port numbers in its header and forwards the segmented data to the Network Layer.

The functions of the transport layer are :

1. **Segmentation and Reassembly:** This layer accepts the message from the (session) layer, breaks the message into smaller units. Each of the segments produced has a header associated with it. The transport layer at the destination station reassembles the message.
2. **Service Point Addressing:** In order to deliver the message to the correct process, the transport layer header includes a type of address called service point address or port address. Thus by specifying this address, the transport layer makes sure that the message is delivered to the correct process.

The services provided by the transport layer :

1. **Connection-Oriented Service:** It is a three-phase process that includes
   –Connection Establishment
   –Data Transfer
   –Termination/disconnection
   In this type of transmission, the receiving device sends an acknowledgement, back to the source after a packet or group of packets is received. This type of transmission is reliable and secure.
2. **Connectionless service:** It is a one-phase process and includes Data Transfer. In this type of transmission, the receiver does not acknowledge receipt of a packet. This approach allows for much faster communication between devices. Connection-oriented service is more reliable than connectionless Service.

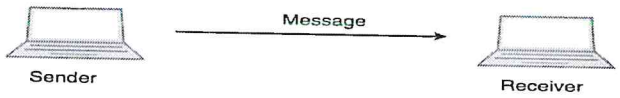
Data in the Transport Layer is called as **Segments**.
Transport layer is operated by the Operating System. It is a part of the OS and communicates with the Application Layer by making system calls.
Transport Layer is called as **Heart of OSI** model.

5. Session Layer (Layer 5) :

This layer is responsible for the establishment of connection, maintenance of sessions, authentication, and also ensures security.
The functions of the session layer are :

1. **Session establishment, maintenance, and termination:** The layer allows the two processes to establish, use and terminate a connection.
2. **Synchronization:** This layer allows a process to add checkpoints which are considered synchronization points into the data. These synchronization points help to identify the error so that the data is re-synchronized properly, and ends of the messages are not cut prematurely and data loss is avoided.
3. **Dialog Controller:** The session layer allows two systems to start communication with each other in half-duplex or full-duplex.

All the below 3 layers(including Session Layer) are integrated as a single layer in the TCP/IPmodelas"ApplicationLayer".
Implementation of these 3 layers is done by the network application itself. These are also knownas **UpperLayers** or **SoftwareLayers**.
Let's consider a scenario where a user wants to send a message through some Messenger application running in his browser. The "Messenger" here acts as the application layer which provides the user with an interface to create the data. This message or so-called Data is compressed, encrypted (if any secure data), and converted into bits (0's and 1's) so that it canbetransmitted.



6. Presentation Layer (Layer 6) :
The presentation layer is also called the **Translation layer**. The data from the application layer is extracted here and manipulated as per the required format to transmit over the network.
The functions of the presentation layer are :

1. **Translation:** For example, ASCII to EBCDIC.
2. **Encryption/ Decryption:** Data encryption translates the data into another form or code. The encrypted data is known as the ciphertext and the decrypted data is known as plain text. A key value is used for encrypting as well as decrypting data.
3. **Compression:** Reduces the number of bits that need to be transmitted on the network.

7. Application Layer (Layer 7) :
At the very top of the OSI Reference Model stack of layers, we find the Application layer which is implemented by the network applications. These applications produce the data, which has to be transferred over the network. This layer also serves as a window for the application services to access the network and for displaying the received information to the user.
Ex:Application–Browsers,SkypeMessenger,etc.
ApplicationLayerisalsocalledDesktopLayer.



The functions of the Application layer are :

1. Network Virtual Terminal
2. FTAM-File transfer access and management
3. Mail Services
4. Directory Services

OSI model acts as a reference model and is not implemented on the Internet because of its late invention. The current model being used is the TCP/IP model.

CO3 BL2 11. Explain the working of telephone systems and its architecture.

The telephone system model is organized as a highly redundant, multilevel hierarchy. It comprises of the following components –

- Telephone of the subscriber or end user
- End office – Local central office directly connected to end user at a distance of 1 – 10km.
- Local loop – A two-way connection between the telephone and the end office.
- Toll office – switching centres which are called tandem offices when located within the same local area.
- Toll connecting trunk – Lines that connect end offices with toll offices.
- Intermediate switching offices – Interconnected non-hierarchical switching offices for connecting toll offices.
- Inter toll trunk – Very high bandwidth channels that connect either two toll offices via intermediate switching offices.

Communication for different Transmissions

- Both caller and callee are attached to same end office –
- In this case, a direct electrical connection is set up between the local loops of the subscribers by the switching mechanism of the end office.
- Caller and callee are attached to different end offices –
- In this case, the end office of the caller sets up a connection with one or more connected toll offices, which then performs the switching job. This again has two cases –
    - If the end offices of the caller and the callee have a common toll office, then the toll office establishes a connection within itself.
    - If there are no common toll office between the caller and callee, then a path is established between the different toll offices, through intermediate switching office via intertoll trunks.

Transmission Media Used

- Local loop – analog twisted pair cables.
- Toll connecting trunk – fibre optic links
- Between switching offices – fibre optic cables and microwaves

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Department of Computer Applications and Technology

I UNIT TEST (2022-23)

CLASS: II BCA ***Duration: 1 Hour*** ***Max.: 25 Marks***

SUB & Code: Open Source Technologies & SAZ2B

Section A (5 x 2 = 10)

(Answer any **FIVE** questions)

CO2 BL1 1. Define: Free software.

CO1 BL3 2. Where the open source has successor?

CO6 BL3 3. Illustrate the reason for using Open Source Technology.

CO2 BL1 4. Define: OSI. Why it is used?

CO1 BL1 5. Define: public domain.

CO1 BL1 6. Define: software freedom.

CO6 BL1 7. List the important of open source initiatives.

Section B (1 x 5 = 5)

(Answer any **ONE** question)

CO1 BL2 8. Explain the difference between open source and close source software.

CO2 BL2 9. Describe all the steps of open source development model

Section C (1 x 10 = 10)

(Answer any **ONE** question)

CO1 BL2 10. Explain open source methodologies.

CO2 BL3 11. Draw and explain process data model for open source software development.

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Department of Computer Applications and Technology

I UNIT TEST (2022-23)

ANSWERKEY

CLASS: II BCA
SUB: Open Source Technologies – SAZ2B

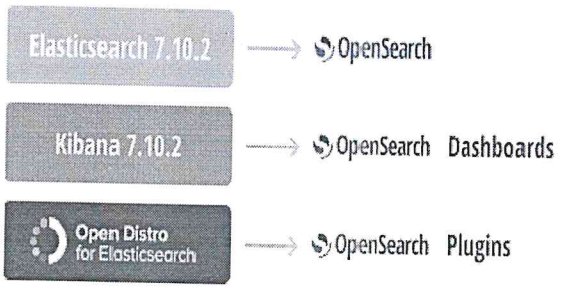
PART A – (5 X 2 = 10 Marks)
Answer any FIVE questions

CO2 BL1 1. Define: Free software.

"Free software" means software that respects users' freedom and community. Roughly, it means that the users have the freedom to run, copy, distribute, study, change and improve the software. Thus, "free software" is a matter of liberty, not price.

CO1 BL3 2. Where the open source has successor?

OpenSearch Alpha was released in April 2021 under the Apache 2.0 open source license, which introduced the projects: OpenSearch as a fork of Elasticsearch 7.10.2, and OpenSearch Dashboards as a fork of Kibana 7.10.2 (the last Apache2-licensed versions of these projects before Elastic's announcement). OpenSearch Beta 1.0 came out just a month later, and already included plugins.



CO6 BL3 3. Illustrate the reason for using Open Source Technology.

OS allows customers to know how the code works, facilitating the development of the most innovative software. It allows reuse and recycling of code, making it easier to collaborate and achieve goals, rather than trying to do everything yourself.

CO2 BL1 4. Define: OSI. Why it is used?

The Open Source Initiative defines open source software as software that is distributed with human readable source code in order to allow the user freedom to run, review, alter, enhance and modify the code for any purpose.

CO1 BL1 5. Define: public domain.

Public domain software is any software that has no legal, copyright or editing restrictions associated with it. It is free and open-source software that can be publicly modified, distributed or sold without any restrictions. SQLite, I2P and CERN httpd are popular examples of public domain software.

CO1 BL1 6. Define software freedom.

Software freedom is essential to the philosophy of Free and Open Source Software. In short, it consists of the freedom to:

- run,
- copy,
- distribute,
- study,
- change and improvethe software.

CO6 BL1 7. List the important of open source initiatives.

Open source licensing encourages innovation through collaboration. Without it, many of the technologies we take for granted today would never have developed, or would be locked away behind patent law. The open source movement is the reason that technology has developed at such a breakneck pace for the past few decades.

PART B – (1 X 5 = 5 Marks)
Answer any ONE question

CO1 BL2 8. Explain the difference between open source and close source software.

OPEN SOURCE SOFTWARE	CLOSED SOURCE SOFTWARE
Open source software refers to the computer software which source is open means the general public can access and use.	Closed source software refers to the computer software which source code is closes means public is not given access to the source code.
Open Source Software in short also referred as OSS.	Closed Source Software in short also referred as CSS.
The source code of open source software is public.	In closed source software the source code is protected.
This code can be modified by other users and organizations means that the source code is available for anyone to look at.	The only individual or organization who has created the software can only modify the code.
The price of open source software is very less.	The price of closed source software is high.
There is no so much restrictions on users based on usability and modification of software.	There is so much restrictions on users based on usability and modification of software.
Programmers compete with each other for recognition.	Programmers do not compete with each other for recognition.
Programmers freely provide improvement for recognition if their improvement is accepted.	Programmers are hired by the software firm/organization to improve the software.
If the program is popular then very large number of programmers may work on the	There is a limitation on the number of programmers/team who will work on the project.

project.	
It is purchased with its source code.	It is not purchased with its source code.
Open software can be installed into any computer.	Closed software needs have a valid license before installation into any computer.
Open source software fails fast and fix faster.	Closed source software has no room for failure.
In open source software no one is responsible for the software.	In closed source software the vendor is responsible if anything happened to software.
Examples are Firefox, OpenOffice, Gimp, Alfresco, Android, Zimbra, Thunderbird, MySQL, Mailman, Moodle, TeX, Samba, Perl, PHP, KDE etc.	Examples are Skype, Google earth, Java, Adobe Flash, Virtual Box, Adobe Reader, Microsoft office, Microsoft Windows, WinRAR, mac OS, Adobe Flash Player etc.

CO2 BL2 9.Describe all the steps of open source development model

Open source software development model has different processes and set of values from traditional proprietary software development model. The traditional software development process consists of six activities, illustrates in Figure 1: collecting and analyzing requirements, design a solution approach, develop the code, test, deploy and maintain. After each step is finished, the process proceeds to the next step.

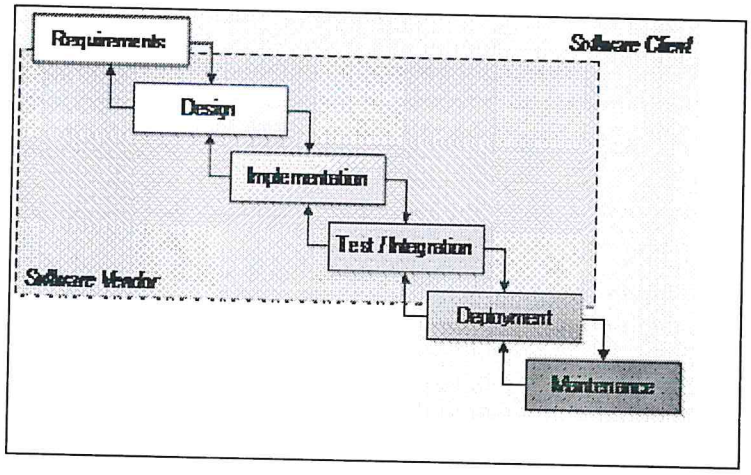


Figure 1: Cascade Model of Traditional Software Engineering

The open source development model has key differences when compared to the traditional model of developing software (collect requirements, design, implement, test, release, and maintain).

The open source development model, illustrated in Figure 2, starts with an idea for a new project, a new functionality or capability to an existing open source software component. Next step is to provide a design for the implementation and then a prototype of the capability and translate it from an idea into running software. At the moment the software runs, it is released as development release, even though it may contain known and unknown bugs. This follows the spirit of release early and release often.

The software will be tested by the community who discuss the software through mailing lists and discussion boards and provide feedback, bug reports, and fixes through the project mailing list. The feedback is recorded and taken into consideration by project members and maintainers to improve the implementation and then a new development release will be available. This cycle happens as many times as needed until project members feel that the implementation is stable enough. When the implementation is released as stable, the development cycle continues to happen with the development release (also called development tree) until a newer stable release is available.

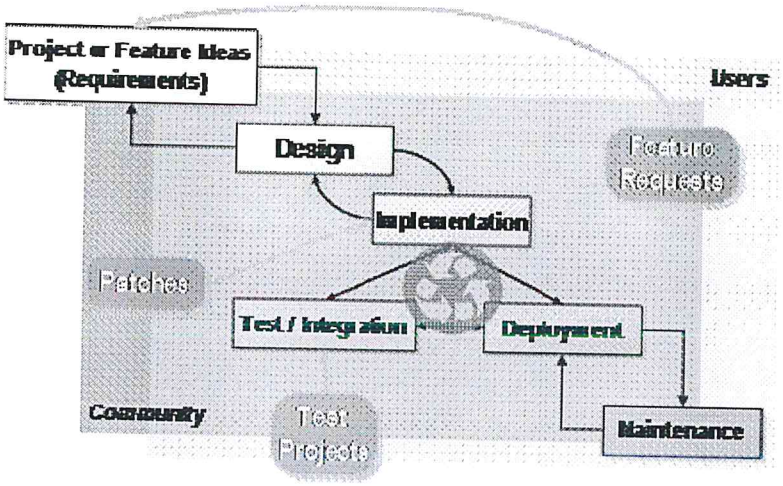


Figure 2: Open source development model
(Source: Bill Weinberg, Open Source Development Labs, 2006)

Some of the unique characteristics of the open source development model include:

- **Bottom up development:** Project members who do the most work get the most say when it comes to making design and implementation decisions. Those that do the most work get the most say. Relationships between developers are very important

- **"Release early, release often":** Don't wait to have a fully working version to make the code public and release a version of the software. This release philosophy allows for peer review, where all members of the community can comment and offer suggestions and bug fixes. It also allows having small incremental changes that are easier to understand and test. Open source projects tend to make a release available early to be used by the user community and then quickly update the releases as the software is modified. This practice is described as "release early, release often". The open source community believes that this practice leads to higher-quality software because of peer review and the large base of users who are using and testing the software, accessing the source code, reporting bugs, and contributing fixes. A side benefit of having many people

looking at the code is that the code is reviewed for adherence to coding style; fragile or inflexible code can also be improved because of these reviews.

- **Peer Review:** Members of the open source project review the code, provide comments and feedback to improve the quality and functionality, and do early test to catch bugs and provide enhancements as early as possible in the development cycle. The result is an improved, high quality code.
- **Small, Incremental changes:** In open source project development, often additional features are small and non intrusive for good reasons:
  - It is easier to understand small patches and code changes than making a large change in the code or a big architectural re-design.
  - The small changes are important because its helps focusing the testing phase which is cyclical and ongoing with every increment of the software.
  - A small change is less like to have unintended consequences.
- **Features that ignore security concerns are flagged:** The open source community takes security very seriously and any development or capability that jeopardizes the security of the software is flagged and not included in the software until the security concern is dealt with.
- **Continuous quality improvement:** This is due to the extensive peer review and quick bug fixes
- **Test projects:** In many cases, test projects are created for large open source projects to create test suites and automate testing.

PART C – (1 X 10 = 10 Marks)

Answer any ONE question

CO1 BL2 Explain open source methodologies.

Open source software is computer software that has a source code available to the general public for use as is or with modifications. This software typically does not require a license fee. There are open source software applications for a variety of different uses such as office automation, web design, content management, operating systems, and communications.

Methods:

1. Waterfall
2. Spiral
3. Agile
4. RAD

The key fact that makes open source software (OSS) different from proprietary software is its license. As copyright material, software is almost always licensed. The license indicates how the software may be used. OSS is unique in that it is always released under a license that has been certified to meet the criteria of the Open Source Definition. These criteria include the right to:

- Redistribute the software without restriction;
- Access the source code;
- Modify the source code; and
- Distribute the modified version of the software.

In contrast, creators of proprietary software usually do not make their source code available to others to modify. When considering the advantages of open source software you should consider the open source product itself. Open source products vary in quality. OSS software does not come with phone support or personalized e-mail support. However, there are commercial service providers who will provide support. If you need a lot of support, consider whether the overall costs of using an open source product will be higher than that of a proprietary product.

Freeware vs. Free Software vs. Shareware

Freeware, free software and shareware are three alternatives to OSS. Each of these options is described below: Freeware. Freeware is software that is made available for use by the author at no cost for an unlimited time. However, the author may retain the copyright. This means that users are not allowed to do anything with the software that is not permitted by the author. Your use of the software may be restricted to personal use, individual use, non-profit use, non-commercial use, academic use, commercial use, or any combination of these.

Free software. Free software is software that can be used, modified, copied and redistributed without restriction and for no cost. For software to be distributed as free software, the source code (human readable form of the program) must be made available to the recipient (along with the free software license releasing the source code to the public) to allow for modification. Free software is distinct from freeware in that it is not proprietary software and can be distributed freely. It should be noted that some proprietary software are not compatible with free software, such as those that depend on a user paying for a licence in order to lawfully use a software product.

Shareware. Shareware is both a type of software and a way to distribute the software. Authors of shareware give users a license to try out the software for a specific period of time, usually for 30 days. If a user wishes to continue using the software after this trial period, he is required to register with the author by paying the author a small fee. (Likewise, users may copy shareware and pass it along to others, but they too are expected to pay a fee if they use the product beyond the 30-day trial period.) If, however, a user does not wish to continue using the software after the evaluation period lapses, he is expected to discontinue use of the product and erase the product files. Thus, shareware is distributed on the basis of an honour system. In many cases, however, once the trial period ends shareware will have updates and will require the user to pay a small fee for additional functionality. Shareware is inexpensive because it is usually produced by a single programmer and is offered directly to customers.

The three primary pitfalls to using freeware and shareware are as follows: • Both may contain viruses, spyware (i.e., software that secretly sends information about your Web surfing habits to its website). • Some shareware and freeware programs do not have an uninstall feature, making them difficult to get rid of. • There may be a lack of technical support if you have questions about a particular shareware or freeware program.

CO2 BL3 11. Draw and explain process data model for open source software development.

Data modeling represents information visually, using diagrams and other tools. While software engineering and IT professionals primarily use data modeling tools to design databases and other structures, you might also use these programs to represent business

workflows, chemical processes and supply chain logistics procedures. Often, different data structures have unique sets of symbols and visual elements, which standardize the way diagrams appear. For example, activity diagrams using the Unified Modeling Language, or UML, use specific notations to represent actions, decisions and other components of the diagram.

open-source data modeling tools

These data modeling programs are available at no cost to the users. Many contain templates for databases and other technological constructs. Some of them are open-source, which means you can edit the code and share the product. Others are free versions of proprietary software, which may have limited functions compared to the paid editions of the program. Here are 13 open-source and free data modeling tools:

1. Lucidchart

Lucidchart, by Lucid, is a free online data modeling tool. You can use this tool to create business process charts, map user journeys, plan databases and cloud structures and accomplish other modeling tasks. As an online-hosted tool, Lucidchart allows you to access your data from an internet connection and download completed documents. Lucid offers several paid service tiers along with the free version, each with its own additional functions.

2. Sonadier

Sonadier is a proprietary data modeling tool that allows users to create applications using a drag-and-drop method. The company offers a free version of the software, along with several paid tiers. The free version allows for five individual users, which might be appropriate for a small database management or app development team. Sonadier uses forms, which the program turns into interactive databases from data the user provides.

3. Dia

Dia is an open-source application that lets users draw and edit diagrams. The program comes with a range of data modeling templates, including relational database, SDL and UML models. Database designers might use Dia to create entity-relationship model diagrams, which can help them design systems and code database functions.

4. Diagrams.net

Diagrams.net, formerly draw.io, is an open-source stack that allows developers to create diagraming applications. Run by JGraph Ltd., this program is browser-based and integrates with a range of platforms. The program has a browser version, which allows users to create diagrams from any location, and a desktop application, which can ensure more data security. Diagrams.net has a variety of templates, including shapes for entity relation and UML models.

5. Dynobird Free

Dynobird Free is a no-cost version of a proprietary data modeling tool for web developers and IT professionals. The free version of the program allows two collaborators and a limited number of projects, so it might be appropriate for smaller teams or beginners. You can also choose one of three paid tiers, each with its own functions and templates.

6. DBDesigner

DBDesigner is a data modeling tool with several service plans, including a free basic version. This version offers the full program features for two database models, with 10 or fewer tables per model. It might be appropriate for IT departments or software engineering teams with two or three members. You can upgrade to a paid service tier if you want to complete more projects or access additional models.

7. ArgoUML

ArgoUML is an open-source program for creating diagrams using the Unified Modeling Language (UML). You can use it to create workflow diagrams, databases, application models and other visual tools. The program can generate and reverse-engineer code from diagrams and other inputs. It also supports a wide range of coding languages and uses cognitive psychology to optimize the diagraming process.

8. Umbrello UML Modeler

Umbrello UML Modeler is an open-source program for data modeling using UML. You can use this downloadable software to create class diagrams, action diagrams, workflows and database models. The program includes code-generating functions and allows users to import code from a range of sources. The program handbook provides information about UML modeling and using this program.

9. Apache Spark

Apache Spark is an open-source system that focuses on processing large sets of data. While this program requires a significant amount of expertise in programming, data modeling and analytics, it has many functions and might be ideal for more experienced programming teams. It allows programmers to perform analytics and create graphs for lots of data in real-time.

10. Valentina Studio Free

Valentina Studio Free is the free version of Valentina Studio, a proprietary data modeling program. This program allows users to build and manage databases. While the paid versions of Valentina Studio have more functions, this free version provides basic functions and allows users to import data from a wide range of sources.

11. Software Ideas Modeler

Software Ideas Modeler is a free edition of a proprietary software for drawing diagrams. The program includes a range of templates and can be used for modeling workflows, algorithms, domains, databases and applications. It has over 20 types of flowchart nodes that users can implement to create custom charts and diagrams, and it also features design elements to add color to their creations.

12. Archi

Archi is an open-source software for creating diagrams using the Archimate modeling language. Enterprise architects might use this notation style to describe the structure of a business or other organization. This program features templates for users to create their own organizational diagrams and flowcharts.

13. Gleek Free

Gleek is a proprietary software for diagraming with several tiers of service, each with its own functions. The free version of the software has the same tools as the paid versions, but it has limited export options and only supports a small number of users, making it appropriate for beginners or smaller teams. This program includes a range of design templates for workflows, diagrams and databases.

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I UNIT TEST (2022-23)

Date: 01.03.2023 **Duration: 1 Hr** **Class: II BCA**

Subject Name & Code: **E-Commerce Technologies & SZ24C**

Section A (5 x 2 = 10)

(Answer any **FIVE** questions)

CO1	BL1	1. Define E-Commerce.
CO1	BL2	2. Discuss the Business Models of e-commerce.
CO 1	BL2	3. Predict the E-transition Challenges for Indian Corporate.
CO2	BL1	4. Define Network.
CO2	BL1	5. Define WWW.
CO2	BL1	6. Quote the use of E-Marketing.
CO2	BL1	7.Define Internet standards.

Section B (1 x 5 = 5)

(Answer any **ONE** question)

CO1	BL6	8. Write Advantages of E-Commerce.
CO2	BL1	9. Describe the use of Software Agents.

Section C (1 x 10 = 10)

(Answer any **ONE** question)

CO1	BL2	10. Infer the E-business Models Based on the Relationship of Transaction Types.
CO2	BL2	11. Summarize the Web Page designing in E-Commerce.

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SRM ARTS AND SCIENCE COLLEGE
SRM Nagar, Kattankulathur
Chengalpattu Dist - 603 203

SRM ARTS AND SCIENCE COLLEGE
Department of Computer Applications and Technology

I UNIT TEST (2022-23)

ANSWERKEY

Class : III BCA
Subject Name & Code: **E-Commerce Technologies & SZ24C**

Section A (5 x 2 = 10)
(Answer any **FIVE** questions)

CO1 BL1 **1. Define E-Commerce**

E-commerce is defined as the buying and selling of goods or services via the internet, and the transfer of money and data to complete the sales. It's also known as electronic commerce or internet commerce.

CO1 BL2 **2. Discuss the Business Models of e-commerce**

B2C (Business-to-consumer), B2B (Business-to-business),B2B2C (Business-to-business-to-consumer). B2G (Business-to-government), C2B (Consumer-to-business), D2C (Direct-to-consumer), C2C (Consumer-to-consumer)

CO 1 BL2 **3. Predict the E-transition Challenges for Indian Corporate**

1. Infrastructural Problems, 2. Absence of Cyber Laws, 3. Privacy and Security Concern, 4. Payment and Tax Related Issues, 5. Digital Illiteracy and Consumer Psyche, 6. Virus Problem and 7. English Specific.

CO BL 4. Define Network.

E-commerce (electronic commerce) is the buying and selling of goods and services, or the transmitting of funds or data, over an electronic network, primarily the internet.

CO BL 5. Define WWW.

The World Wide Web—commonly referred to as WWW, W3, or the Web—is an interconnected system of public WebPages accessible through the Internet

CO BL 6. Mention the use of E-Marketing.

E-marketing enables you to personalize your advertising strategies and create customized experiences that target your audience's best interests.

CO BL 7.Define Internet standards.

Internet Standards refer to all the documented requirements both in technology as well as methodology pertaining to the Internet.

Section B (1 x 5 = 5)
(Answer any **ONE** question)

CO1 BL6 8. Advantages of E-Commerce

Advantages to Organizations

- Using e-commerce, organizations can expand their market to national and international markets with minimum capital investment. An organization can easily locate more customers, best suppliers, and suitable business partners across the globe.
- E-commerce helps organizations to reduce the cost to create process, distribute, retrieve and manage the paper based information by digitizing the information.
- E-commerce improves the brand image of the company.
- E-commerce helps organization to provide better customer services.
- E-commerce helps to simplify the business processes and makes them faster and efficient.
- E-commerce reduces the paper work.
- E-commerce increases the productivity of organizations. It supports "pull" type supply management. In "pull" type supply management, a business process starts when a request comes from a customer and it uses just-in-time manufacturing way.

Advantages to Customers

- It provides 24x7 support. Customers can enquire about a product or service and place orders anytime, anywhere from any location.
- E-commerce application provides users with more options and quicker delivery of products.
- E-commerce application provides users with more options to compare and select the cheaper and better options.
- A customer can put review comments about a product and can see what others are buying, or see the review comments of other customers before making a final purchase.
- E-commerce provides options of virtual auctions.
- It provides readily available information. A customer can see the relevant detailed information within seconds, rather than waiting for days or weeks.
- E-Commerce increases the competition among organizations and as a result, organizations provides substantial discounts to customers.

Advantages to Society

- Customers need not travel to shop a product, thus less traffic on road and low air pollution.
- E-commerce helps in reducing the cost of products, so less affluent people can also afford the products.
- E-commerce has enabled rural areas to access services and products, which are otherwise not available to them.
- E-commerce helps the government to deliver public services such as healthcare, education, social services at a reduced cost and in an improved manner.

CO BL 9. Describe the use of Software Agents.

Software agents are the useful tools to help individuals to undertake their activities on E-Commerce surroundings. Software agents create different paths for communication. Software agents increase the effectiveness and efficiency in several levels of market processes.

Software agents are like guards and locomotives of most E-Commerce. They however differ from traditional software.

The following are very few characteristics:

- Software agents can do their task without any outsource intervention.
- Social interaction with other software agents and human
- Software agents are specific in their goals.

Section C (1 x 10 = 10)

(Answer any **ONE** question)

CO1 BL2 10.Summarize the E-business Models Based on the Relationship of Transaction Types

Based on transaction type, different types of transactions can be identified as listed below:

- Brokerage
- Aggregator
- Info-mediary
- Community
- Value chain
- Advertising

These transaction types take place in a variety of ways. Moreover, any given firm may combine one or two of these as part of its web business strategy.

1) Brokerage Model

Brokers are market-makers: they bring buyers and sellers together and facilitate transactions. Brokers play a frequent role in business-to-business (B2B), business-to-consumer (B2C), or consumer-to-consumer (C2C) markets. Usually a broker charges a fee or commission for each transaction it enables. The formula for fees can vary depending on context. Brokerage models include:

Marketplace Exchange: offers a full range of services covering the transaction process, from market assessment to negotiation and fulfillment. Some examples are [Orbitz, ChemConnect]

Buy/Sell Fulfillment: takes customer orders to buy or sell a product or service, including terms like price and delivery. Some examples are [CarsDirect, Respond.com]

Auction Broker: conducts auctions for sellers (individuals or merchants). Broker charges the seller a listing fee and commission scaled with the value of the transaction. Auctions vary widely in terms of the offering and bidding rules. Some examples are [eBay]

Transaction Broker: provides a third-party payment mechanism for buyers and sellers to settle a transaction. Some examples are [PayPal, Escrow.com]

Search Agent: a software agent or "robot" used to search-out the price and availability for a good or service specified by the buyer, or to locate hard to find information.

Virtual Marketplace or virtual mall: a hosting service for online merchants that charges setup, monthly listing, and/or transaction fees. It may also provide automated transaction and relationship marketing services. Some examples are [zShops and Merchant Services at Amazon.com]

2) Aggregator Model

Electronic commerce business model where a firm (that does not produce or warehouses any item) collects (aggregates) information on goods and/or services from several competing sources at its website. The firm's strength lies in its ability to create an 'environment' which draws visitors to its website, and in designing a system which allows easy matching of prices and specifications. Aggregator model includes:

Virtual Merchant: this is a business that operate only from the web and offers either traditional or web specific goods and services. The method of selling may be listing price or auction. Some example includes [Amazon, eToys]

Catalog Merchant: Catalog business is a migration of mail order to web-based order business.

Bit Vendor: This is the merchant that deals strictly in digital products and services in its purest form.

Subscription model: The users have to pay for the access of the site. High value added content should be essential for subscription model. Some examples are [Wall street journal, Consumer Reports]

3) Info-mediary Model

Data about consumers and their consumption habits are valuable, especially when that information is carefully analyzed and used to target marketing campaigns. Independently collected data about producers and their products are useful to consumers when considering a purchase. Some firms function as infomediaries (information intermediaries) assisting buyers and/or sellers understand a given market. Info-mediary model includes:

Advertising Networks: feed banner ads to a network of member sites, thereby enabling advertisers to deploy large marketing campaigns. Ad networks collect data about web users that can be used to analyze marketing effectiveness. [DoubleClick]

Audience Measurement Services: online audience market research agencies. [Nielsen//Netratings]

Incentive Marketing: customer loyalty program that provides incentives to customers such as redeemable points or coupons for making purchases from associated retailers. Data collected about users is sold for targeted advertising. [Coolsavings]

Metamediary: facilitates transactions between buyer and sellers by providing comprehensive information and ancillary services, without being involved in the actual exchange of goods or services between the parties. [Edmunds]

4) Community Model

The viability of the community model is based on user loyalty. Users have a high investment in both time and emotion. Revenue can be based on the sale of ancillary products and services or voluntary contributions; or revenue may be tied to contextual advertising and subscriptions for premium services. The Internet is inherently suited to community business models and today this is one of the more fertile areas of development, as seen in rise of social networking.

Open Source: software developed collaboratively by a global community of programmers who share code openly. Some examples are [Red Hat, Linux]

Open Content: openly accessible content developed collaboratively by a global community of contributors who work voluntarily. [Wikipedia]

Public Broadcasting: user-supported model used by not-for-profit radio and television broadcasting extended to the web. A community of users supports the site through voluntary donations. [The Classical Station (WCPE.org)]

Social Networking Services: sites that provide individuals with the ability to connect to other individuals along a defined common interest (professional, hobby, romance). Social networking services can provide opportunities for contextual advertising and subscriptions for premium services. [Facebook, Orkut]

5) Value Chain Model

Value chain selling is supported through two business models: demand chain and a supply chain; E-Commerce supports the transactions through both the demand chain business model and supply chain business model.

Products, goods, services, or information are delivered through the parties of the value chain from producers to end users. A value chain also has relationship and administrative aspects, that is, you can manage the relationship of the partners or enterprises in your value chain, as well as offer some administrative services to those parties.

As a result, value chain business models must manage the two sides of their businesses: their customers and direct sales, and their channel partners and suppliers. Each requires its own management channels and practices.

To sell directly to customers (direct sales), value chain models usually include a storefront, where customers can purchase their goods or services directly. To manage relationships with partners or suppliers, the demand chain and a supply chain models within the value chain include a hub.

6) Advertising Model

The web advertising model is an extension of the traditional media broadcast model. The broadcaster, in this case, a web site, provides content (usually, but not necessarily, for free) and services (like email, IM, blogs) mixed with advertising messages in the form of banner ads. The banner ads may be the major or sole source of revenue for the broadcaster. The

advertising model works best when the volume of viewer traffic is large or highly specialized. Advertising model includes:

Portal: usually a search engine that may include varied content or services. A high volume of user traffic makes advertising profitable and permits further diversification of site services. Some common examples are [Google, Yahoo!]

Classifieds: list items for sale or wanted for purchase. Listing fees are common, but there also may be a membership fee. [Monster.com, Craigslist]

User Registration: content-based sites that are free to access but require users to register and provide demographic data. Registration allows inter-session tracking of user surfing habits and thereby generates data of potential value in targeted advertising campaigns. [NYTimes]

Contextual Advertising / Behavioral Marketing: For example, a browser extension that automates authentication and form fill-ins, also delivers advertising links or pop-ups as the user surfs the web. Contextual advertisers can sell targeted advertising based on an individual user's surfing activity.

CO BL 11. Summarize the Web Page designing in E-Commerce.

Building an ecommerce site may be simpler than you imagine. There are now ecommerce solutions that do most of the work for you, but you still need to understand what's offered and what your site needs. If you do enough research, you can make decisions that lead to a magnificent site that grows and evolves with you in the years to come.

1. Select your perfect ecommerce platform.
2. Purchase a domain name.
3. Find a developer.
4. Pick your ecommerce theme.
5. Customize your ecommerce template.
6. Add your products.
7. Set up payment options.
8. Sort out your shipping settings.
9. Preview, test… and publish your online store.

Find Your Perfect Ecommerce Platform

Finding the right ecommerce website builder is the first step in your journey. It's important to have one that can meet the needs of your products and brand.

1. Types of Ecommerce platforms.

There are three main types of ecommerce platforms to choose from, which suit different kinds of businesses and have different functionality. Here's what you need to know:

Open source

As the name suggests, open-source platforms offer their source code freely to everyone who wants to use it. It's free to install and endlessly customizable. However, open-source platforms usually require advanced coding knowledge to use properly. Security breaches are also a concern, and users often need to hire people dedicated to maintaining the security, which may end up costing more than a subscription to another type of platform.

SaaS

SaaS, or Software as a Service, is an ecommerce platform that's offered as a subscription service. These systems are generally easy to use, scalable, and have robust security. As they're designed specifically for ecommerce, they can handle the logistical processes, like checkout and payment processing.

Pricing is a concern with SaaS, as there's a monthly subscription fee, transaction fees, and expenses for plug-in apps. Some services may also have restricted branding, which limits your creativity when designing. Sites built on Wix, for example, have "powered by Wix" at the bottom of the screen, so not only are you promoting your brand, but you're sharing the spotlight with Wix. Premium services usually give you more leeway to create a look and feel that reflects your brand, alone.

Headless commerce

Headless commerce keeps the shopping cart and display layer of ecommerce sites separate. This means you can use a content management system (CMS), digital experience platform (DXP), progressive web app (PWA) or other technology on the frontend and power that with an ecommerce engine on the backend.

Headless commerce enables customer-facing changes to be made quickly and gives businesses plenty of creative control. It also lets companies get to market faster, with a lower total cost, and businesses get increased control over their store while outsourcing security and PCI compliance.

2. Ecommerce Hosting.

Ecommerce web hosting is where your data is stored. It can have an impact on security and costs, so take the time to understand your options.

Cloud

Cloud hosting refers to ecommerce sites hosted off-site. It's generally offered by SaaS or headless commerce companies. The platform manages the uptime as well as updates, patches, and upgrades that help keep sites secure. Open source solutions may also have a cloud option that includes the costs of hosting, but will still require security maintenance to be done by the merchant.

On-premise

On-premise hosting refers to ecommerce sites that are hosted on servers owned by the business and is usually found with open source solutions. The company needs to have space

for the server, handle the installation, and hire people to look after it to ensure that the site stays up and secure. This usually is more feasible for large corporations.

3. Things to consider when choosing your ecommerce solution.

Several systems have to work seamlessly to give your customers the best ecommerce experience. Look at how your preferred ecommerce platform works in the following areas to ensure it performs optimally now and into the future.

Website performance

Make sure the platform works consistently and has a strong uptime record, so your website is available when customers want to shop. Unlimited API calls help make your site easier to manage, and pages that load quickly give customers the best experience.

Traffic capacity

Can the platform meet your current traffic needs? Does it have the scope to grow with you as your business expands? Does it handle big days like Black Friday and Cyber Monday?

Mobile optimization

More consumers are shopping on mobile devices, so it's essential that your platform can optimize your website for an excellent mobile encounter. Look for ways to enhance customer experience through mobile technology, like geolocation, which helps customers find the nearest store.

Secure payments and data

The platform must be able to protect your data and your customer's data. SaaS solutions include security, like SSL and PCI, as part of their monthly plans. Self-hosted and open-source solutions require you to have a greater understanding of security, as there's a higher chance of attack.

4. Ecommerce website builders to use.

Your website builder is the foundation of your online store. Options explicitly designed for ecommerce give you more options and room to grow than generic website builders with an ecommerce add-on. Here are a few to consider:

BigCommerce

BigCommerce is a SaaS solution that's known for being scalable. It has 24/7 customer support, with priority support available for large accounts. There are plenty of built-in features. Multi-layered security keeps data safe, and local payment methods bring in customers from around the world. BigCommerce supports headless, so brands can deliver API-driven experiences through a CMS, DXP, application, device, or custom front-end — with BigCommerce powering the commerce engine.

Shopify

Shopify is another SaaS solution that's fully hosted and known for being quick and easy to set up. They have an extensive range of plug-ins, but if you need to use a lot, the price can quickly add up. Shopify can handle a high number of transactions per minute, so it can easily cope with traffic spikes.

Magento

Magento is a self-hosted solution, so you have total creative freedom; however, you need someone with coding knowledge to take full advantage of the platform. There's a wide choice of integrations, and it can handle instant purchases and product suggestions.

WooCommerce

WooCommerce is an open-source WordPress plug-in, so it's free to install. It's generally used by those with an existing WordPress site. WooCommerce is flexible, has limitless customization, and industry experts audit its secure code.

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Department of Computer Applications and Technology

I UNIT TEST (2022-23)

Date: 27.02.2023 **Duration: 1 hr** **Class: III BCA**

Subject Name & Code: Web Design and Development

Section A (5 x 2 = 10)

(Answer any **FIVE** questions)

CO1 BL1 1. List out the most common languages used for web designing?

CO1, 3 BL2, 4 2. Define HTML.

CO3 BL2 3. Express Heading tags with example.

CO6 BL1 4. List out the various operators involved in Javascript.

CO3 BL1 5. Give examples of HTML tags in forms.

CO1 BL1 6. Examine bold, big, strike tags.

CO1, 3 BL3, 6 7. Construct frameset.

Section B (1 x 5 = 5)

(Answer any **ONE** question)

CO2, 3 BL2 8.Describe the various types of paired and unpaired tags supported by HTML with examples.

CO4, 3 BL2, 5 9. Summarize the ordered and unordered list in HTML.

Section C (1 x 10 = 10)

(Answer any **ONE** question)

CO5 BL3 10. Demonstrate the different control statements in javascript with an example.

CO3 BL3 11. Illustrate the concept of table attributes with an example.

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I UNIT TEST (2022-23)

ANSWERKEY

Class :III BCA
Subject Name & Code: Web Design and Development

Section A (5 x 2 = 10)

(Answer any **FIVE** questions)

CO1 BL1 1. List out the most common languages used for web designing?

- CSS: CSS stands for Cascading Style Sheets. It is used for styling the webpage in terms of look and layout.
- HTML: HTML or Hypertext Markup Language provides the code to structure a web page, its template, and its content.
- JavaScript: It is a programming language used to make the web page interactive.

CO1,3 BL2,4 2. Define HTML.

HTML stands for Hyper Text Markup Language. HTML is the standard markup language for creating Web pages. HTML describes the structure of a Web page. HTML consists of a series of elements. HTML elements tell the browser how to display the content.

CO3 BL2 3. Express Heading tags with example.

The heading elements are H1, H2, H3, H4, H5, and H6 with H1 being the highest (or most important) level and H6 the least. For example: <H1>This is a top level heading</H1> Here is some text

CO6 BL1 4. List out the various operators involved in Javascript.

- Arithmetic Operators.
- Assignment Operators.
- Logical Operators.
- Relational Operators.
- Unary Operators.
- Bitwise Operators.
- Ternary Operators.

CO3 BL1 5. Give examples of HTML tags in forms.

The <form> tag is used to create an HTML form for user input.

- <input>
- <textarea>
- <button>
- <select>
- <option>
- <optgroup>
- <fieldset>
- <label>

CO1 BL1 6. Examine bold, big, strike tags.
The <strike> tag was used in HTML to define strikethrough text.
<strike>This text is bold</strike>
The <big> tag was used in HTML to define bigger text.
<big>This text is bold</big>
The HTML element defines bold text, without any extra importance.
This text is bold

CO1,3 BL3,6 7. Construct frameset.
o use frames on a page we use <frameset> tag instead of <body> tag. The <frameset> tag defines, how to divide the window into frames. The rows attribute of <frameset> tag defines horizontal frames and cols attribute defines vertical frames.

Section B (1 x 5 = 5)

(Answer any **ONE** question)

CO2,3 BL2 8. Describe the various types of paired and unpaired tags supported by HTML with examples.
Tags in HTML are categorized as Paired Tags and Unpaired Tags on the basics of opening and closing.

1. Paired Tags
2. Unpaired Tags

Paired Tags
Paired Tags are tags with both opening and closing. They can have child tags, plain text and attributes. For example <p>, <h1>, <body> etc.

Unpaired Tags
Unpaired tags are tags with opening only, example <img>, <input> etc. They can have attributes.

CO4,3BL2,5 9. Summarize the ordered and unordered list in HTML.
Ordered HTML List
HTML lists allow web developers to group a set of related items in lists.
An ordered list starts with the <ol> tag. Each list item starts with the <li> tag.
An ordered HTML list:

1. First item
2. Second item
3. Third item
4. Fourth item

An unordered list starts with the <ul> tag. Each list item starts with the <li> tag.
An unordered HTML list:

- Item
- Item
- Item
- Item

HTML Description Lists
HTML also supports description lists.
A description list is a list of terms, with a description of each term.
The <dl> tag defines the description list, the <dt> tag defines the term (name), and the <dd> tag describes each term:

Section C (1 x 10 = 10)

(Answer any **ONE** question)

CO5 BL3 10. Demonstrate the different control statements in javascript with an example.

A control statement in java is a statement that determines whether the other statements will be executed or not. It controls the flow of a program. An 'if' statement in java determines the sequence of execution between a set of two statements. Control Statements can be divided into three categories, namely.

1. Decision Making statements
    - if statements
    - switch statement
2. Loop statements
    - do while loop
    - while loop
    - for loop
3. Jump statements
    - break statement
    - continue statement

CO3 BL3 11. Illustrate the concept of table attributes with an example.

HTML Table with Border

There are two ways to specify border for HTML tables.

1. By border attribute of table in HTML

HTML Table with cell padding

You can specify padding for table header and table data by two ways:

1. By cellpadding attribute of table in HTML
2. By padding property in CSS

HTML Table width:

We can specify the HTML table width using the CSS width property. It can be specify in pixels or percentage.

HTML Table with colspan

To make a cell span more than one column, you can use the colspan attribute.

HTML Table with rowspan

To make a cell span more than one row, you can use the rowspan attribute.

It will divide a cell into multiple rows. The number of divided rows will depend on rowspan values.

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I UNIT TEST (2022-23)

Date: 28.02.2023 **Duration: 1 hr** **Class: III BCA**

Subject Name & Code: Data Mining

Section A (5 x 2 = 10)

(Answer any **FIVE** questions)

CO1 B1 1. Define data mining.

CO1 B1 2. List out some the data mining tools.

CO1 B1 3. Define data warehousing.

CO4 B1 4. State the categories of clustering methods.

CO2 B1 5. Define the purpose of Apriori Algorithm.

CO3 B1 6. Define classification.

CO4 B1 7. Define tree Pruning.

Section B (1 x 5 = 5)

(Answer any **ONE** question)

CO1 B6 8. Distinguish OLAP and OLTP.

CO3 B2 9. Explain classification with example.

Section C (1 x 10 = 10)

(Answer any **ONE** question)

CO1 B2 10. Explain the data mining functionalities.

CO6 B2 11. Explain mining multidimensional data from transactional databases and relational databases.

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I UNIT TEST (2022-23)

ANSWERKEY

Date: 28.02.2023 **Duration: 1 hr** **Class: III BCA**

Subject Name & Code: DATA MINING

Section A (5 x 2 = 10)

(Answer any **FIVE** questions)

CO1 B1 1. Define data mining

Data mining is **the process of sorting through large data sets to identify patterns and relationships that can help solve business problems through data**

CO1 B1 2. List out some the data mining tools

- MonkeyLearn | No-code text mining tools.
- RapidMiner | Drag and drop workflows or data mining in Python.
- Oracle Data Mining | Predictive data mining models.

CO1 B1 3. Define data warehousing

A data warehouse is a central repository of information that can be analyzed to make more informed decisions.

CO2 B1 4. State the categories of clustering methods?

- Connectivity-based Clustering (Hierarchical clustering)
- Centroids-based Clustering (Partitioning methods)
- Distribution-based Clustering

CO2 B1 5. Define the purpose of Apriori Algorithm?

Apriori algorithm is given by R. Agrawal and R. Srikant in 1994 for finding frequent itemsets in a dataset for boolean association rule.

CO3 B1 6. Define classification

Classification is a task in data mining that involves assigning a class label to each instance in a dataset based on its features.

CO4 B1 7. Define tree Pruning.

In machine learning and data mining, pruning is a technique associated with decision trees

Section B (1 x 5 = 10)

(Answer any **one** question)

CO1 B6 8. Distinguish OLAP and OLTP

OLTP and OLAP: The two terms look similar but refer to different kinds of systems. Online transaction processing (OLTP) captures, stores, and processes data from transactions in real time. Online analytical processing (OLAP) uses complex queries to analyze aggregated historical data from OLTP systems.

CO3 B2 9. Explain classification with example.

A classification is an ordered set of related categories used to group data according to its similarities. It consists of codes and descriptors and allows survey responses to be put into meaningful categories in order to produce useful data. A classification is a useful tool for anyone developing statistical surveys.

CO4 B6 10. Distinguish between PCA and FA.

In PCA, the components are actual orthogonal linear combinations that maximize the total variance. In FA, the factors are linear combinations that maximize the shared portion of the variance--underlying "latent constructs". That's why FA is often called "common factor analysis".

Section C (1 x 10 = 10)

(Answer any **ONE** question)

CO1 B2 11. Explain the data mining functionalities

Data mining functionalities are used to represent the type of patterns that have to be discovered in data mining tasks. In general, data mining tasks can be classified into two types including descriptive and predictive.

CO3 B2 12. Explain mining multidimensional data from transactional databases and relational databases.

Multidimensional data is a data set with many different columns, also called features or attributes. The more columns in the data set, the more likely you are to discover hidden insights. In this case, two-dimensional analysis falls flat. Think of this data as being in a cube on multiple planes.

20/2/23

23/2/23

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I UNIT TEST (2022-23)

Date: 01.03.2023 ***Duration: 1Hr*** ***Class: III BCA***

Subject Name & Code: Mobile Application Development

Section A (5 x 2 = 10)

(Answer any **FIVE** questions)

CO 1 BL 2 1. Infer the Characteristics of DDMS.

CO 2 BL 1 2. Define AVD.

CO 4 BL 2 3. Cite a note on various components in mobile application development.

CO 5 BL 2 4. Illustrate hybrid /cross platform approach.

CO 3 BL 4 5. Discriminate breakpoints.

CO 6 BL 4 6. Point out front end talks to the back end.

CO 6 BL 3 7. Recall history of Android.

Section B (1 x 5 = 5)

(Answer any **ONE** question)

CO 5 BL 2 8. Discuss about Developer tools in Android.

CO 1 BL 5 9. Summarize code completion in Android.

Section C (1 x 10 = 10)

(Answer any **ONE** question)

CO 2 BL 4 10. Classify native and hybrid applications.

CO 3 BL 3 11. Sketch the neat diagram of Android Architecture.

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Class : III BCA
Subject Name & Code: Mobile Application Development

Section A (5 x 2 = 10)
(Answer any **FIVE** questions)

1. Android ships with a debugging tool called Dalvik Debug Monitor Server(DDMS), which provides port forwarding services, screen capture on the device ,thread and heap information on the device, logcat, process, and radio state information, incoming call and SMS spoofing, location data spoofing and more.
2. An Android Virtual Device is a configuration that defines the characteristics of an Android phone, tablet, Wear OS, Android TV, or Automotive OS device that you want to simulate in the Android Emulator.
3. Activities, Services, content providers, broadcast receiver, intents, widgets, views, notifications.
4. In the case of cross-platform and hybrid apps, the same codebase is used to develop for all platforms (iOS and Android), whereas native apps demand a separate codebase for iOS and Android. This is why native app development tends to be more expensive than cross-platform and hybrid app development.
5. o set a breakpoint in Android Studio, you need to navigate to a specific line of code and then click in the gutter next to the line number. To unset a breakpoint, you need to click an existing breakpoint in the gutter to make it disappear. To try it yourself, set a breakpoint where the image Resource variable is set.
6. The user points their browser to one of your website's urls. This makes the browser send out one or more requests to your server. The user waits for the browser to render the page. The user sees a useful and usable page. The user interacts with the page.
7. Android versions 1.0 to 1.1: The early days., Android version 1.5: Cupcake. Android version 1.6: Donut. ...Android versions 2.0 to 2.1: Eclair.Android version 2.2: Froyo. Android version 2.3: Gingerbread. Android 3.0 to 3.2: Honeycomb. Android version 4.0: Ice Cream Sandwich.

Section B (1 x 5 = 5)

(Answer any ONE question)

8. Manage Android Virtual Devices (AVD), Create and update Android projects, Update your sdk with new platform add-ons and documentation.
9. Code Completion helps us write code quickly by automatically completing the code using dynamic suggestion lists that are generated based on what we just typed. The basic code completion is the list of suggestions that appears while we are typing, as shown in the following screenshot.

Section C (1 x 10 = 10)

(Answer any ONE question)

10. The main difference: Native apps are built for a specific operating system – either iOS or Android. Hybrid apps, however, are built to work across any operating system and share the same codebase.
11. The main components of android architecture are following:-

    a. Applications
    b. Application Framework
    c. Android Runtime
    d. Platform Libraries
    e. Linux Kernel

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Department of Computer Applications and Technology

I UNIT TEST (2022-23)

Date: 02.03.2023 **Duration: 1 Hr** **Class: III BCA**

Subject Name & Code: IOT and its Applications

Section A (5 x 1 = 5)

(Answer any **FIVE** questions)

CO1	BL1	1. Define IOT.
CO1	BL1	2. State the characteristics of IOT.
CO 1	BL1	3. Define Wireless Sensor Networks.
CO1	BL1	4. Define data and information.
CO2	BL1	5. Define M2M.
CO2	BL2	6. Differentiate between IOT and M2M.
CO 1	BL6	7. Write the basic operations in IOT.

Section B (2 x 5 = 10)

(Answer any **TWO** questions)

CO1	BL2	8. Explain Advantages and disadvantages of IOT.
CO2	BL3	9. Explain in detail about M2M.

Section C (1 x 10 = 10)

(Answer any **ONE** question)

CO1	BL2	10. Explain smart home IOT application using figure.
CO2	BL6	11. Design the IOT-A Architecture.

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I UNIT TEST (2022-23)

ANSWERKEY

Class : III BCA
Subject Name & Code : IOT and its Applications

Section A (5 x 1 = 5)

(Answer any **FIVE** questions)

CO1 BL1 1. Define IOT

Internet of Things (IoT) is a network of physical objects or people called "things" that are embedded with software, electronics, network, and sensors that allow these objects to collect and exchange data.

CO1 BL1 2. State the characteristics of IoT.

Connectivity, Intelligence and Identity, Scalability, Dynamic and Self-Adapting, Architecture , Safety , Self Configuring

CO 1 BL1 3. Define Wireless Sensor Networks.

Wireless Sensor Network (WSN) is an infrastructure-less wireless network that is deployed in a large number of wireless sensors in an ad-hoc manner that is used to monitor the system, physical or environmental conditions.

CO1 BL1 4. Define data and information in IoT

Information is the knowledge that is remodeled and classified into an intelligible type, which may be utilized in the method of deciding. Data is a raw and unorganized fact that is required to be processed to make it meaningful

CO2 BL1 5. Define M2M

Machine to Machine : This is commonly known as Machine to machine communication. It is a concept where two or more than two machines communicate with each other without human interaction using a wired or wireless mechanism.

CO2 BL2 6. Differentiate between IoT and M2M.

CO 1 BL6 7. Write the basic operations in IoT.

Section B (2 x 5 = 10)

(Answer any **TWO** questions)

CO1 BL2 8. Explain Advantages and disadvantages of IOT

Advantages:

- It can assist in the smarter control of homes and cities via mobile phones. It enhances security and offers personal protection.
- By automating activities, it saves us a lot of time.
- Information is easily accessible, even if we are far away from our actual location, and it is updated frequently in real time.
- Electric Devices are directly connected and communicate with a controller computer, such as a cell phone, resulting in efficient electricity use. As a result, there will be no unnecessary use of electricity equipment.
- Personal assistance can be provided by IoT apps, which can alert you to your regular plans.
- It is useful for safety because it senses any potential danger and warns users. For example, GM OnStar, is a integrated device that system which identifies a car crash or accident on road. It immediately makes a call if an accident or crash is found.
- It minimizes human effort because IoT devices connect and communicate with one another and perform a variety of tasks without the need for human intervention.

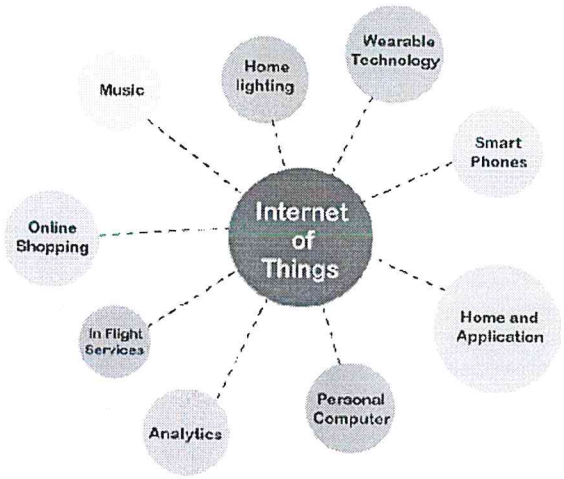
Disadvantages:

- Hackers may gain access to the system and steal personal information. Since we add so many devices to the internet, there is a risk that our information as it can be misused.
- They rely heavily on the internet and are unable to function effectively without it.
- With the complexity of systems, there are many ways for them to fail.
- We lose control of our lives—our lives will be fully controlled and reliant on technology.
- Overuse of the Internet and technology makes people unintelligent because they rely on smart devices instead of doing physical work, causing them to become lazy.
- Unskilled workers are at a high risk of losing their jobs, which could lead to unemployment. Smart surveillance cameras, robots, smart ironing systems, smart washing machines, and other facilities are replacing security guards, maids, ironmen, and dry-cleaning services etc.
- It is very difficult to plan, build, manage, and enable a broad technology to IoT framework.

- Deploying IoT devices is very costly and time-consuming.

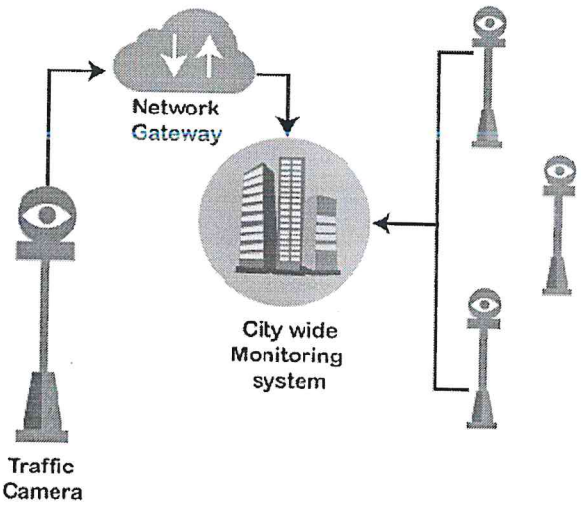
CO1 BL2 9. Discuss various application areas of IoT.

The **Internet of Things (IoT)** provides the ability to interconnect computing devices, mechanical machines, objects, animals or unique identifiers and people to transfer data across a network without the need for human-to-human or human-to-computer is a system of conversation. **IoT applications** bring a lot of value in our lives. The Internet of Things provides objects, **computing devices**, or **unique identifiers** and people's ability to transfer data across a network without the **human-to-human** or **human-to-computer interaction**.



A traffic camera is an intelligent device. The camera monitors **traffic congestion, accidents** and **weather conditions** and can access it to a common entrance.

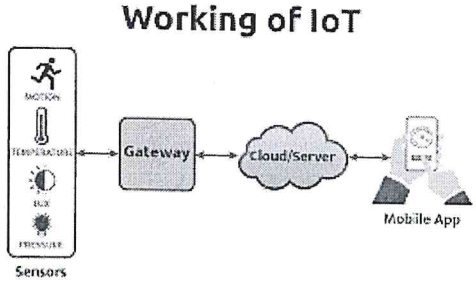
This gateway receives data from such cameras and transmits information to the city's **traffic monitoring system**.



For example, the municipal corporation has decided to repair a road that is connected to the national highway. It may cause traffic congestion to the national highway. The insight is sent to the traffic monitoring system.

CO1 BL3 10. Sketch the working of IOT

IoT is a giant network consisting of interconnected devices.



IoT devices have **sensors embedded** into them. These sensors are capable of sensing their surroundings. The devices store the information in some form of data. These devices include appliances such as mobile phones, coffee machines, microwaves, geysers, fire alarms, Air conditioners, cars and so on.

The sensors embedded in these devices **constantly emit data** about the surrounding and on the working information of these devices. **IoT serves as a platform** to dump all the data collected by these devices.

IoT platform includes **cloud servers and large databases**. The IoT platform acts on the data. It integrates and processes the information. Further, the platform analyses the data thoroughly

to gather important details. The platform then sends back instructions based on the data provided.

Finally, the **data aggregation is shared with other devices** for better performance in the future. It is also done for improved user experience.

The future of IoT is bright and massive. According to a report generated by Business Insider, 24 billion IoT devices were installed in the year 2020. ITC predicts that IoT revenue will reach 300 billion dollars in the coming years. This generates large amounts of job opportunities in the technological industry and various other industries.

CO2 BL3 11. Illustrate the difference between IoT and M2M.

Basis of	IoT	M2M
Abbreviation	Internet of Things	Machine to Machine
Intelligence	Devices have objects that are responsible for decision making	Some degree of intelligence is observed in this.
Connection type used	The connection is via Network and using various communication types.	The connection is a point to point
Communication protocol used	Internet protocols are used such as HTTP, FTP, and Telnet.	Traditional protocols and communication technology techniques are used
Data Sharing	Data is shared between other applications that are used to improve the end-user experience.	Data is shared with only the communicating parties.
Internet	Internet connection is required for communication	Devices are not dependent on the Internet.
Type of Communication	It supports cloud communication	It supports point-to-point communication.

Basis of	IoT	M2M
Computer System	Involves the usage of both Hardware and Software.	Mostly hardware-based technology
Scope	A large number of devices yet scope is large.	Limited Scope for devices.
Business Type used	Business 2 Business(B2B) and Business 2 Consumer(B2C)	Business 2 Business (B2B)
Open API support	Supports Open API integrations.	There is no support for Open APIs
It requires	Generic commodity devices.	Specialized device solutions.
Centric	Information and service centric	Communication and device centric.
Approach used	Horizontal enabler approach	Vertical system solution approach .
Components	Devices/sensors, connectivity, data processing, user interface	Device, area networks, gateway, Application server.
Examples	Smart wearables, Big Data and Cloud, etc.	Sensors, Data and Information, etc.

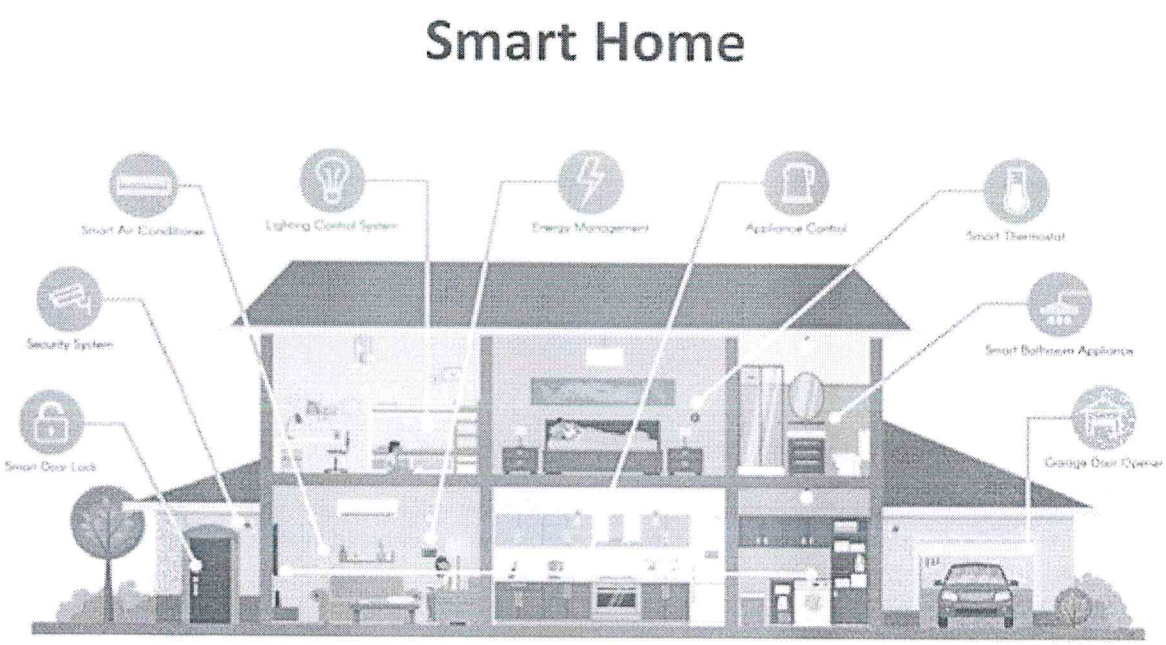
Section C (1 x 10 = 10)

(Answer any **ONE** question)

CO1 BL2 11. Explain smart home IOT application using figure

A **smart home system** can be something that makes our life quite easy. Starting from energy management where the power controls system in the AC appliances where we use the

thermostat, all this is managed to cut down the power consumption that's taking place. A door management system, security management system, water management system are the part of this as well. Still, these are vital things that stand out in the smart home system. The limitation of IoT in smart home application stops where our imagination stops. Anything that we wish to automate or want to make our life easier can be a part of smart home, a smartphone system as well.



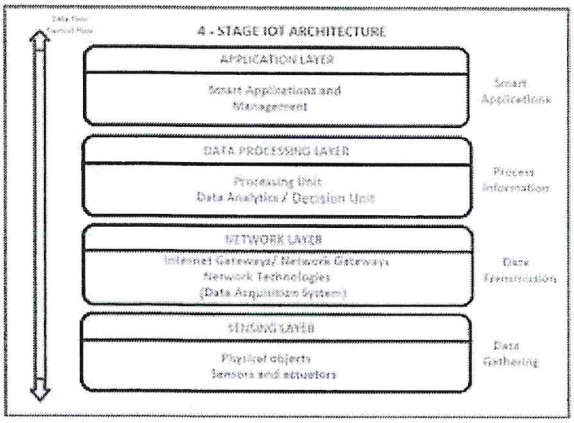
Now, a smart home usually is going to be a base of a **smart city**. The smart city is an evolution of a smart home. Here, it is not just the sensors of a single home that is connected, here its correlation or a network or a connection between various organizations, various domains as well as multiple segments of that city as a whole. In the smart city, the life of every single dependent becomes more comfortable and in tune really help to develop that city to greater extends as such. Now, the key factor for a smart city is government support as well, and if the governments are willing to take this step, then we hope we would see a smart city completely build on the Internet of Things.

CO2 BL6 12. Design the IoT-A Architecture.

Internet of Things (IoT) technology has a wide variety of applications and use of Internet of Things is growing so faster. Depending upon different application areas of Internet of Things, it works accordingly as per it has been designed/developed. But it has not a

standard defined architecture of working which is strictly followed universally. The architecture of IoT depends upon its functionality and implementation in different sectors. Still, there is a basic process flow based on which IoT is built.

So. here in this article we will discuss basic fundamental architecture of IoT i.e., 4 Stage IoT architecture.



4 Stage IoT architecture

So, from the above image it is clear that there is 4 layers are present that can be divided as follows: Sensing Layer, Network Layer, Data processing Layer, and Application Layer.

These are explained as following below.

1. **Sensing Layer** – Sensors, actuators, devices are present in this Sensing layer. These Sensors or Actuators accepts data(physical/environmental parameters), processes data and emits data over network.
2. **Network Layer** – Internet/Network gateways, Data Acquisition System (DAS) are present in this layer. DAS performs data aggregation and conversion function (Collecting data and aggregating data then converting analog data of sensors to digital data etc). Advanced gateways which mainly opens up connection between Sensor networks and Internet also performs many basic gateway functionalities like malware protection, and filtering also some times decision making based on inputted data and data management services, etc.
3. **Data processing Layer** – This is processing unit of IoT ecosystem. Here data is analyzed and pre-processed before sending it to data center from where data is accessed by software applications

often termed as business applications where data is monitored and managed and further actions are also prepared. So here Edge IT or edge analytics comes into picture.

4. **Application Layer**

This is last layer of 4 stages of IoT architecture. Data centers or cloud is management stage of data where data is managed and is used by end-user applications like agriculture, health care, aerospace, farming, defense, etc.

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II UNIT TEST (2022-23)

Date: 12.04.2023 **Duration: 1 Hr** **Class: I BCA**

Subject Name & Code: Object Oriented Programming Concepts using C++ & SU22A

Section A (5 x 2 = 10)

(Answer any **FIVE** questions)

CO1,3 BL1 1. Define Operator Overloading.

CO2,4 BL2 2. Describe the Array of Objects.

CO3 BL2 3. Discuss types of Inheritance.

CO1,4 BL1 4. Define Pointers.

CO1,4 BL1 5. Define Object Binding in C++.

CO2,3 BL1 6. Define Bit Fields.

CO1,5 BL1 7. Define String.

Section B (1 x 5 = 5)

(Answer any **ONE** question)

CO3 BL2 8. Describe the Unary and Binary operator overloading with examples.

CO2 BL2 9. Explain about the Constructor with example.

Section C (1 x 10 = 10)

(Answer any **ONE** question)

CO1,3 BL2 10. Describe about the Multiple and Hybrid inheritance in c++ with examples.

CO5 BL2 11. Explain the working of file stream and its operation with example.

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II UNIT TEST (2022-23)

ANSWERKEY

Class : I BCA

Subject Name & Code: Object Oriented Programming Concepts using C++ & SU22A

Section A **(5 x 2 = 10)**

(Answer any FIVE questions)

CO1,3 BL1 1. Define Operator Overloading.

Operator overloading is a compile-time polymorphism in which the operator is overloaded to provide the special meaning to the user-defined data type. Operator overloading is used to overload or redefines most of the operators available in C++. It is used to perform the operation on the user-defined data type. For example, C++ provides the ability to add the variables of the user-defined data type that is applied to the built-in data types.Operator that cannot be overloaded are as follows:

- Scope operator (::)
- Sizeof
- member selector(.)
- member pointer selector(*)
- ternary operator(?:)

CO2,4 BL2 2. Describe the Array of Objects.

Array of other user-defined data types, an array of type class can also be created. The array of type class contains the objects of the class as its individual elements. Thus, an array of a class type is also known as an array of objects. An array of objects is declared in the same way as an array of any built-in data type.

The syntax for declaring an array of objects is

class_name array_name [size] ;

CO3 BL2 3. Discuss types of Inheritance

- Single Inheritance
- Multiple Inheritance
- Multilevel Inheritance
- Hierarchical Inheritance
- Hybrid Inheritance

CO1,4 BL1 4. Define Pointers.

The pointer in C++ language is a variable, it is also known as locator or indicator that points to an address of a value. The symbol of an address is represented by a pointer. In addition to creating and modifying dynamic data structures, they allow programs to emulate call-by-

reference. One of the principal applications of pointers is iterating through the components of arrays or other data structures. The pointer variable that refers to the same data type as the variable you're dealing with has the address of that variable set to it (such as an int or string).
Syntax

datatype *var_name;

int *ptr;

CO1,4 BL1 5. Define Object Binding in C++.

The binding means the process of converting identifiers into addresses. For each variables and functions this binding is done. For functions it is matching the call with the right function definition by the compiler. The binding is done either at compile time or at runtime.

Early Binding

This is compile time polymorphism. Here it directly associates an address to the function call. For function overloading it is an example of early binding.

Late Binding

This is run time polymorphism. In this type of binding the compiler adds code that identifies the object type at runtime then matches the call with the right function definition. This is achieved by using virtual function.

CO2,3 BL1 6. Define Bit Fields.

Classes and structures can contain members that occupy less storage than an integral type. These members are specified as bit fields.
The syntax for bit-field *member-declarator* specification follows:
Syntax
declarator **:** *constant-expression*

CO1,5 BL1 7. Define String.

Strings are used for storing text. A string variable contains a collection of characters

surrounded by double quotes:

Example

Create a variable of type string and assign it a value:

string greeting = "Hello";

Section B **(1 x 5 = 5)**

(Answer any ONE question)

CO3 BL2 8. Describe the Unary and Binary operator overloading with examples.

An operator which contains two operands to perform a mathematical operation is called the Binary Operator Overloading. It is a polymorphic compile technique where a single operator can perform various functionalities by taking two operands from the programmer or user. There are multiple binary operators like +, -, *, /, etc., that can directly manipulate or overload the object of a class.

For example, suppose we have two numbers, 5 and 6; and overload the binary (+) operator. So, the binary (+) operator adds the numbers 5 and 6 and returns 11. Furthermore, we can also perform subtraction, multiplication, and division operation to use the binary operator for various calculations.

Syntax of the Binary Operator Overloading

Following is the Binary Operator Overloading syntax in the C++ Programming language.

```
return_type :: operator binary_operator_symbol (arg)
{
// function definition
}
```

Here, return_type: It defines the return type of the function.

operator: It is a keyword of the function overloading.

binary_operator_symbol: It represents the binary operator symbol that overloads a function to perform the calculation.

arg: It defines the argument passed to the function.

```
#include <iostream>
using namespace std;
class Arith_num
{
  // declare data member or variable
  int x, y;
  public:
    // create a member function to take input
    void input()
    {
      cout << " Enter the first number: ";
      cin >> x;
    }
    void input2()
    {
      cout << " Enter the second number: ";
      cin >> y;
    }
```

```
        Arith_num operator + (Arith_num &ob)
        {
     Arith_num A;
          // assign values to object
          A.x = x + ob.x;
          return (A);
        }
        // display the result of binary + operator
        void print()
        {
          cout << "The sum of two numbers is: " <<x;
        }
    };
    int main ()
    {
      Arith_num x1, y1, res;

      x1.input();
       y1.input();
      // assign result of x1 and x2 to res
       res = x1 + y1;
       // call the print() function to display the results
res.print();
       return 0;
  }
```

Output

```
Enter the first number: 5
Enter the second number: 6
The sum of two numbers is: 11
```

Overloading Unary Operator

Let us consider overloading (-) unary operator. In the unary operator function, no arguments should be passed. It works only with one class object. It is the overloading of an operator operating on a single operand.

Example: Assume that class Distance takes two member objects i.e. feet and inches, and creates a function by which the Distance object should decrement the value of feet and inches by 1 (having a single operand of Distance Type).

```
#include <iostream>

using namespace std;



class Distance {
```

```
public:
    int feet, inch;

    // Constructor to initialize
    // the object's value
    Distance(int f, int i)
    {
        this->feet = f;
        this->inch = i;
    }

    // Overloading(-) operator to
    // perform decrement operation
    // of Distance object
    void operator-()
    {
        feet--;
        inch--;
        cout << "\nFeet & Inches(Decrement): " <<
                feet << "'" << inch;
    }
```

```
};

// Driver Code
int main()
{
   Distance d1(8, 9);

   // Use (-) unary operator by
   // single operand
   -d1;
   return 0;
}
```

Output

```
Feet & Inches(Decrement): 7'8
```

CO2 BL2 9. Explain about the Constructor with example.

In C++, constructor is a special method which is invoked automatically at the time of object creation. It is used to initialize the data members of new object generally. The constructor in C++ has the same name as class or structure.

In brief, A particular procedure called a constructor is called automatically when an object is created in C++. In general, it is employed to create the data members of new things. In C++,

the class or structure name also serves as the constructor name. When an object is completed, the constructor is called. Because it creates the values or gives data for the thing, it is known as a constructor.

The Constructors prototype looks like this:

<**class**-name> (list-of-parameters);

The following syntax is used to define the class's constructor:

<**class**-name> (list-of-parameters) { // constructor definition }

The following syntax is used to define a constructor outside of a class:

<**class**-name>: :<**class**-name> (list-of-parameters){ // constructor definition}

Constructors lack a return type since they don't have a return value.

There can be two types of constructors in C++.

- Default constructor
- Parameterized constructor

C++ Default Constructor

A constructor which has no argument is known as default constructor. It is invoked at the time of creating object.

Let's see the simple example of C++ default Constructor.

```
#include <iostream>
using namespace std;
class Employee
 {
  public:
     Employee()
     {
        cout<<"Default Constructor Invoked"<<endl;
     }
};
int main(void)
{
   Employee e1; //creating an object of Employee
   Employee e2;
   return 0;
}
```

Output:

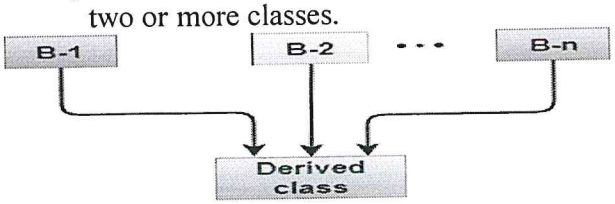
```
Default Constructor Invoked
Default Constructor Invoked
```

Section C (1 x 10 = 10)

(Answer any ONE question)

CO1,3 BL2 10. Describe about the Multiple and Hybrid inheritance in c++ with examples.

Multiple inheritance is the process of deriving a new class that inherits the attributes from two or more classes.



Syntax of the Derived class:

```
1. class D : visibility B-1, visibility B-2, ?
2. {
3.    // Body of the class;
4. }
```

Let's see a simple example of multiple inheritance.

```
#include <iostream>
using namespace std;
class A
{
   protected:
    int a;
   public:
   void get_a(int n)
   {
      a = n;
   }
};

class B
{
   protected:
   int b;
   public:
   void get_b(int n)
   {
      b = n;
   }
};
class C : public A,public B
{
   public:
    void display()
```

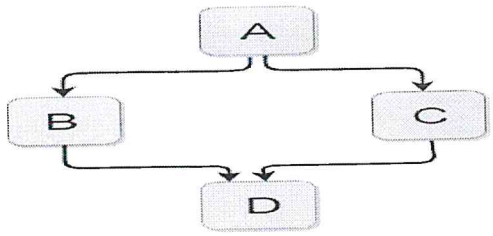
```
  {
     std::cout << "The value of a is : " <<a<< std::endl;
     std::cout << "The value of b is : " <<b<< std::endl;
     cout<<"Addition of a and b is : "<<a+b;
  }
};
int main()
{
  C c;
  c.get_a(10);
  c.get_b(20);
  c.display();

   return 0;
}
```

Output:

```
The value of a is : 10
The value of b is : 20
Addition of a and b is : 30
```

C++ Hybrid Inheritance

Hybrid inheritance is a combination of more than one type of inheritance.



Let's see a simple example:

```
#include <iostream>
using namespace std;
class A
{
   protected:
   int a;
   public:
   void get_a()
   {
     std::cout << "Enter the value of 'a' : " << std::endl;
     cin>>a;
   }
};

class B : public A
{
   protected:
   int b;
```

```
  public:
  void get_b()
  {
     std::cout << "Enter the value of 'b' : " << std::endl;
    cin>>b;
  }
};
class C
{
  protected:
  int c;
  public:
  void get_c()
  {
     std::cout << "Enter the value of c is : " << std::endl;
     cin>>c;
  }
};

class D : public B, public C
{
  protected:
  int d;
  public:
  void mul()
  {
      get_a();
      get_b();
      get_c();
      std::cout << "Multiplication of a,b,c is : " <<a*b*c<< std::endl;
  }
};
int main()
{
  D d;
  d.mul();
  return 0;
}
```

Output:

```
Enter the value of 'a' :
10
Enter the value of 'b' :
20
Enter the value of c is :
30
Multiplication of a,b,c is : 6000
```

CO5 BL2 11. Explain the working of file stream and its operation with example.

The **iostream** standard library, which provides **cin** and **cout** methods for reading from standard input and writing to standard output respectively.

This tutorial will teach you how to read and write from a file. This requires another standard C++ library called **fstream**, which defines three new data types –

Sr.No	Data Type & Description
1	**Ofstream** This data type represents the output file stream and is used to create files and to write information to files.
2	**Ifstream** This data type represents the input file stream and is used to read information from files.
3	**Fstream** This data type represents the file stream generally, and has the capabilities of both ofstream and ifstream which means it can create files, write information to files, and read information from files.

To perform file processing in C++, header files <iostream> and <fstream> must be included in your C++ source file.

Opening a File

A file must be opened before you can read from it or write to it. Either **ofstream** or **fstream** object may be used to open a file for writing. And ifstream object is used to open a file for reading purpose only.

Following is the standard syntax for open() function, which is a member of fstream, ifstream, and ofstream objects.

void open(const char *filename, ios::openmode mode);

Here, the first argument specifies the name and location of the file to be opened and the second argument of the **open()** member function defines the mode in which the file should be opened.

Sr.No	Mode Flag & Description
1	**ios::app** Append mode. All output to that file to be appended to the end.
2	**ios::ate** Open a file for output and move the read/write control to the end of the file.

3	**ios::in** Open a file for reading.
4	**ios::out** Open a file for writing.
5	**ios::trunk** If the file already exists, its contents will be truncated before opening the file.

You can combine two or more of these values by **OR**ing them together. For example if you want to open a file in write mode and want to truncate it in case that already exists, following will be the syntax –

```
ofstream outfile;
outfile.open("file.dat", ios::out | ios::trunc );
```

Similar way, you can open a file for reading and writing purpose as follows –

```
fstream  afile;
afile.open("file.dat", ios::out | ios::in );
```

Closing a File

When a C++ program terminates it automatically flushes all the streams, release all the allocated memory and close all the opened files. But it is always a good practice that a programmer should close all the opened files before program termination.

Following is the standard syntax for close() function, which is a member of fstream, ifstream, and ofstream objects.

```
void close();
```

Writing to a File

While doing C++ programming, you write information to a file from your program using the stream insertion operator (<<) just as you use that operator to output information to the screen. The only difference is that you use an **ofstream** or **fstream** object instead of the **cout** object.

Reading from a File

You read information from a file into your program using the stream extraction operator (>>) just as you use that operator to input information from the keyboard. The only difference is that you use an **ifstream** or **fstream** object instead of the **cin** object.

Read and Write Example

Following is the C++ program which opens a file in reading and writing mode. After writing information entered by the user to a file named afile.dat, the program reads information from the file and outputs it onto the screen

```
#include <fstream>
#include <iostream>
```

```
using namespace std;

int main () {
  char data[100];

  // open a file in write mode.
  ofstream outfile;
  outfile.open("afile.dat");

  cout << "Writing to the file" << endl;
  cout << "Enter your name: ";
  cin.getline(data, 100);

  // write inputted data into the file.
  outfile << data << endl;

  cout << "Enter your age: ";
  cin >> data;
  cin.ignore();

  // again write inputted data into the file.
  outfile << data << endl;

  // close the opened file.
  outfile.close();

  // open a file in read mode.
  ifstream infile;
  infile.open("afile.dat");

  cout << "Reading from the file" << endl;
  infile >> data;

  // write the data at the screen.
  cout << data << endl;

  // again read the data from the file and display it.
  infile >> data;
  cout << data << endl;

  // close the opened file.
  infile.close();

  return 0;
}
```

```
Writing to the file
Enter your name: Zara
Enter your age: 9
Reading from the file
Zara
9
```

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II UNIT TEST (2022-23)

Date: 10.04.2023 **Duration: 1 hr** **Class: II BCA**

Subject Name & Code: Computer Network & SZ24A

Section A (5 x 2 = 10)

(Answer any **FIVE** questions)

CO1,3 BL1 1. Define is Bluetooth.

CO1,4,5 BL1 2. Define IP Address.

CO1 BL1 3. Define Topology.

CO1,2,3 BL1 4. Identify the responsibilities of data link layer.

CO5 BL1 5. Define Reliable Flooding.

CO3 BL1 6. Define Redundancy.

CO5,3 BL1 7. Define ICMP.

Section B (1 x 5 = 5)

(Answer any **ONE** question)

CO2 BL2 8. Describe the various types of Multiplexing.

CO1 BL2 9. Explain the characteristics of Twisted- pair wiring.

Section C (1 x 10 = 10)

(Answer any **ONE** question)

CO1 BL2 10. Describe the concepts of Coaxial cable and Fibre Optics Cable.

CO2,3 BL2 11. Explain the different types of Switching Techniques.

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II UNIT TEST (2022-23)
ANSWER KEY

Class :II BCA

Subject Name & Code: Computer Network & SZ24A

Section A (5 x 2 = 10)

(Answer any **FIVE** questions)

CO1,3 BL1 1. Define is Bluetooth.

Bluetooth is universal for short-range wireless voice and data communication. It is a Wireless Personal Area Network (WPAN) technology and is used for exchanging data over smaller distances. A Bluetooth network is called a **piconet** and a collection of interconnected piconets is called **scatternet**.

CO1,4,5 BL1 2. Define IP Address.

An IP address represents a unique address that distinguishes any device on the internet or any network from another. IP or Internet Protocol defines the set of commands directing the setup of data transferred through the internet or any other local network.

CO1 BL1 3. Define Topology.

Topology defines the structure of the network of how all the components are interconnected to each other. There are two types of topology: physical and logical topology. There are six types of network topology which are Bus Topology, Ring Topology, Tree Topology, Star Topology, Mesh Topology, and Hybrid Topology.

CO1,2,3 BL14. Identify the responsibilities of data link layer.

The Data-link layer is the second layer from the bottom in the OSI (Open System Interconnection) network architecture model. It is responsible for the node-to-node delivery of data. Its major role is to ensure error-free transmission of information. DLL is also responsible to encode, decode and organize the outgoing and incoming data. This is considered the most complex layer of the OSI model as it hides all the underlying complexities of the hardware from the other above layers.

CO5 BL1 5. Define Reliable Flooding.

Reliable Flooding: Each router sends the information to every other router on the internetwork except its neighbors. This process is known as Flooding. Every router that receives the packet sends the copies to all its neighbors. Finally, each and every router receives a copy of the same information.

CO3 BL1 6. Define Redundancy.

Network redundancy is a process through which additional or alternate instances of network devices, equipment and communication mediums are installed within network infrastructure. It is a method for ensuring network availability in case of a network device or path failure and unavailability. As such, it provides a means of network failover.

CO5,3 BL1 7. Define ICMP.

The ICMP stands for Internet Control Message Protocol. It is a network layer protocol. It is used for error handling in the network layer, and it is primarily used on network devices such as routers. As different types of errors can exist in the network layer, so ICMP can be used to report these errors and to debug those errors.For example, some sender wants to send the message to some destination, but the router couldn't send the message to the destination. In this case, the router sends the message to the sender that I could not send the message to that destination.

Section B (1 x 5 = 5)

(Answer any **ONE** question)

CO2 BL2 8. Describe the various types of Multiplexing.

Multiplexing is a technique used to combine and send the multiple data streams over a single medium. The process of combining the data streams is known as multiplexing and hardware used for multiplexing is known as a multiplexer.

Multiplexing is achieved by using a device called Multiplexer (**MUX**) that combines n input lines to generate a single output line. Multiplexing follows many-to-one, i.e., n input lines and one output line.

Demultiplexing is achieved by using a device called Demultiplexer (**DEMUX**) available at the receiving end. DEMUX separates a signal into its component signals (one input and n outputs). Therefore, we can say that demultiplexing follows the one-to-many approach.

Types of Multiplexing

There are Five types of Multiplexing :

1. Frequency Division Multiplexing (FDM)
2. Time-Division Multiplexing (TDM)
3. Wavelength Division Multiplexing (WDM)
4. Code-division multiplexing (CDM)
5. Space-division multiplexing (SDM):

CO1 BL2 9. Explain the characteristics of Twisted- pair wiring.

Twisted Pair Cables :

These are a type of guided media. It was invented by Alexander Graham Bell. Twisted pair cables have two conductors that are generally made up of copper and each conductor has insulation. These two conductors are twisted together, thus giving the name twisted pair cables.



Twisted Pair Cables are further of two types :

1. Unshielded Twisted Pair Cables (UTP) :

These are a pair of two insulated copper wires twisted together without any other insulation or shielding and hence are called unshielded twisted pair cables. They reduce the external interference due to the presence of insulation. Unshielded twisted pair cables are arranged in pairs so that we can add a new connection whenever required. The DSL or telephone lines in our houses have one extra pair in them. When UTP are arranged in pairs, each pair is coded with a different color as defined by the 25-pair color code developed by AT&T Corporation. The Electronic Industries Association divides UTP into 7 categories based on some standards. Categories are based upon cable quality where 1 is the highest quality and 7 is the lowest quality. Each cable in a category is put to a different use as needed.

Advantages –

1. These cables are cost-effective and easy to install owing to their compact size.
2. They are generally used for short-distance transmission of both voice and data.
3. It is less costly as compared to other types of cables.

Disadvantages –

1. The connection established using UTP is not secure.
2. They are efficient only for a distance up to 100 meters and have to be installed in pieces of up to 100 meters.
3. These cables have limited bandwidth.

Section C (1 x 10 = 10)

(Answer any **ONE** question)

CO1 BL2 10. Describe the concepts of Coaxial cable and Fibre Optics Cable.

Optical fiber Cable:

Optical Fiber is the type of guided media is made of plastics and glasses which is used to transmit the signal is in light form or optical form. It provides the high bandwidth (B). Its Installation and implementation is not so easy like coaxial cable.

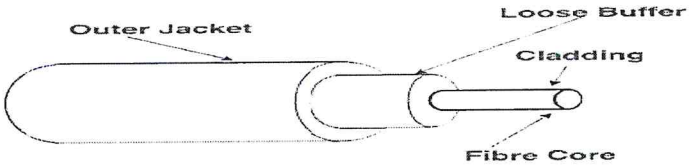

Figure of Optical Fibre Cable

Coaxial Cable:

Coaxial Cable is the type of guided media is made of Plastics, copper wires which is used to transmit the signal is in electrical form rather than light form. Its installation and implementation is easy but it is less efficient than optical fiber also it provides moderate high bandwidth (B) in comparison of optical fiber.

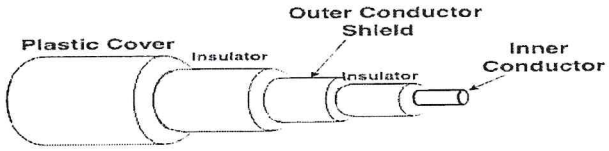

Figure of Optical Coaxial Cable

Optical Fiber	Coaxial Cable

Data and signals are transmitted using optical fiber.	Electrical signals are transmitted over the coaxial cable as data and signals.
Signal loss is extremely small when using optical fiber.	Coaxial cable performs less well.
Optical fiber is pricey, and installation costs are high.	Coaxial cable is inexpensive, and installing it costs less money.
The weight of optical fiber is quite low.	Compared to an optical fiber, coaxial cable is significantly heavier.
Coaxial cable has a higher bandwidth than optical fiber.	High bandwidth is provided through coaxial cable.
Fiber optics have a smaller diameter.	The diameter of coaxial cable is larger than that of optical fiber.
Glass and plastic are used to create optical fiber.	Coaxial cable is made of plastic and copper wires.

CO2,3 BL2 11. Explain the different types of Switching Techniques.

Switching techniques

In large networks, there can be multiple paths from sender to receiver. The switching technique will decide the best route for data transmission.

Switching technique is used to connect the systems for making one-to-one communication.

Circuit Switching

- Circuit switching is a switching technique that establishes a dedicated path between sender and receiver.
- In the Circuit Switching Technique, once the connection is established then the dedicated path will remain to exist until the connection is terminated.

- Circuit switching in a network operates in a similar way as the telephone works.
- A complete end-to-end path must exist before the communication takes place.
- In case of circuit switching technique, when any user wants to send the data, voice, video, a request signal is sent to the receiver then the receiver sends back the acknowledgment to ensure the availability of the dedicated path. After receiving the acknowledgment, dedicated path transfers the data.
- Circuit switching is used in public telephone network. It is used for voice transmission.
- Fixed data can be transferred at a time in circuit switching technology.
- Circuit establishment
- Data transfer
- Circuit Disconnect

Message Switching

- Message Switching is a switching technique in which a message is transferred as a complete unit and routed through intermediate nodes at which it is stored and forwarded.
- In Message Switching technique, there is no establishment of a dedicated path between the sender and receiver.
- The destination address is appended to the message. Message Switching provides a dynamic routing as the message is routed through the intermediate nodes based on the information available in the message.
- Message switches are programmed in such a way so that they can provide the most efficient routes.
- Each and every node stores the entire message and then forward it to the next node. This type of network is known as **store and forward network.**
- Message switching treats each message as an independent entity.

Packet Switching

- The packet switching is a switching technique in which the message is sent in one go, but it is divided into smaller pieces, and they are sent individually.

- The message splits into smaller pieces known as packets and packets are given a unique number to identify their order at the receiving end.
- Every packet contains some information in its headers such as source address, destination address and sequence number.
- Packets will travel across the network, taking the shortest path as possible.
- All the packets are reassembled at the receiving end in correct order.
- If any packet is missing or corrupted, then the message will be sent to resend the message.
- If the correct order of the packets is reached, then the acknowledgment message will be sent.

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Department of Computer Applications and Technology

II UNIT TEST (2022-23)

Date: 11.04.2023 *Duration: 1 Hour* *Class: II BCA*

Subject Name & Code: Open Source Technologies & SAZ2B

Section A **(5 X 2 = 10)**

Answer any FIVE questions

CO3 BL1 1. Define: GCC.

CO5 BL4 2. Why Open Office is good.

CO6 BL4 3. Is it possible HTTP and HTTPS from the same server.

CO4 BL1 4. Define:Open source hardware.

CO3 BL1 5. Define: BSD.

CO2 BL2 6. Describe open media.

CO1 BL3 7. Why we use FTP server.

Section B **(1 X 5 = 5)**

Answer any ONE question

CO6 BL4 8. Illustrate the rules for open source media.

CO5 BL2 9. Explain about Joomla.

Section C **(1 X 10 = 10)**

Answer any ONE question

CO3 BL2 10. Explain about Linux.

CO4 BL2 11. Explain about Open-Source Teaching.

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II UNIT TEST (2022-23)

ANSWERKEY

PART A – (5 X 2 = 10 Marks)

1. Define: GCC
   The GNU Compiler Collection (GCC) is an optimizing compiler produced by the GNU Project supporting various programming languages, hardware architectures and operating systems.
2. Why Open Office is good?

   No licensing fees.

   Open source

   Cross-platform

   Extensive language support

   Consistent user interface

   Integration

   Granularity

   File compatibility

   No vendor lock-in.

3. Is it possible HTTP and HTTPS from the same server?
   Yes. HTTP and HTTPS use different server ports (HTTP binds to port 80, HTTPS to port 443), so there is no direct conflict between them.

4. Define: Open source hardware.
   "Open hardware," or "open source hardware," refers to the design specifications of a physical object which are licensed in such a way that said object can be studied, modified, created, and distributed by anyone.

5. Define: BSD

BSD refers to the Berkeley Software Distribution OS. The BSD OS is a Unix-based OS.

6. What is open media?

   OpenMedia is a Canadian non-partisan, non-profit advocacy organization working to encourage open and innovative communication systems within Canada.

7. What is FTP server? Why we use it?

   FTP servers are the software solutions used for transferring files across the internet. They are primarily used for two essential functions, "Put" and "Get." It allows uploading (Put) files to the server from the client device and downloading (Get) files from the server on the client device.

PART B

8. Explain the rules for open source media?

1. Don't violate open source licenses. If anyone tells you that open source licenses are never enforced, or violating them never causes problems, they are wrong. Violating open source licenses can cause legal liability and embarrassment, and slow down or compromise investments or acquisitions for your company. Even worse, it could make potential customers refuse to buy your products. Complying with software licenses is simply the right thing to do. Lots of developers have gone to great effort to make the software available to you; it's only fair to follow their licenses.
2. Keep track of what you are using. From day one, keep track of the open source software you are using. Someday you will have to provide a list, and having one already in hand will save you a lot of time and effort. Most open source software downloads have an included file called "license.txt". Keep a copy of the license file, and note what software it covers, so you know what license terms you need to follow. Most startup companies do this with a simple spreadsheet.
3. Understand Copyleft and Permissive licenses. There are two kinds of open source licenses: copyleft and permissive. Copyleft licenses include GPL, LGPL, Eclipse Public License, Mozilla Public License, and the Common Development and Distribution License (CDDL). Permissive licenses include BSD, MIT, and Apache.

There are many other licenses, but almost all open source software is under Copyleft or Permissive. Most companies — and their customers — have no legal concerns over using software under permissive licenses. Complying with Copyleft licenses takes more care, however, so if you want to use software under those licenses, be prepared to do what is necessary to comply.

4. Comply with notice requirements. All open source licenses have notice requirements. A typical notice requirement states that when you distribute open source software, you need to include a copy of the license. This usually means the entire license — not a link, not a short form. Notices can be challenging to maintain, particularly for embedded software. It's important to work out a license notice delivery strategy that complies with most open source licenses, but doesn't confuse or alienate your customers.
5. Finger Pointing Doesn't Work. If you violate an open source license, it doesn't matter if your supplier or contract developer was at fault. It's still your problem. Be sure all your suppliers and contractors follow the rules. For example, don't buy chips or computers with Linux if the supplier can't also provide you the source code.

9. Explain Joomla.

Joomla is an open-source content management system used for creating Web content. It is written in PHP and makes use of a MySQL database for storing data and uses object-oriented programming techniques. It is one of the most popular content management systems owing to its features such as page caching, multi-language support, plugins and extensions.Joomla is based on a model-view-controlled Web application framework. It is very user friendly and flexible and is also one of the fast growing content management systems. Like other content management systems, Joomla also removes the technical aspects of creating and running websites. Joomla has a good navigation system capable of managing several hierarchies and subpages. It also provides an administrative panel that comes with several handy features for users.

There are many advantages for using Joomla. It is free and is an open-source platform with reusable source codes according to requirements. With plenty of options and features available, Joomla can be deployed to make any type of website, blog or even e-commerce website. Joomla is easy to install and easily deployable. Its content management systems are highly accessible and can be used by anyone without any knowledge of Web development or

programming. In order to make websites attractive, Joomla also provides various templates and themes. A vast supportcommunity is available for Joomla.

However there are few drawbacks associated with Joomla. Some of the plugins provided can only function with specific scripts. Joomla may not have advanced functionalities that one may need in customizing complex sites. Joomla may not be very SEO friendly and could face problems while simultaneously installing plugins or extensions. Joomla can make the website heavy to load and run, as it takes large amounts of server resources.

PART C

10. Explain about Linux.

Linux was created in 1991 by Linus Torvalds, a then-student at the University of Helsinki. Torvalds built Linux as a free and open source alternative to Minix, another Unix clone that was predominantly used in academic settings. He originally intended to name it "Freax," but the administrator of the server Torvalds used to distribute the original code named his directory "Linux" after a combination of Torvalds' first name and the word Unix, and the name stuck.

Linux is the best-known and most-used open source operating system. As an operating system, Linux is software that sits underneath all of the other software on a computer, receiving requests from those programs and relaying these requests to the computer's hardware.By virtue of its open source licensing, Linux is freely available to anyone. However, the trademark on the name "Linux" rests with its creator, Linus Torvalds. The source code for Linux is under copyright by its many individual authors, and licensed under the GPLv2 license.

The term "Linux" technically refers to just the Linux kernel. Most people refer to the entire operating system as "Linux" because to most users an OS includes a bundle of programs, tools, and services (like a desktop, clock, an application menu, and so on). Some people, particularly members of the Free Software Foundation, refer to this collection as GNU/Linux, because many vital tools included are GNU components.

However, not all Linux installations use GNU components as a part of the operating system: Android, for example, uses a Linux kernel but relies very little on GNU tools. Unix, which is an operating system developed in the 1970s at Bell Labs by Ken Thompson, Dennis Ritchie, and others. Unix and Linux are similar in many ways, and in fact, Linux was originally created to be indistinguishable from Unix. Both have similar tools for interfacing with the system, programming tools, filesystem layouts, and other key components. However, not all Unices are free and open source.Over the years, a number of different operating systems have been created that attempted to be "unix-like" or "unix-compatible," but Linux has been the most successful, far surpassing its predecessors in popularity.Linux is similar to other operating systems you may have used before, such as Windows, macOS (formerly OS X), or iOS.

Like other operating systems, Linux has a graphical interface, and the same types of software you are accustomed to, such as word processors, photo editors, video editors, and so on. In many cases, a software's creator may have made a Linux version of the same program you use on other systems. In short: if you can use a computer or other electronic device, you can use Linux.

But Linux also is different from other operating systems in many important ways. First, and perhaps most importantly, Linux is open source software. The code used to create Linux is free and available to the public to view, edit, and—for users with the appropriate skills—to contribute to.Linux is also different in that, although the core pieces of the Linux operating system are generally common, there are many *distributions* of Linux, which include different software options. This means that Linux is incredibly customizable, because not just applications, such as word processors and web browsers, can be swapped out. Linux users also can choose core components, such as which system displays graphics, and other user-interface components

11. Explain about Open Source Teaching.

Open-Source Learning is a philosophy of education for the Digital Age. In their day, education frameworks such as Waldorf, Montessori, and Reggio Emilia met the evolving needs of learners. Today's challenges and opportunities demand more.Open-Source Learning empowers students to develop their own learning experiences and interdisciplinary paths of

inquiry. In the process of asking big questions and pursuing their passions, students master concepts and skills that extend far beyond traditional curriculum.

Open-Source Learning enables students to amplify and accelerate their learning by participating in virtual networks and online communities. Students apprentice with expert mentors and collaborate with partners around the world. They also create their own knowledge capital in real time as they learn. In the process, students develop the skills they need to safely and effectively contribute to virtual communities.Open-Source Learning offers value, interdependence, and hope. In a world of big problems and fractured informational realities, Open-Source Learning integrates connection: with ourselves, with information, and with others.

The philosophy behind oss is user freedom. Users can use the software as is, study and change the code and function of the program, redistribute copies, and redistribute modified versions. This allows the collective knowledge of the developer community to grow much faster than it normally could if everything was locked behind pricing schemes. Since one of the main drivers of oss is teaching, and using that to further improvement, it's only natural that OS based educational systems have come in to play.

OSS learning provides free online education to anyone who has an interest in learning. There are no entry applications or fees, no prerequisites to fulfill. Anyone in any situation, that can access the internet, is able to learn from up-to-date resources. Since there are no formalities students can learn when it is convenient for them, at their own pace.Methods and Tools

In Open-Source Learning, each student works with the guidance of a teacher-mentor to develop an interdisciplinary learning journey around a big idea, question, and/or key interests.Students design their experience by working with a variety of tools – especially resources in the digital realm. One community has even developed open source software that offers more features than big tech, along with sovereign identity and enhanced collaboration tools.

As their journeys develop, students deepen their experience through information-sharing that establishes themselves and empowers others.

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II UNIT TEST (2022-23)

Date: *10.04.2023* **Duration: 1 hr** **Class: III BCA**

Subject Name & Code: Web Design and Development & SZ26B

Section A (5 x 2 = 10)

(Answer any **FIVE** questions)

CO1 BL3 1. Sketch the structure of HTML

CO3,4 BL2,4 2. Define CSS.

CO2,6 BL2 3. Discuss about adding multimedia in webpage.

CO5 BL4,5 4. Compare JQuery and Angular JS.

CO3 BL2,4 5. Define data binding.

CO3 BL2,4 6. Define DHTML.

CO4 BL2,5 7. Summarize the data and time functions in javascript.

Section B (1 x 5 = 5)

(Answer any **ONE** question)

CO5 BL1 8. List out the various advantages and disadvantages of AJAX.

CO4,3 BL2,5 9. Discuss about adding CSS to web pages with example.

Section C (1 x 10 = 10)

(Answer any **ONE** question)

CO2 BL2,3 10. Demonstrate the HTML form controls with an example.

CO4 BL3 11. Illustrate the concept of Document object model (DCOM) with an example.

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II UNIT TEST (2022-23)

Class :III BCA
Subject Name & Code: Web Design and Development & SZ26B

Section A (5 x 2 = 10)

(Answer any **FIVE** questions)

CO1 BL3 1. Sketch the structure of HTML

An HTML Document is mainly divided into two parts:

HEAD: This contains the information about the HTML document. For Example, the Title of the page, version of HTML, Meta Data, etc.

BODY: This contains everything you want to display on the Web Page.

CO3,4 BL2,4 2. Define CSS.

CSS is used to **define** styles for your web pages, including the design, layout and variations in display for different devices and screen sizes

CO2,6 BL2 3. Discuss about adding multimedia in webpage.

To add music or video into your web page. The easiest way to add video or sound to your web site is to include the special HTML tag called <embed>. This tag causes the browser itself to include controls for the multimedia automatically provided browser supports <embed> tag and given media type.

CO5 BL4,5 4. Compare JQuery and Angular JS.

jQuery is a Javascript-based library that is primarily used for DOM manipulation whereas Angular is a front-end development framework that is used for creating single-page applications. Angular employs two-way data binding to adapt and extend HTML codes.

CO3 BL2,4 5. Define data binding.

Data binding is the process that couples two data sources together and synchronizes them. With data binding, a change to an element in a data set automatically updates in the bound data set. CO3 BL2,4 6. Define DHTML.

DHTML is short for "**Dynamic HTML**". Dynamic HTML refers to the code from which interactive web pages are made and which are modified as the user interacts with them.

CO4 BL2,5 7. Summarize the data and time functions in javascript.

getMinutes(),getSeconds(),getMilliseconds(),getTime(),Date()

Section B (1 x 5 = 5)

(Answer any **ONE** question)

CO5 BL1 8. List out the various advantages and disadvantages of AJAX.

1. Reduces the server traffic and increases the speed.
2. It is responsive, and the time taken is also less.
3. Form validation.
4. Bandwidth usage can be reduced.
5. Asynchronous calls can be made; this reduces the time for data arrival

CO4,3 BL2,5 9. Discuss about adding CSS to web pages with example.

CSS may be added to HTML in three different ways. To style a single HTML element on the page, use Inline CSS in a style attribute. By adding CSS to the head section of our HTML document, we can embed an internal stylesheet. We can also connect to an external stylesheet that separates our CSS from our HTML.

Section C (1 x 10 = 10)

(Answer any **ONE** question)

CO2 BL2,3 10. Demonstrate the HTML form controls with an example.

There are different types of form controls that you can use to collect data using HTML form –

- Text Input Controls
- Checkboxes Controls
- Radio Box Controls
- Select Box Controls
- File Select boxes
- Hidden Controls
- Clickable Buttons
- Submit and Reset Button

CO4 BL3 11. Illustrate the concept of Document object model (DCOM) with an example.

The DOM defines a standard for accessing documents:

"The W3C Document Object Model (DOM) is a platform and language-neutral interface that allows programs and scripts to dynamically access and update the content, structure, and style of a document."

The W3C DOM standard is separated into 3 different parts:

- Core DOM - standard model for all document types
- XML DOM - standard model for XML documents
- HTML DOM - standard model for HTML documents

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II UNIT TEST (2022-23)

Date: 12.04.2023 **Duration: 1 Hour** **Class: II BCA**
Subject Name & Code: **E-Commerce Technologies &** SZ24C

Section A (5 x 2 = 10)

(Answer any **FIVE** questions)

CO3 BL1 1.Define Copyright

CO2 BL1 2. DefineData Integrity.

CO5 BL6 3. Write about skimming.

CO4 BL1 4. Define M Commerce.

CO4. BL1 5. Define Micro Payment.

CO1 BL6 6. Write the e-transition challenges for Indian corporate.

CO3 BL6 7. Write about Internet Gambling.

Section B (1 x 5 = 5)

(Answer any **ONE** question)

CO2 BL2 8. Explain Phishing in detail.

CO2 BL2 9. Explain Public key and private key crypto System.

CO 2 BL2 10. Explain the role of SSL and SET.

Section C (1 x 10 = 10)

(Answer any **ONE** question)

CO5 BL2 11. Explain different generations of Wireless Communication

CO4 BL2 12. Describe the working of E cash payment system.

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II UNIT TEST (2022-23)
ANSWER KEY

Class: II BCA
Subject Name & Code: **E-Commerce Technologies &** SZ24C

Section A (5 x 2 = 10)

(Answer any **FIVE** questions)

CO3 BL1 1.Define Copyright

Copyright (or author's right) is a legal term used to describe the rights that creators have over their literary and artistic works

CO2 BL1 2. DefineData Integrity.

Data integrity is the overall accuracy, completeness, and consistency of data. Data integrity also refers to the safety of data in regard to regulatory compliance — such as GDPR compliance — and security

CO5 BL6 3. Write about skimming.

The most advanced and prevalent forms of skimming today include e-skimming, which is carried out by infecting e-commerce websites with malicious code to steal the customer's debit or credit card information.

CO4 BL1 4. Define M Commerce.

M-commerce (mobile commerce) is the buying and selling of goods and services through wireless handheld devices such as smartphones and tablets

CO4. BL1 5. Define Micro Payment.

Micropayments are small payments made over the internet and for digital products

CO1 BL6 6. Write the e-transition challenges for Indian corporate.

8 Challenges for ecommerce in India

- Indian customers return much of the merchandise they purchase online.
...
- Cash on delivery is the preferred payment mode. ...
- Payment gateways have a high failure rate. ...
- Internet penetration is low. ...
- Feature phones still rule the roost. ...
- Postal addresses are not standardized.

CO3 BL6 7. Write about Internet Gambling.

Online gambling can be defined as being involved in betting on casinos or sports over the internet.

Section B (1 x 5 = 5)

(Answer any **ONE** question)

CO2 BL2 8. Explain Phishing in detail.

Phishing is a type of social engineering attack often used to steal user data, including login credentials and credit card numbers. It occurs when an attacker, masquerading as a trusted entity, dupes a victim into opening an email, instant message, or text message. The recipient is then tricked into clicking a malicious link, which can lead to the installation of malware, the freezing of the system as part of a ransomware attack or the revealing of sensitive information.

An attack can have devastating results. For individuals, this includes unauthorized purchases, the stealing of funds, or identify theft.

Moreover, phishing is often used to gain a foothold in corporate or governmental networks as a part of a larger attack, such as an advanced persistent threat (APT) event. In this latter scenario, employees are compromised in order to bypass security perimeters,

CO2 BL2 9. Explain Public key and private key crypto System.

Public keys and private keys are the working parts of Public-key cryptography. Together, they encrypt and decrypt data that resides or moves in a network. The public key is truly public and can be shared widely while the private key should be known only to the owner. In order for a client to establish a secure connection with a server, it first checks the server's digital certificate. Then, the client generates a session key that it encrypts with the server's public key. The server decrypts this session key with its private key (that's known only to the server), and the session key is used by the client-server duo to encrypt and decrypt messages in that session. In case of email communication, the sender's private key signs the message while the recipient's public key verifies the sender's signature. This is why the private key should be kept secret– exposing it will pave the way for hackers to intercept and decrypt data and messages.

CO 2 BL2 10. Explain the role of SSL and SET.

SSL is an encryption mechanism for order taking, queries, and other applications and is available on the customer's browser. It does not protect against all security hazards and is naturally simple and widely used. SSL is a protocol for general-purpose secure message exchange. SSL protocol may use a certificate, but the payment gateway is not available. So, the merchant needs to receive both the ordering information and credit card information because the capturing process should be generated by the merchant. SSL protocol has been the industry standard for securing internet communication.

SET is a very comprehensive protocol. It provides privacy, integration, and authenticity. It is not used frequently due to its complexity and the need for a special card reader by the user. It may be abandoned if it is not simplified. SET is tailored to the credit card payment to the merchant. SET protocols

hide the customer's credit card information from merchant and also hides the order information from banks to protect privacy called a **dual signature.** The SET protocol is complex and more secure

Section C

(1 x 10 =

(Answer any **ONE** question)

CO5 BL2 11. Explain different generations of Wireless Communication

Very huge improvements in wireless communication and have expanded the capabilities of our wireless communication system. We all have seen various generations in our life. Let's discuss them one by one.

0th Generation:

- Pre-cell phone mobile telephony technology, such as radio telephones some had in cars before the arrival of cell phones.
- Communication was possible through voice only.
- These mobile telephones were usually mounted in cars or trucks.

1G (1st Generation):

- First-time calling was introduced in mobile systems.
- It used analog signals.
- It used an FDD scheme and typically allocated a bandwidth of 25 Mhz.
- The coverage area was small.
- No roaming support between various operators.
- Low sound quality.
- Speed:- 2.4 kbps.
- **2G (2nd Generation) :** Shifted from analog to digital.
- It supported voice and SMS both.
- Supported all 4 sectors of the wireless industry namely Digital cellular, Mobile Data, PCS, WLAN,
- Moderate mobile data service.
- 2G WLAN provided a high data rate & large area coverage.
- Speed:- 64 kbps.

2.5G came after **2G** which used the concept of GPRS. Streaming was also introduced and mail services too. Then came **2.75G** or EDGE which was faster in providing services than 2.5G. It gave faster internet speed up to 128kbps and also used edge connection.

3G (3rd Generation) :

- The Internet system was improved.
- Better system and capacity.
- Offers high-speed wireless internet.
- The connection used was UMTS and WCMA.
- Speed:- 2mbps.

4G (4th Generation) :

- IP-based protocols.
- LTE (Long term evaluation) was mainly for the internet.
- Vo-LTE (Voice over LTE) is for both voice and the internet.

- Freedom and flexibility to select any desired service with reasonable QoS.
- High usability.
- Supports multimedia service at a low transmission cost.
- HD Quality Streaming.
- Speed:-100mbps.

5G (5th Generation): It is yet to come in many countries but here are some notable points about 5G.

- Higher data rates.
- Connectivity will be more fast and more secure,
- Data Latency will be reduced to a great level.
- Massive network capacity.
- It is 30 times faster than 4G.
- There would be more flexibility in the network.

CO4 BL2 12. Describe the working of E cash payment system.

E-Money

E-Money transactions refer to situation where payment is done over the network and the amount gets transferred from one financial body to another financial body without any involvement of a middleman. E-money transactions are faster, convenient, and saves a lot of time.

Online payments done via credit cards, debit cards, or smart cards are examples of emoney transactions. Another popular example is e-cash. In case of e-cash, both customer and merchant have to sign up with the bank or company issuing e-cash.

Electronic Fund Transfer

It is a very popular electronic payment method to transfer money from one bank account to another bank account. Accounts can be in the same bank or different banks. Fund transfer can be done using ATM (Automated Teller Machine) or using a computer.

Nowadays, internet-based EFT is getting popular. In this case, a customer uses the website provided by the bank, logs in to the bank's website and registers another bank account. He/she then places a request to transfer certain amount to that account. Customer's bank transfers the amount to other account if it is in the same bank, otherwise the transfer request is forwarded to an ACH (Automated Clearing House) to transfer the amount to other account and the amount is deducted from the customer's account. Once the amount is transferred to other account, the customer is notified of the fund transfer by the bank.

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II UNIT TEST (2022-23)

Date: 11.04.2023 **Duration: 1 hr** **Class: III BCA**

Subject Name & Code: Data Mining & SZ26B

Section A (5 x 2 = 10)

(Answer any **FIVE** questions)

CO1 BL1 1. Define the term KDD.

CO2 BL1 2. Define the Data Transformation.

CO3 BL1 3. Define an association rule.

CO3 BL1 4. List out the two drawbacks of Apriori algorithm.

CO4 BL1 5. Name two algorithms based on Decision Tree Induction.

CO4 BL1 6. State the Bayes' Theorem.

CO5 BL1 7. Define a web log.

Section B (1 x 5 = 5)

(Answer any **ONE** question)

CO4 BL3 8. . Illustrate a brief explanation about techniques that can be used in evaluating the accuracy of a Classification or Predictor.

CO5 BL2 9. Write about detail note on outliers with example.

Section C (1 x 10 = 10)

(Answer any **ONE** question)

CO4 BL2 10. Explain the working of Naïve Bayesian Classifier with example.

CO5 BL6 11. Write a detailed note on Web Mining.

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II UNIT TEST (2022-23)

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Date: 11.04.2023 **Duration: 1 hr** **Class: III BCA**

Subject Name & Code: Data Mining & SZ26B

Section A (5 x 2 = 10)

(Answer any **FIVE** questions)

CO1 BL1 1. Define the term KDD

KDD (Knowledge Discovery in Databases) is a process that involves the extraction of useful, previously unknown, and potentially valuable information from large datasets.

CO2 BL1 2. Define the Data Transformation

Data transformation is the process of converting data from one format, such as a database file, XML document or Excel spreadsheet, into another

CO3 BL1 3. Define an association rule

Association rules are if/then statements that help uncover relationships between seemingly unrelated data in a relational database or other information

CO3 BL1 4. List out the two drawbacks of Apriori algorithm

The main limitation is time required to hold a vast number of candidate sets with much frequent itemsets, low minimum support or large itemsets i.e. it is not an efficient approach for large number of datasets.

CO4 BL1 5. Name two algorithms based on Decision Tree Induction.

Decision trees in machine learning can either be classification trees or regression trees

CO4 BL1 6. State the Bayes' Theorem

Bayes' Theorem states that the conditional probability of an event, based on the occurrence of another event, is equal to the likelihood of the second event given the first event multiplied by the probability of the first event

CO5 BL1 7. Define a web log.

A weblog (blog) is a website that contains a log or diary of information, specific topics or opinions.

Section B (1 x 5 = 5)

(Answer any **ONE** question)

CO4 BL3 8. . Illustrate a brief explanation about techniques that can be used in evaluating the

accuracy of a Classification or Predictor.

Classification metrics include the following:

- Accuracy is the proportion of correctly identified instances out of all identified instances.
- Error rate, also known as the *misclassification rate*, is the proportion of incorrectly identified instances out of all identified instances.
- Sensitivity, also known as the *true positive rate (TPR)*, is the probability of getting a true positive.
- Specificity, also known as the *true negative rate (TNR)*, is the probability of getting a true negative.

CO5 BL2 9. Write about detail note on outliers with example.

Outliers is a data object that deviates significantly from the rest of the data objects and behaves in a different manner. An outlier is an object that deviates significantly from the rest of the objects. They can be caused by measurement or execution errors. The analysis of outlier data is referred to as outlier analysis or outlier mining.

Section C (1 x 10 = 10)

(Answer any **ONE** question)

CO4 BL2 10. Explain the working of Naïve Bayesian Classifier with example

Naive Bayes classifiers are a collection of classification algorithms based on **Bayes' Theorem**.

Assumption:

The fundamental Naive Bayes assumption is that each feature makes an:

- independent
- equal

contribution to the outcome.

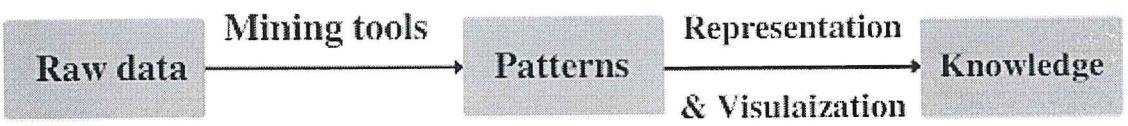
With relation to our dataset, this concept can be understood as:

- We assume that no pair of features are dependent. For example, the temperature being 'Hot' has nothing to do with the humidity or the outlook being 'Rainy' has no effect on the winds. Hence, the features are assumed to be **independent**.
- Secondly, each feature is given the same weight(or importance). For example, knowing only temperature and humidity alone can't predict the outcome accurately.

CO5 BL6 11. Write a detailed note on Web Mining.

Web Mining is the process of Data Mining techniques to automatically discover and extract information from Web documents and services. The main purpose of web mining is discovering useful information from the World-Wide Web and its usage patterns.

Process of web mining:



Web mining can be broadly divided into three different types of techniques of mining: Web Content Mining, Web Structure Mining, and Web Usage Mining

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II UNIT TEST (2022-23)

Date : 12.09.2022 **Duration : 1** **Class : III BCA**

Subject Name & Code: Mobile Application Development & SZ26C

Section A (5 x 2 = 10)

(Answer any **FIVE** questions)

CO 2 BL 2 1. Explain Fragment.

CO 2 BL 1 2. Define Edit Text Control.

CO 4 BL 3 3. Give note on various attributes of linear layout.

CO 5 BL 2 4. Illustrate Radio button and Radio button group.

CO 3 BL 4 5. Discriminate anchoring controls.

CO 6 BL 4 6. Point out table layout.

CO 6 BL 3 7. Recall methods of toggle button.

Section B (1 x 5 = 5)

(Answer any **ONE** question)

CO 5 BL 2 8. Discuss about intents and its types in Android.

CO 1 BL 5 9. Summarize shared preferences overview in Android.

Section C (1 x 10 = 10)

(Answer any **ONE** question)

CO 3 BL 4 10.Categorize an UI controls.

CO 4 BL 3 11. Sketch the neat diagram of Android Internal Store Architecture.

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Class : III BCA

Subject Name & Code: Mobile Application Development & SZ26C

Section A (5 x 2 = 10)

(Answer any **FIVE** questions)

1. A fragment is a piece that has been broken off of or detached from something else. Fragment most commonly refers to a part that has broken off rather than one that has been separated gently or intentionally, as in the vase smashed into a million fragments.
2. A EditText is an overlay over TextView that configures itself to be editable. It is the predefined subclass of TextView that includes rich editing capabilities.
3. LinearLayout is a view group that aligns all children in a single direction, vertically or horizontally. You can specify the layout direction with the android:orientation attribute.
4. In Android, RadioButton are mainly used together in a RadioGroup. In RadioGroup checking the one radio button out of several radio button added in it will automatically unchecked all the others. It means at one time we can checked only one radio button from a group of radio buttons which belong to same radio group.
5. Set the controls to appear at the places relative to the four edges of the screen. When the screen orientation changes, the controls do not disappear but are rearranged relative to the four edges.
6. Android TableLayout going to be arranged groups of views into rows and columns. You will use the <TableRow> element to build a row in the table. Each row has zero or more cells; each cell can hold one View object.

7 **ToggleButton** is basically a stop / play or on/off button with indicator light indicating the current state of ToggleButton. ToggleButton is widely used, some examples are on/off audio, Bluetooth, WiFi, hot-spot etc. This is a subclass of **Composite Button**.

Section B (1 x 5 = 5)

(Answer any **ONE** question)

7. Manage Android Virtual Devices (AVD), Create and update Android projects, Update your sdk with new platform add-ons and documentation.

8. Code Completion **helps us write code quickly by automatically completing the code using dynamic suggestion lists that are generated based on what we just typed**. The basic code completion is the list of suggestions that appears while we are typing, as shown in the following screenshot.

Section C (1 x 10 = 10)

(Answer any **ONE** question)

9. The main difference: **Native apps are built for a specific operating system – either iOS or Android. Hybrid apps, however, are built to work across any operating system and share the same codebase.**
10. The main components of android architecture are following:-

    a. Applications
    b. Application Framework
    c. Android Runtime
    d. Platform Libraries
    e. Linux Kernel

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II UNIT TEST (2022-23)

Class : III BCA

Date : 13.04.2023 **Duration : 1 Hour**

Subject Name & Code: IOT and its Applications & SU46B

(5 x 2 = 10)

Section A

(Answer any **FIVE** questions)

CO3 BL1 1.Define Reference Model

CO4 BL1 2. Define the term'Industry4.0'.

CO5 BL1 3. Define SMARTIE.

CO1 BL1 4. Define Virtual Sensor

CO4 BL1 5. Define Brownfield IoT

CO2 BL6 6. Write about M2M Communication.

CO4 BL6 7. Write the Dimensions of Big Data.

(1 x 5 = 5)

Section B

(Answer any **ONE** question)

CO4 BL2 8. Explain IoT For Oil and GasIndustry

CO5 BL2 9. Discuss Security, Privacy and Trust in IoT DataPlatforms for Smart Cities.

(1 x 10 = 10)

Section C

(Answer any **ONE** question)

CO4 BL2 11. Explain Future Factory Concepts

CO3 BL6 12. Design the IoT Reference Architecture

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Class : III BCA
Subject Name & Code : IOT and its Applications & SU46B

Section A (5 x 2 = 10)

(Answer any **FIVE** questions)

CO3 BL1 1.Define Reference Model

A Reference Model is an abstract framework for understanding significant relationships among the entities of some environment. It enables the development of specific reference architectures. A Reference Model consists of a minimal set of unifying concepts, axioms and relationships

CO4 BL1 2. Define the term'Industry4.0'.

It stands for the fourth industrial revolution and focuses on the end-to-enddigitization of all physical assets and integration into digital ecosystems with value chain partners. Industry 4.0 digitizes and integrates processes vertically across the entire organization, from product development and purchasing, through manufacturing, logistics and service.

CO5 BL1 3. Define SMARTIE.

Ans.: SMARTIE is a secure and smarter cities datamanagement system.TheSMARTIE projectworksonsecurity,privacyandtrustfordataexchangebetweenIoTdevicesand consumers of their information.

CO1 BL1 4. Define Virtual Sensor

A virtual sensor is a software sensor as opposed to a physical or hardware sensor. Virtual sensors provide indirect measurements of abstract conditionsby combining sensed data from a group of heterogeneous physical sensors.

CO4 BL1 5. Define Brownfield IoT

Brownfield refersto the implementationof new systemsto resolveIT problem areas while accounting for established stems. Brownfield describes the billions ofdevices and legacy software applications performing discretefunctions in isolation. me of these will require migration strategies to connect with and realize the benefits of IoT

CO2 BL6 6. Write about M2M Communication.

M2M communication is a form of data communication that involves one or more entities that do not necessarily require man interaction or intervention in the process of communication

CO4 BL6 7. Write the Dimensions of Big Data.

Dimension of Big data are :

1. Volume:datasets who size runs into petabytes and beyond.
2. Variety:data who form could be structured or unstructured.
3. Velocity:datathat comesinto the processing environment very fast.

Section B (1 x 5 = 5)

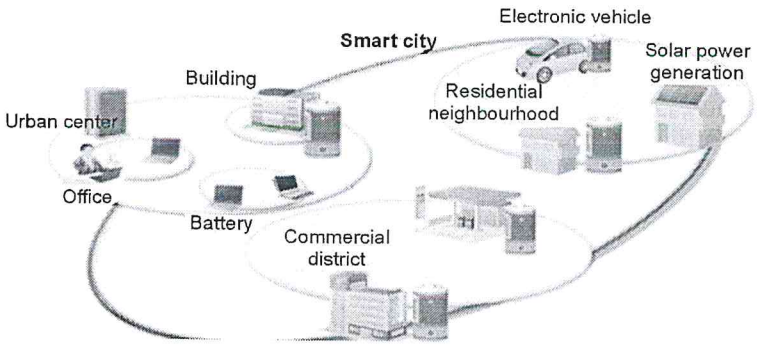
(Answer any **ONE** question)

CO4 BL2 8. Explain IoT For Oil and GasIndustry

- Unconventional resources challenge the oil industry. Exploration and development of oil and gas reservoirs quire new sensors, analytics, and processes. Systems require better connectivity, monitoring and control, and process tomation.
- Process industry in general and Oil and Gas in particular put special requirements on field devices. Devices ve to operate under harsh conditions; dirt, often high temperatures and sometimes in explosion prone environments. It is a allenge to develop a field device that not only is easy to install and maintain, have a long enough life length but also thstand this tough environment.
- Modern process control systems often have the facility to pass HART commands through the I/O modules that instrument configuration can be modified at the host system level.
- At a time when well drilling and completion complexities are increasing and field experts are becoming arcer,automation offers many benefits. Besides capturing domain knowledge, automation increases safety and decreases rsonnel time on-site and therefore lowers cost.

CO5 BL2 9. Discuss Security, Privacy and Trust in IoTDataPlatforms for Smart Cities.

Components of a typical smart city information system



SMARTIE is a secure and smarter cities data management system. The SMARTIE project works on security, privacy and trust for data exchange between IoT devices and consumers of their information.

- A secure, trusted, but easy to use IoT system for a smart city will benefit the various stakeholders of a smart city.
- The city administration will have it easier to get information from their citizens while protecting their privacy.
- Furthermore, the services offered will be more reliable if quality and trust of the underlying information is ensured.

Section C

(1 x 10 = 10)

(Answer any **ONE** question)

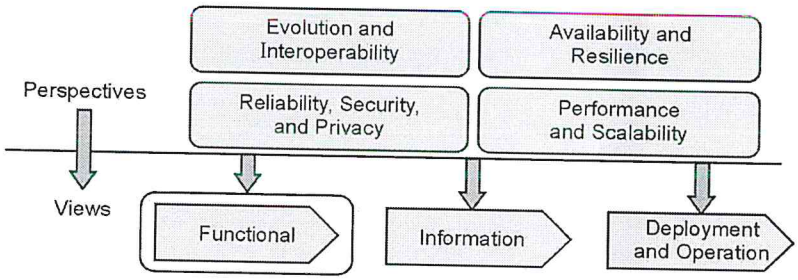
CO4 BL2 11. Explain Future Factory Concepts

- The manufacturing sector supports the development of IoT by the provision of smart products. For instance, 43 million wearable bands were shipped in 2015, and it is estimated that 20 million smart thermostats will ship by 2023. By 2016, smart products will be offered by 53 % of manufacturers.
- At present, the majority of manufacturing plants and production facilities around the world are putting into place systems that will make them adaptive, fully connected, analytical and more efficient.
- These new manufacturing systems are introducing a new industrial revolution, called Factory of the Future (FoF). This model marks the beginning of a new phase of manufacturing characterized by complete automation and involving an increased use of technology and field devices in and outside of themanufacturingfacility.
- Factories of the future are oriented toward ensuring the availability of all relevant information in real time through the connectivity of all elements participating in the value chain, as wellasprovidingtheabilitytodeducethe optimal valuechainprocesses from this data at the demand of the individual customer.
- The factory of the future will increase global competitiveness and will require an unprecedented integration of systems across domains, hierarchy boundaries and life cycle phases.
- Many factors can contribute to establishing factories of the future, but consensus-based standards are indispensable in this process.
- Thebenefitsofdatatofactoriesareacrossseveralvectors.Theseinclude:

1. Improved compliance to environmental guidelines; a major challenge forindustries at the moment.
2. Heightened and improved security, reducing loss due to sabotage, pilferage, leakages and human error
3. Giving your MES system an efficiency boost from process improvement and reduced down time of equipment realized through real-time alerts and predictive analytics
4. Insights into new product demand from markets thus directly driving RandD spends and design programs
5. Reduced cost through better demand forecasting, sourcing, supply chain management and inventory

control.

CO3 BL6 12. Design the IoT Reference Architecture



- Reference Architecture is a starting point for generating concrete architectures and actual systems.
- The Reference Architecture is based on the concepts of architectural views and architectural perspectives.
- A view is a representation of one or more structural aspects of a reference architecture that illustrates how the reference architecture can be adopted to address one or more concerns held by its stakeholders.
- Perspectives : The issues addressed by perspectives are the nonfunctional requirements of the architecture
- Architectural views derive from the concerns of stakeholders (i.e., people, groups, or entities with an interest in the realization of the architecture). Views are representations of one or more structural aspects of an architecture that illustrate how the architecture addresses the concerns set by its stakeholders .
- Reference Architecture, serves as a guide for one or more concrete system architects. Views are useful for reducing the complexity of the Reference Architecture.
- The IoT Reference Architecture does not contain details about the environment where the actual system is deployed, some views cannot be presented in detail or at all.
- ReferenceArchitectureasasetofarchitecturalviewsisasfollows:

1) FunctionalView:Descriptionofwhatthesystemdoes,anditsmainfunctions.
2) Information View : Description of the data and information that the systemhandles.
3) Deployment and Operational View : Description of the main real world components of the system such as devices, network routers, servers, etc.

PurposeofArchitecturalReferenceModels:

1) Cognitiveaid:commonlanguage,commonconcepts

2) Referencemodelasacommongrounding

3) Generationofarchitectures

4) Identifyingdifferencesandcommonalitiesinderivedarchitectures

5) Benchmarking

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Date: 08.09.2022 **Duration: One Hour** **Class: I BCA**

Subject Name & Code: Problem Solving using Python

Section A (5 x 2 = 10)

(Answer any **FIVE** questions)

CO1	B1	1. Define Travelling Salesman Problem
CO1	B1	2. Define the term Algorithm
CO1	B2	3. Describe the Brute Force Approach
CO1	B1	4. State Computer Hardware?
CO1	B1	5. Define Operating Systems
CO1	B1	6. Define the Syntax and Semantics?
CO1	B1	7.Define an Interpreter.

Section B (1 x 5 = 5)

(Answer any **ONE** question)

CO1	B2	8. Describe about the Essence of Computational Problem Solving in python.
CO1	B1	9. State the method Variables and Identifiers and its rules.

Section C (1 x 10 = 10)

(Answer any **ONE** question)

CO1	B2	10. Describe the Features of Python
CO1	B1	11. Examine about the various process of Computational problem solving method in python.

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Date: 12.09.2022 **Duration: 1 Hr** **Class: II B.C.A**

Subject Name & Code: Data Structures & SZ23A

Section A (5 x 2 = 10)

(Answer any **FIVE** questions)

CO1 BL2 1. Explain linked list.

CO1 BL2 2. Explain recursion.

CO1 BL2 3. Summarize the use of singly linked list.

CO2 BL1 4. Define queue.

CO2 BL1 5. Define prefix, infix, postfix notation.

CO2 BL1 6. Define circular queue.

CO1 BL2 7. Differentiate linked list and array.

Section B (1 x 5 = 5)

(Answer any **ONE** question)

CO1 BL2 8. Discuss an algorithm for binary search and explain with an example.

CO2 BL1 9. Tabulate the following expression into postfix notation

(a+b)*(c/d)+(e*f)/(g+h)

(a+b*c)+((d*e+f)*g)

Section C (1 x 10 = 10)

(Answer any **ONE** question)

CO1 BL2 10. Describe the concept of singly linked list with suitable example.

CO2 BL1 11. Examine various operation of stack.

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Date : 13.09.2022 **Duration : 1 Hr** **Class : II BCA**

Subject Name & Code: Java Programming & SZ23B

Section A (5 x 2 = 10)
(Answer any **FIVE** questions)

CO1	B1	1. Define OOP.
CO1	B1	2. State about Data Abstraction
CO 1	B1	3. Define JRE
CO2	BL3	4. Illustrate type casting in Java
CO2	BL6	5. Write about any two features of Java
CO 2	BL1	6. Define JRE
CO 2	BL1	7.Define API

Section B (1 x 5 = 5)
(Answer any **ONE** question)

CO1	BL2	8. Describe about the Data types in Java Programming
CO1	BL2	9. Explain Variables in Java with an example.

Section C (1 x 10 = 10)
(Answer any **ONE** question)

CO2	BL2	10. Discuss any two Control statements in Java
CO2	BL2	11. Demonstrate Operators and Statements in Java

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Date: 14.09.2022 **Duration: One Hour** **Class: II BCA**

Subject Name & Code: Computer Organization& SZ23C

Section A (5 x 2 = 10)

(Answer any **FIVE** questions)

CO1	B1	1. Define Complements.
CO1	B1	2. Identify the term BUS.
CO1	B2	3. Describe the major components of CPU.
CO1	B1	4. State Micro operation.
CO2	BL1	5. Define Stack Pointer.
CO2	BL1	6. Define Pipeline.
CO2	BL1	7.Define an RISC.

Section B (1 x 5 = 5)

(Answer any **ONE** question)

CO1	BL2	8. Describe about Arithmetic and Logic micro operation with example.
CO2	BL1	9. List in detail about instruction formats with examples.

Section C (1 x 10 = 10)

(Answer any **ONE** question)

CO2	BL1	10. Define the RISC. Relate in detail about RISC pipeline.
CO1	BL1	11. Examine about various Data type Representations with Examples.

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Date: 13.9.2022 **Duration: 1 HR** **Class : III BCA**

Subject Name & Code: Operating System

Section A (5 x 2 = 10)

(Answer any **FIVE** questions)

CO1	B1	1. State the goals of operating system.
CO1,2	B1	2. Define context switching.
CO1	B1	3. List the three types of scheduler.
CO1	B1	4. Enumerate the interprocess communication.
CO2	B1	5. Define deadlock.
CO 2	B6	6. Write the Monitor syntax in OS.
CO 2	B2	7. Discuss about Critical region.

Section B (1 x 5 = 5)

(Answer any **ONE** question)

CO1	B4	8. Explain the operating system services.
CO2	B3	9. Illustrate about synchronization hardware in detail.

Section C (1 x 10 = 10)

(Answer any **ONE** question)

CO1	B2	10. Describe the features of any two CPU scheduling algorithm.
CO2	B3	11. Sketch the state transition Processes with neat diagram.

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Date: 12.09.2022 **Duration: 1 Hour** **Class: III BCA**

Subject Name &Code: Software Engineering

Section A (5 x 2 = 10)

(Answer any **FIVE** questions)

CO1	BL6	1.Write the definition of Software Engineering
CO2	BL5	2. Summarize the users of SRS Document
CO 2	BL4	3. Distinguish between requirements analysis and specification?
CO2	BL3	4.Sketch out the good characteristics of SRS Document.
CO1	BL4	5. Compare Process and Methodology
CO 1	BL2	6. Interpret the Agile Model
CO 1	BL1	7. State the phase containment of errors.

Section B (1 x 5 = 5)

(Answer any **ONE** question)

CO1	BL2	8. Summarize the advantages and disadvantages of Agile Model.
CO1	BL4	9. Survey the different stages of SDLC.

Section C (1 x 10 = 10)

(Answer any **ONE** question)

CO1	BL4	10. Compare the relative advantages of RAD, iterative waterfall, and the evolutionary models of software development
CO2	BL1	11.Enumerate the main activities carried out during requirements analysis and specification phase?

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Date : 14.09.2022 **Duration : 1** **Class : III BCA**

Subject Name & Code: RDBMS &

Section A (5 x 2 = 10)

(Answer any **FIVE** questions)

CO 1 BL 1 1. Define DBMS.

CO 1 BL 2 2. Distinguish between data and information.

CO 1 BL 3 3. Sketch the neat diagram in DBMS Architecture.

CO 4 BL 2 4. Describe data types in SQL.

CO 4 BL 6 5. Formulate ALTER Query in SQL.

CO 4 BL 4 6. Point out DML Commands with two examples.

CO 4 BL 3 7. Demonstrate BETWEEN Operators in SQL.

Section B (1 x 5 = 5)

(Answer any **ONE** question)

CO 1 BL 2 8. Discuss advantages and disadvantages in DBMS.

CO 4 BL 5 9. Summarize the DDL Commands with Constraints.

Section C (1 x 10 = 10)

(Answer any **ONE** question)

CO 1 BL 4 10. Categorize the various components in DBMS

CO 4 BL 3 11. Illustrate sub query in RDBMS.

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Date: 15.09.2022 **Duration: 1 Hour** **Class: III BCA**

Subject Name & Code: Principles of Information Security

Section A (5 x 2 = 10)
(Answer any **FIVE** questions)

CO1	BL1	1. Define Information System.
CO1	BL1	2. State about principles of IS.
CO 1	BL1	3. Define data responsibility.
CO2	BL3	4. Illustrate security policy.
CO2	BL6	5. Write about major goals in IS.
CO 2	BL1	6. Define contextualising of IS.
CO 2	BL1	7.Define Risk.

Section B (1 x 5 = 5)
(Answer any **ONE** question)

CO1	BL2	8. Describe about System Security Assurance.
CO1	BL2	9. Explain the goals of Security testing.

Section C (1 x 10 = 10)
(Answer any **ONE** question)

CO2	BL2	10. Discuss about the minimal protection.
CO2	BL2	11. Demonstrate Security Architecture.

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Date: 01.11.2022 **Duration: One hour** **Class: II BCA**

Subject Name & Code: Java Programming & SZ23B

Section A (5 x 2 = 10)
(Answer any **FIVE** questions)

CO3 BL1 1. Define Classes.

CO4 BL1 2. State about Exception handling.

CO5 BL1 3. Define File stream.

CO1 BL3 4. Illustrate Command Line arguments.

CO2 BL6 5. Write about Multidimensional array.

CO3 BL1 6. Define String.

CO3 BL1 7. Define Interface.

Section B (1 x 5 = 5)
(Answer any **ONE** question)

CO3 BL2 8. Describe about Inheritance with its types.

CO4 BL2 9. Explain Synchronization and Thread scheduling.

Section C (1 x 10 = 10)
(Answer any **ONE** question)

CO5 BL2 10. Discuss about Applet Life cycle.

CO1 BL2 11. Demonstrate the concepts of Object Oriented Programming.

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Subject Name & Code: Java Programming & SZ23B
Answer key

1. Define Classes.

A class — in the context of Java — is a template used to create objects and to define object data types and methods.

2. State about Exception handling.

The Exception Handling in Java is one of the powerful mechanism to handle the runtime errors so that the normal flow of the application can be maintained.

3. Define File stream.

A FileInputStream obtains input bytes from a file in a file system. What files are available depends on the host environment. FileInputStream is meant for reading streams of raw bytes such as image data.

4. Illustrate Command Line arguments.

Java command line arguments are arguments that are passed to your program via a terminal or shell command. They make your Java program more configurable by giving users or scripts running your software a way to specify input parameters at run time.Write about any two features of Java

- Object Oriented. In Java, everything is an Object.
- Platform Independent.
- Simple

5. Write about Multi-dimensional array.

A multidimensional array is an array of arrays.
To create a two-dimensional array, add each array within its own set of curly braces:
Example :

```
int[][] myNumbers = { {1, 2, 3, 4}, {5, 6, 7} };
```

6. Define String.

Strings, which are widely used in Java programming, are a sequence of characters. In the Java programming language, strings are objects. The Java platform provides the String class to create and manipulate strings.

7. Define Interface.

An interface in Java is a blueprint of a class. It has static constants and abstract methods. The interface in Java is a mechanism to achieve abstraction.

Section B

(Answer any **ONE** question)

8. Describe about inheritance with its types.

Inheritance is a mechanism of acquiring the features and behaviours of a class by another class.

Single inheritance,

Multiple inheritance,

Multilevel inheritance,

hybrid inheritance, and

hierarchical inheritance.

9. Explain Synchronization and Thread Scheduling.

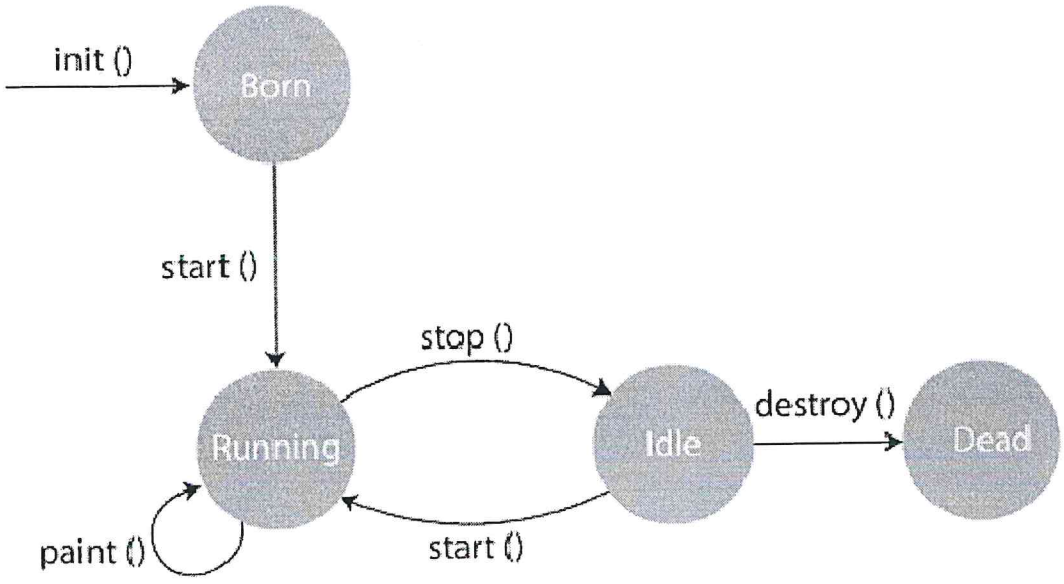
Synchronization in Java is the capability to control the access of multiple threads to any shared resource.

A component of Java that decides which thread to run or execute and which thread to wait is called a thread scheduler in Java.

Section C

(Answer any **ONE** question)

10. Discuss about Applet life cycle.



11. Demonstrate the concepts of Object Oriented Programming.

Object-Oriented Programming is a paradigm that provides many concepts, such as inheritance, data binding, polymorphism, etc. Object-Oriented Programming is a methodology or paradigm to design a program using classes and objects. It simplifies software development and maintenance by providing some concepts:

- Object
- Class
- Inheritance
- Polymorphism
- Abstraction
- Encapsulation

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Date : .11.2022 **Duration : 1** **Class : III BCA**

Subject Name & Code: RDBMS &

Section A (5 x 2 = 10)

(Answer any **FIVE** questions)

CO 1	BL 2	1. Characteristics of DBMS.
CO 2	BL 1	2. Define multivalued attribute.
CO 4	BL 3	3. Sketch the neat diagram in right join with query.
CO 5	BL 2	4. Describe data types in PL/SQL.
CO 3	BL 4	5. Discriminate functional dependency?
CO 6	BL 4	6. Point out referential integrity constraints with examples.
CO 6	BL 3	7. Demonstrate Mapping Constraints in SQL.

Section B (1 x 5 = 5)

(Answer any **ONE** question)

CO 5	BL 2	8. Discuss about Exception Handling in PL/SQL.
CO 1	BL 5	9. Summarize Association, Aggregation and Composition.

Section C (1 x 10 = 10)

(Answer any **ONE** question)

CO 2	BL 4	10. Categorize the various CODD'S rule in DBMS
CO 3	BL 3	11. Explain normalization and its types.

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Answer key

Date : .09.2022 **Duration : 1** **Class : III BCA**

Subject Name & Code: RDBMS &

Section A (5 x 2 = 10)

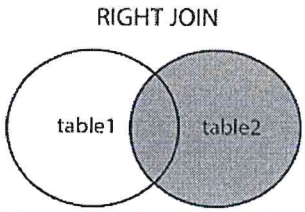
(Answer any **FIVE** questions)

CO 1 BL 2 1. Characteristics of DBMS.

A database management system is able to store any kind of data in a database. The database management system has to support ACID (atomicity, consistency, isolation, durability) properties. The Database management system allows so many users to access databases at the same time.

CO 2 BL 1 2. Define multivalued attribute.

A multivalued attribute of an entity is an attribute that can have more than one value associated with the key of the entity.



CO 4 BL 3 3.

CO 5 BL 2 4. Describe data types in PL/SQL.

integer, floating point, character, Boolean, date, collection, reference, and LOB types.

CO 3 BL 4 5. Discriminate functional dependency?

A functional dependency is a constraint that specifies the relationship between two sets of attributes where one set can accurately

CO 6 BL 4 6. Point out referential integrity constraints with examples.

A foreign key constraint (also referred to as a referential constraint or a referential integrity constraint) is a logical rule about values in one or more columns in one or more tables.

CO 6 BL 3 7. Demonstrate Mapping Constraints in SQL.

A mapping constraint is a data constraint that expresses the number of entities to which another entity can be related via a relationship set.

Section B (1 x 5 = 5)

(Answer any ONE question)

CO 5 BL 2 8. Discuss about Exception Handling in PL/SQL.

An exception is an error condition during a program execution. PL/SQL supports programmers to catch such conditions using EXCEPTION block in the program and an appropriate action is taken against the error condition. There are two types of exceptions

- System-defined exceptions
- User-defined exceptions

CO 1 BL 5 9. Summarize Association, Aggregation and Composition.

Association is a relationship between two objects. In other words, association defines the multiplicity between objects. You may be aware of one-to-one, one-to-many, many-to-one, many-to-many all these words define an association between objects. Aggregation is a special form of association. Composition is a special form of aggregation.

Section C (1 x 10 = 10)

(Answer any ONE question)

CO 2 BL 4 10. Categorize the various CODD'S rule in DBMS

Rule 1: Information Rule

Rule 2: Guaranteed Access Rule

Rule 3: Systematic Treatment of NULL Values

Rule 4: Active Online Catalog

Rule 5: Comprehensive Data Sub-Language Rule

Rule 6: View Updating Rule

Rule 7: High-Level Insert, Update, and Delete Rule

Rule 8: Physical Data Independence

Rule 9: Logical Data Independence

Rule 10: Integrity Independence

Rule 11: Distribution Independence

Rule 12: Non-Subversion Rule

CO 3 BL 3 11. Explain normalization and its types.

Normalization is the process of organizing data into a related table; it also eliminates redundancy and increases the integrity which improves performance of the query. To normalize a database, we divide the database into tables and establish relationships between the tables.

- Insertion Anomaly: Insertion Anomaly refers to when one cannot insert a new tuple into a relationship due to lack of data.
- Deletion Anomaly: The delete anomaly refers to the situation where the deletion of data results in the unintended loss of some other important data.
- Updatation Anomaly: The update anomaly is when an update of a single data value requires multiple rows of data to be updated.
    - A relation is in 1NF if it contains an atomic value.
    - A relation will be in 2NF if it is in 1NF and all non-key attributes are fully functional dependent on the primary key.
    - A relation will be in 3NF if it is in 2NF and no transition dependency exists.
    - A stronger definition of 3NF is known as Boyce Codd's normal form.

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Date: 03.11.2022 **Duration: 1 Hour** **Class: III BCA**

Subject Name & Code: Principles of Information Security & SZ45A

Section A (5 x 2 = 10)
(Answer any **FIVE** questions)

CO3	BL1	1. Define Computer law.
CO1	BL1	2. State about IS principles.
CO3	BL1	3. Define Patent law.
CO5	BL3	4. Illustrate Access control system.
CO2	BL6	5. Write about Minimal Protection.
CO1	BL1	6. Define CIA triad.
CO4	BL1	7.Define cyber security.

Section B (1 x 5 = 5)
(Answer any **ONE** question)

CO2	BL2	8. Describe computer security evaluation criteria.
CO4	BL2	9. Explain about operation security process controls.

Section C (1 x 10 = 10)
(Answer any **ONE** question)

CO1	BL2	10. Discuss about Information security project team.
CO5	BL2	11. Demonstrate purpose and uses of digital certificates.

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Subject Name & Code: Principles of Information Security & SZ45A
Answer key

1. Define Computer law.

   Cyber Law also called IT Law is the law regarding Information-technology including computers and the internet. It is related to legal informatics and supervises the digital circulation of information, software, information security, and e-commerce.

2. State about IS principles.

   The basic tenets of information security are confidentiality, integrity and availability. Every element of the information security program must be designed to implement one or more of these principles.

3. Define Patent law.

   A patent is a form of intellectual property. It consists of a set of exclusive rights granted by a sovereign state to an inventor or their assignee for a limited period of time in exchange for the public disclosure of an invention.

4. Illustrate Access control system.

   Access control is a security technique that regulates who or what can view or use resources in a computing environment. It is a fundamental concept in security that minimizes risk to the business or organization.

5. Write about Minimal Protection.

   Information security protects sensitive information from unauthorized activities, including inspection, modification, recording, and any disruption or destruction.

6. Define CIA triad.

   Confidentiality, integrity and availability, also known as the CIA triad, is a model designed to guide policies for information security within an organization.

7. Define cyber security.

   Cyber security is the practice of defending computers, servers, mobile devices, electronic systems, networks, and data from malicious attacks.

Section B

(Answer any **ONE** question)

8. Describe computer security evaluation criteria.

Security Evaluation Criteria are usually presented as a set of parameter thresholds that must be met for a system to be evaluated and deemed acceptable. These criteria are established based on a Threat Assessment to establish the extent of the data sensitivity, the security policy, and the system characteristics.

9. Explain about operation security process controls.

Operational controls that maintain the security and integrity of ID system facilities, data centers, and equipment are paramount to protecting personal data. Data breaches can come from multiple internal and external sources, including employees who fail to follow security procedures, hackers who gain access to inadequately-protected databases, and thieves who steal unsecured portable devices. In order to reduce these threats, ID system operators should employ state-of-the-art measures to reasonably prevent, detect, mitigate and respond to third party attacks, unauthorized access, and malicious or fraudulent use.

Section C

(Answer any **ONE** question)

10. Discuss about Information security project team.

Common IT Security Roles and Responsibilities Explained

- ✓ Application Security Engineer.
- ✓ CISO.
- ✓ Data Protection Officer.
- ✓ Network Security Engineer.
- ✓ Security Administrator.
- ✓ Security Analyst.
- ✓ Security Architect.
- ✓ Security Specialist.

11. Demonstrate purpose and uses of digital certificates.

Digital certificates facilitate secure electronic communication and data exchange between people, systems, and devices online. They are issued by Certificate Authorities (CAs) and perform two primary functions: Verifying the identity of the sender/receiver of an electronic message.

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Date : 31.10.2022 **Duration : 1 Hour** **Class : III BCA**

***Subject Name &Code :Software Engineering &* SU25A**

Section A (5 x 2 = 10)

(Answer any **FIVE** questions)

CO4	BL1	1.Define Testing.
CO4	BL5	2. Summarize the types of UML diagrams.
CO4	BL4	3. Distinguish between composition and aggregation
CO2	BL3	4.Sketch out the Formal Technique.
CO3	BL4	5.Define Decision Table.
CO3	BL2	6. Interpret the Non-functional requirements in SRS document
CO3	BL1	7. State the Data Flow Diagram

Section B (1 x 5 = 5)

(Answer any **ONE** question)

CO3	BL2	8. Summarize the function oriented approach and object oriented approach.
CO4	BL4	9.Explain the advantages and disadvantages of OOD.

Section C (1 x 10 = 10)

(Answer any **ONE** question)

CO3	BL4	10.Compare the different types of Cohesion and coupling
CO4	BL1	11.Enumerate the UML diagrams in detail

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Answer Key

Subject Name &Code :Software Engineering & SU25A

Section A (5 x 2 = 10)

(Answer any **FIVE** questions)

CO4 BL1 1.Define Testing

Software testing is a process of identifying the correctness of software by considering its all attributes (Reliability, Scalability, Portability, Re-usability, Usability) and evaluating the execution of software components to find the software bugs or errors or defects

CO4 BL5 2. Summarize the types of UML diagrams.

- Structure Diagrams
  - Class Diagram
  - Component Diagram
  - Deployment Diagram
  - Object Diagram
  - Package Diagram
  - Profile Diagram
  - Composite Structure Diagram
- Behavioral Diagrams
  - Use Case Diagram
  - Activity Diagram
  - State Machine Diagram
  - Sequence Diagram
  - Communication Diagram
  - Interaction Overview Diagram
  - Timing Diagram

CO4 BL4 3. Distinguish between composition and aggregation

In an aggregation relationship, the associated objects exist independently within the scope of the system. In a composition relationship, the associated objects cannot exist independently within the scope of the system.

CO2 BL3 4.Sketch out the Formal Technique.

The formal methods model is an approach to software engineering that applies mathematical methods or techniques to the process of developing complex software systems.

CO3 BL4 5.Define Decision Table.

Decision tables are a concise visual representation for specifying which actions to perform depending on given conditions.

CO3 BL2 6. Interpret the Non-functional requirements in SRS document

Nonfunctional Requirements (NFRs) define system attributes such as security, reliability, performance, maintainability, scalability, and usability.

CO3 BL1 7. State the Data Flow Diagram

A data flow diagram (DFD) maps out the flow of information for any process or system. It uses defined symbols like rectangles, circles and arrows, plus

short text labels, to show data inputs, outputs, storage points and the routes between each destination.

Section B (1 x 5 = 5)

(Answer any **ONE** question)

CO3 BL2 8. Summarize the function oriented approach and object oriented approach.

1. Function Oriented Design :

Function oriented design is the result of focusing attention to the function of the program. This is based on the stepwise refinement. Stepwise refinement is based on the iterative procedural decomposition. Stepwise refinement is a top-down strategy where a program is refined as a hierarchy of increasing levels of details.

2. Object Oriented Design :

Object oriented design is the result of focusing attention not on the function performed by the program, but instead on the data that are to be manipulated by the program. Thus, it is orthogonal to function -oriented design. Object-oriented design begins with an examination of the real world "things". These things are characteristics individually in terms of their attributes and behavior.

CO4 BL4 9.Explain the advantages and disadvantages of OOD.

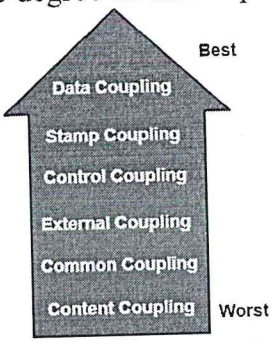
It promises to reduce development time, reduce the time and resources required to maintain existing applications, increase code reuse, and provide a competitive advantage to organizations that use it.

Section C (1 x 10 = 10)

(Answer any **ONE** question)

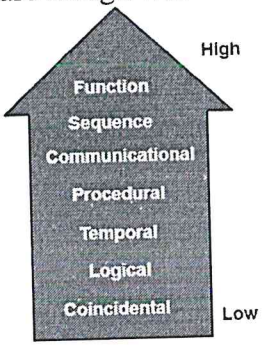
CO3 BL4 10.Compare the different types of Cohesion and coupling

Coupling: Coupling is the measure of the degree of interdependence between the modules.



A good software will have low coupling.

Cohesion: Cohesion is a measure of the degree to which the elements of the module are functionally related. It is the degree to which all elements directed towards performing a single task are contained in the component. Basically, cohesion is the internal glue that keeps the module together. A good software design will have high cohesion.



CO4 BL1 11.Enumerate the UML diagrams in detail

A UML diagram is a diagram based on the UML (Unified Modeling Language) with the purpose of **visually representing a system** along with its main actors, roles, actions, artifacts or classes, in order to better understand, alter, maintain, or document information about the system.

Types of UML diagram

Behavioral UML Diagram

- Activity Diagram
- Use Case Diagram
- Interaction Overview Diagram
- Timing Diagram
- State Machine Diagram
- Communication Diagram
- Sequence Diagram

Structural UML Diagram

- Class Diagram
- Object Diagram
- Component Diagram
- Composite Structure Diagram
- Deployment Diagram
- Package Diagram
- Profile Diagram

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Department of Computer Applications and Technology

Date: 02.11.2022 **Duration :1 Hr** **Class : III BCA**

Subject Name & Code: **Relational Database Management System & SE25C**

Section A (5 x 2 = 10)

(Answer any **FIVE** questions)

CO 1 BL 2 1. Characteristics of DBMS.

CO 2 BL 1 2. Define multivalued attribute.

CO 4 BL 3 3. Sketch the neat diagram in right join with query.

CO 5 BL 2 4. Describe data types in PL/SQL.

CO 3 BL 4 5. Discriminate functional dependency?

CO 6 BL 4 6. Point out referential integrity constraints with examples.

CO 6 BL 3 7. Demonstrate Mapping Constraints in SQL.

Section B (1 x 5 = 5)

(Answer any **ONE** question)

CO 5 BL 2 8. Discuss about Exception Handling in PL/SQL.

CO 1 BL 5 9. Summarize Association, Aggregation and Composition.

Section C (1 x 10 = 10)

(Answer any **ONE** question)

CO 2 BL 4 10. Categorize the various CODD'S rule in DBMS

CO 3 BL 3 11. Explain normalization and its types.

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Answer key

Class : III BCA

Subject Name & Code: **Relational Database Management System & SE25C**

Section A (5 x 2 = 10)

(Answer any **FIVE** questions)

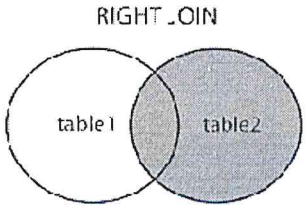
CO 1 BL 2 1. Characteristics of DBMS.

A database management system is able to store any kind of data in a database. The database management system has to support ACID (atomicity, consistency, isolation, durability) properties. The Database management system allows so many users to access databases at the same time.

CO 2 BL 1 2. Define multivalued attribute.

A multivalued attribute of an entity is an attribute that can have more than one value associated with the key of the entity.

CO 4 BL 3 3.



CO 5 BL 2 4. Describe data types in PL/SQL.

integer, floating point, character, Boolean, date, collection, reference, and LOB types.

CO 3 BL 4 5. Discriminate functional dependency?

A functional dependency is a constraint that specifies the relationship between two sets of attributes where one set can accurately

CO 6 BL 4 6. Point out referential integrity constraints with examples.

A foreign key constraint (also referred to as a referential constraint or a referential integrity constraint) is a logical rule about values in one or more columns in one or more tables.

CO 6 BL 3 7. Demonstrate Mapping Constraints in SQL.

A mapping constraint is a data constraint that expresses the number of entities to which another entity can be related via a relationship set.

Section B (1 x 5 = 5)

(Answer any ONE question)

CO 5 BL 2 8. Discuss about Exception Handling in PL/SQL.

An exception is an error condition during a program execution. PL/SQL supports programmers to catch such conditions using EXCEPTION block in the program and an appropriate action is taken against the error condition. There are two types of exceptions

- System-defined exceptions
- User-defined exceptions

CO 1 BL 5 9. Summarize Association, Aggregation and Composition.

Association is a relationship between two objects. In other words, association defines the multiplicity between objects. You may be aware of one-to-one, one-to-many, many-to-one, many-to-many all these words define an association between objects. Aggregation is a special form of association. Composition is a special form of aggregation.

Section C (1 x 10 = 10)

(Answer any ONE question)

CO 2 BL 4 10. Categorize the various CODD'S rule in DBMS

Rule 1: Information Rule

Rule 2: Guaranteed Access Rule

Rule 3: Systematic Treatment of NULL Values

Rule 4: Active Online Catalog

Rule 5: Comprehensive Data Sub-Language Rule

Rule 6: View Updating Rule

Rule 7: High-Level Insert, Update, and Delete Rule

Rule 8: Physical Data Independence

Rule 9: Logical Data Independence

Rule 10: Integrity Independence

Rule 11: Distribution Independence

Rule 12: Non-Subversion Rule

CO 3 BL 3 11. Explain normalization and its types.

Normalization is the process of organizing data into a related table; it also eliminates redundancy and increases the integrity which improves performance of the query. To normalize a database, we divide the database into tables and establish relationships between the tables.

- Insertion Anomaly: Insertion Anomaly refers to when one cannot insert a new tuple into a relationship due to lack of data.
- Deletion Anomaly: The delete anomaly refers to the situation where the deletion of data results in the unintended loss of some other important data.
- Updatation Anomaly: The update anomaly is when an update of a single data value requires multiple rows of data to be updated.
    - A relation is in 1NF if it contains an atomic value.
    - A relation will be in 2NF if it is in 1NF and all non-key attributes are fully functional dependent on the primary key.
    - A relation will be in 3NF if it is in 2NF and no transition dependency exists.
    - A stronger definition of 3NF is known as Boyce Codd's normal form.
    -

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Department Of Computer Applications and Technology

Date: 01.11.2022 **Duration: 1 HR** **Class : III BCA**

Subject Name & Code: Operating System

Section A (5 x 2 = 10)

(Answer any **FIVE** questions)

CO1	BL1	1. List out the different states of process.
CO2	BL1	2. Define semaphore.
CO3,4	BL1	3. Define address Binding.
CO4,5	BL1	4. List out the file attributes.
CO3	BL2	5. Distinguish between logical and physical address.
CO 3	BL4	6. Explain the External fragmentation.
CO6	BL6	7. Write the difference between worms and virus.

Section B (1 x 5 = 5)

(Answer any **ONE** question)

CO2	BL5	8. Summarize dinning philosopher's problem.
CO4	BL2	9. Describe in detail about thrashing.

Section C (1 x 10 = 10)

(Answer any **ONE** question)

CO3	BL3	10. Illustrate the memory management concept paging in detail with suitable diagram.
CO4	BL2	11. Discuss the different types of page replacement algorithms with neat diagrams.

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Answer Key

Class : III BCA

Subject Name & Code :Operating System

Section A (5 x 2 = 10)

(Answer any FIVE questions)

CO1 B1 1. List out the different states of process.
New, Ready, Running, Waiting or Block, Terminated or Completed, Suspend ready, and Suspend wait or blocked

CO2 B1 2. Define semaphore.
Semaphores are integer variables that are used to solve the critical section problem by using two atomic operations, wait and signal

CO3,4 B1 3. Define address Binding.
The Address Binding refers to the mapping of computer instructions and data to physical memory locations. Both logical and physical addresses are used in computer memory.

CO4,5 B1 4. List out the file attributes.
Name, Identifier, Type, Size, Location, protection, time and date

CO3 B2 5. Distinguish between logical and physical address.
The logical address is rendered by CPU while a program is executed, whereas the physical address directs to a location in the memory unit.

CO 3 B4 6. Explain the term External fragmentation?
External fragmentation arises when free memory is separated into small blocks and is interspersed by allocated memory. It is a weakness of certain storage allocation algorithms, when they fail to order memory used by programs efficiently.

CO6 B6 7. Write the difference between worms and virus.
The primary difference between a virus and a worm is that viruses must be triggered by the activation of their host; whereas worms are stand-alone malicious programs that can self-replicate and propagate independently as soon as they have breached the system.

Section B (1 x 5 = 5)

(Answer any **ONE** question)

CO2 B5 8. Summarize dinning philosopher's problem.
The dining philosopher's problem is the classical problem of synchronization which says that Five philosophers are sitting around a circular table and their job is to think and eat alternatively. A bowl of noodles is placed at the center of the table along with five chopsticks for each of the philosophers. To eat a philosopher needs both their right and a left chopstick. A philosopher can only eat if both

immediate left and right chopsticks of the philosopher is available. In case if both immediate left and right chopsticks of the philosopher are not available then the philosopher puts down their (either left or right) chopstick and starts thinking again.

CO4 B2 9. Describe in detail about thrashing.

Thrashing occurs when a computer's virtual memory resources are overused, leading to a constant state of paging and page faults, inhibiting most application-level processing. This causes the performance of the computer to degrade or collapse.

Section C (1 x 10 = 10)

(Answer any **ONE** question)

CO3 B3 10. Illustrate the memory management concept paging in detail with suitable diagram.

In Operating Systems, Paging is a storage mechanism used to retrieve processes from the secondary storage into the main memory in the form of pages.

The main idea behind the paging is to divide each process in the form of pages. The main memory will also be divided in the form of frames.

One page of the process is to be stored in one of the frames of the memory. The pages can be stored at the different locations of the memory but the priority is always to find the contiguous frames or holes.

Pages of the process are brought into the main memory only when they are required otherwise they reside in the secondary storage.

When a page is to be accessed by the CPU by using the logical address, the operating system needs to obtain the physical address to access that page physically.

The logical address has two parts.

1. Page Number
2. Offset

CO4 B2 11. Discuss the different types of page replacement algorithms with neat diagrams.

Page replacement occurs due to page faults. The various page replacement algorithms like FIFO, Optimal page replacement,

- First in First Out (FIFO) ... This method is the simplest of all the logics in which the system maintains the order of page loading from virtual to main memory
- Optimal Page Replacement algorithm → this algorithms replaces the page which will not be referred for so long in future. ...
- Least recent used (LRU) page replacement algorithm → this algorithm replaces the page which has not been referred for a long time.

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Department of computer Applications and Technology

Date : 02.11.2022 **Duration :One Hour** **Class :II BCA**

Subject Name & Code : Computer Organization & SZ23C

Section A (5 x 2 = 10)

(Answer any **FIVE** questions)

CO3	B1	1. Define Packed BCD
CO4	B4	2. Explain about BCD Addition
CO3	B2	3. Predict the method for clearing of Accumulator.
CO4	B1	4. Define Maskable Interrupt?
CO5	B2	5. Predict any two register of DMA Controller
CO2	B1	6. Define Counter
CO3	B6	7. Write a short note on BCD Code

Section B (1 x 5 = 5)

(Answer any **ONE** question)

CO3	B2	8. Describe about the 8085 Instruction Sets?
CO4	B1	9. Examine the process of Vector Interrupt.

Section C (1 x 10 = 10)

(Answer any **ONE** question)

CO3	B2	10. Summarize Microprocessor Architecture and its Operations.
CO5	B4	11. Explain about Direct Memory Access 8257 and DMA Controller.

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Department of computer Applications and Technology
ANSWER KEY

II BCA

Subject Name & Code : Computer Organization& SZ23C

Section (5 x 2 = 10)
(Answer any **FIVE** questions)

CO3 B1 1. Define Packed BCD

Packed BCD: Packed BCD Numbers are stored in two digits to a byte, in 4 bit groups referred to as nibbles. ALU is capable of performing only binary addition and subtraction, but by adjusting the sum or difference the correct result in packed BCD format.

CO4 B4 2. Explain about BCD Addition

BCD Addition : The **addition of BCD numbers** is slightly different from **binary addition**. Here, the rules of binary addition are partially applicable only to the individual 4-bit groups. The **BCD addition**, is thus carried out by individually adding the corresponding 4-bit groups starting from the LSB side and if there is a carry to the next group, or if the result belongs to any of the 6 illegal states than we add $\mathbf{6_{10}(0110)}$ to the sum term of that group and resulting carry is added in the next group.

CO3 B2 3. Predict the method for clearing of Accumulator.

S.No.	MNEMONICS	COMMENT
1	MVI A, 00	A <- 00
2	ANI 00	A AND 00
3	XRA A	A XOR A
4	SUB A	A <- A – A

CO4 B1 4. Define Maskable Interrupt?

Maskable Interrupt:

An Interrupt that can be disabled or ignored by the instructions of CPU are called as Maskable Interrupt.The interrupts are either edge-triggered or level-triggered or level-triggered.

Eg: RST6.5,RST7.5,RST5.5 of 8085

CO5 B2 5. Predict any two register of DMA Controller

The DMA controller has three registers as follows.

- **Address register** – It contains the address to specify the desired location in memory.
- **Word count register** – It contains the number of words to be transferred.
- **Control register** – It specifies the transfer mode.

CO2 B1 6. Define Counter

Counter is a sequential circuit. A digital circuit which is used for a counting pulses is known counter. Counter is the widest application of flip-flops. It is a group of flip-flops with a clock signal applied. Counters are of two types.

- Asynchronous or ripple counters.
- Synchronous counters.

CO3 B6 7. Write a short note on BCD Code

BCD code plays an important role in digital circuits. The BCD stands for Binary Coded Decimal Number. In BCD code, each digit of the decimal number is represented as its equivalent binary number. So, the LSB and MSB of the decimal numbers are represented as its binary numbers. There are the following steps to convert the binary number to BCD:

1. First, we will convert the binary number into decimal.
2. We will convert the decimal number into BCD.

Section B (1 x 5 = 5)

(Answer any **ONE** question)

CO3 B2 8. Describe about the 8085 Instruction Sets?

Instruction and Data Formats

The various techniques to specify data for instructions are:

1. 8-bit or 16-bit data may be directly given in the instruction itself.
2. The address of the memory location, I/O port or I/O device, where data resides, may be given in the instruction itself.
3. In some instructions, only one register is specified. The content of the specified register is one of the operands.
4. Some instructions specify two registers. The contents of the registers are the required data.
5. In some instructions, data is implied. The most instructions of this type operate on the content of the accumulator.

- **STA 2400H:** It stores the content of the accumulator in the memory location 2400H.
- **32, 00, 24:** The above instruction in the code form.
- **MOV A, B:** Move the content of B register to register A.

- **LXI H, 2500 H** - Load H-L pair with 2500H.
- **MOV A, M** - Move the content of the memory location, whose address is in H-L pair (i.e. 2500 H) to the accumulator.
- **HLT** - Halt.

CO4 B1 9. Examine the process of Vector Interrupt.

Vectored Interrupts

Devices that use vectored interrupts are assigned an **interrupt vector**. This is a number that identifies a particular interrupt handler. This vector may be fixed, configurable (using jumpers or switches), or programmable. In the case of programmable devices, an interrupt device cookie is used to program the device interrupt vector. When the interrupt handler is registered, the kernel saves the vector in a table.

When the device interrupts, the system enters the **interrupt acknowledge cycle**, asking the interrupting device to identify itself. The device responds with its interrupt vector. The kernel then uses this vector to find the responsible interrupt handler.

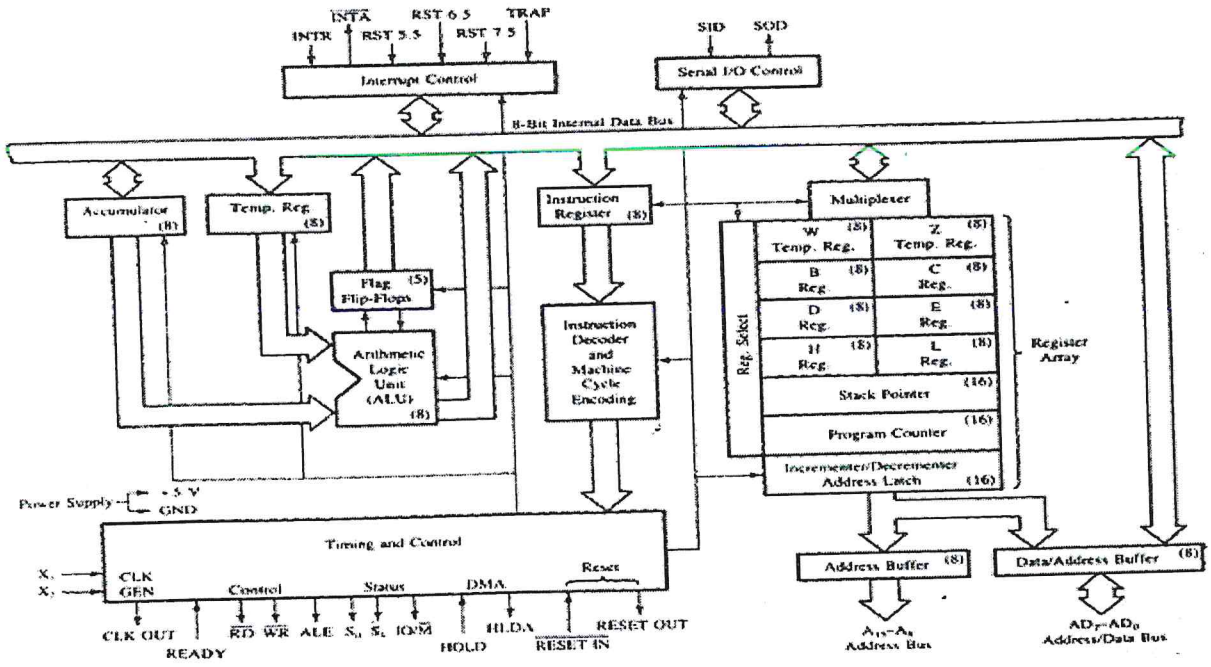
The VME bus supports vectored interrupts. **vectored interrupts** An efficient method implemented in hardware for dealing with many different devices, each of which is capable of interrupting and each different type of device requiring a unique interrupt handler. The *interrupt vector* is an array of interrupt handler locations. When a device successfully interrupts the processor, it supplies the processor with a reference to its entry in the interrupt vector. The processor then uses this to transfer control to the appropriate interrupt handler.

Section C (1 x 10 = 10)
(Answer any **ONE** question)

CO3 B2 10. Summarize Microprocessor Architecture and its Operations.

8085 Architecture

We have tried to depict the architecture of 8085 with this following image –



8085 Microprocessor – Functional Units

8085 consists of the following functional units –

Accumulator

It is an 8-bit register used to perform arithmetic, logical, I/O & LOAD/STORE operations. It is connected to internal data bus & ALU.

Arithmetic and logic unit

As the name suggests, it performs arithmetic and logical operations like Addition, Subtraction, AND, OR, etc. on 8-bit data.

General purpose register

There are 6 general purpose registers in 8085 processor, i.e. B, C, D, E, H & L. Each register can hold 8-bit data.

These registers can work in pair to hold 16-bit data and their pairing combination is like B-C, D-E & H-L.

Program counter

It is a 16-bit register used to store the memory address location of the next instruction to be executed. Microprocessor increments the program whenever an instruction is being executed, so that the program counter points to the memory address of the next instruction that is going to be executed.

Stack pointer

It is also a 16-bit register works like stack, which is always incremented/decremented by 2 during push & pop operations.

Temporary register

It is an 8-bit register, which holds the temporary data of arithmetic and logical operations.

Flag register

It is an 8-bit register having five 1-bit flip-flops, which holds either 0 or 1 depending upon the result stored in the accumulator.

These are the set of 5 flip-flops –

- Sign (S)
- Zero (Z)
- Auxiliary Carry (AC)
- Parity (P)
- Carry (C)

Its bit position is shown in the following table –

D7	D6	D5	D4	D3	D2	D1	D0
S	Z		AC		P		CY

Instruction register and decoder

It is an 8-bit register. When an instruction is fetched from memory then it is stored in the Instruction register. Instruction decoder decodes the information present in the Instruction register.

Timing and control unit

It provides timing and control signal to the microprocessor to perform operations. Following are the timing and control signals, which control external and internal circuits –

- Control Signals: READY, RD', WR', ALE
- Status Signals: S0, S1, IO/M'
- DMA Signals: HOLD, HLDA
- RESET Signals: RESET IN, RESET OUT

Interrupt control

As the name suggests it controls the interrupts during a process. When a microprocessor is executing a main program and whenever an interrupt occurs, the microprocessor shifts the control from the main program to process the incoming request. After the request is completed, the control goes back to the main program.

There are 5 interrupt signals in 8085 microprocessor: INTR, RST 7.5, RST 6.5, RST 5.5, TRAP.

Serial Input/output control

It controls the serial data communication by using these two instructions: SID (Serial input data) and SOD (Serial output data).

Address buffer and address-data buffer

The content stored in the stack pointer and program counter is loaded into the address buffer and address-data buffer to communicate with the CPU. The memory and I/O chips are connected to these buses; the CPU can exchange the desired data with the memory and I/O chips.

Address bus and data bus

Data bus carries the data to be stored. It is bidirectional, whereas address bus carries the location to where it should be stored and it is unidirectional. It is used to transfer the data & Address I/O devices.

CO5 B4 11. Explain about Direct Memory Access 8257 and DMA Controller.

DMA stands for Direct Memory Access. It is designed by Intel to transfer data at the fastest rate. It allows the device to transfer the data directly to/from memory without any interference of the CPU.

Using a DMA controller, the device requests the CPU to hold its data, address and control bus, so the device is free to transfer data directly to/from the memory. The DMA data transfer is initiated only after receiving HLDA signal from the CPU.

How DMA Operations are Performed?

Following is the sequence of operations performed by a DMA –

- Initially, when any device has to send data between the device and the memory, the device has to send DMA request (DRQ) to DMA controller.
- The DMA controller sends Hold request (HRQ) to the CPU and waits for the CPU to assert the HLDA.
- Then the microprocessor tri-states all the data bus, address bus, and control bus. The CPU leaves the control over bus and acknowledges the HOLD request through HLDA signal.
- Now the CPU is in HOLD state and the DMA controller has to manage the operations over buses between the CPU, memory, and I/O devices.

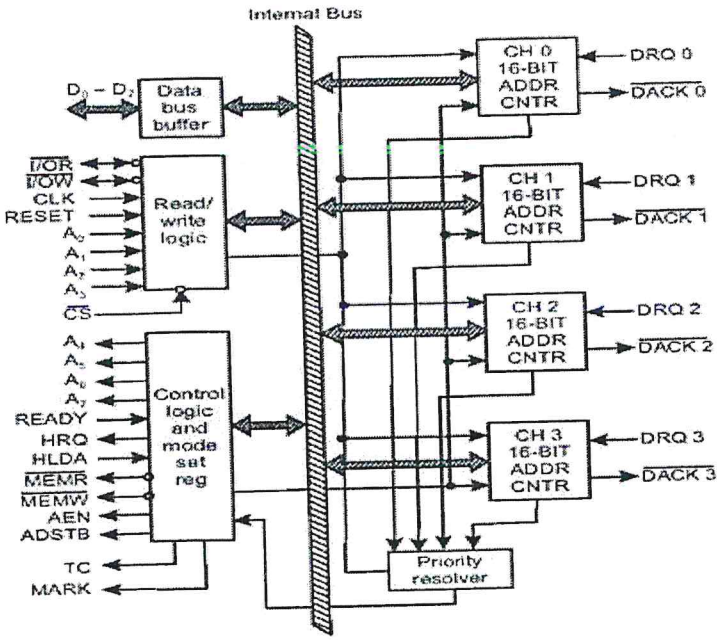
Features of 8257

Here is a list of some of the prominent features of 8257 –

- It has four channels which can be used over four I/O devices.
- Each channel has 16-bit address and 14-bit counter.
- Each channel can transfer data up to 64kb.
- Each channel can be programmed independently.
- Each channel can perform read transfer, write transfer and verify transfer operations.
- It generates MARK signal to the peripheral device that 128 bytes have been transferred.
- It requires a single phase clock.
- Its frequency ranges from 250Hz to 3MHz.
- It operates in 2 modes, i.e., **Master mode** and **Slave mode**.

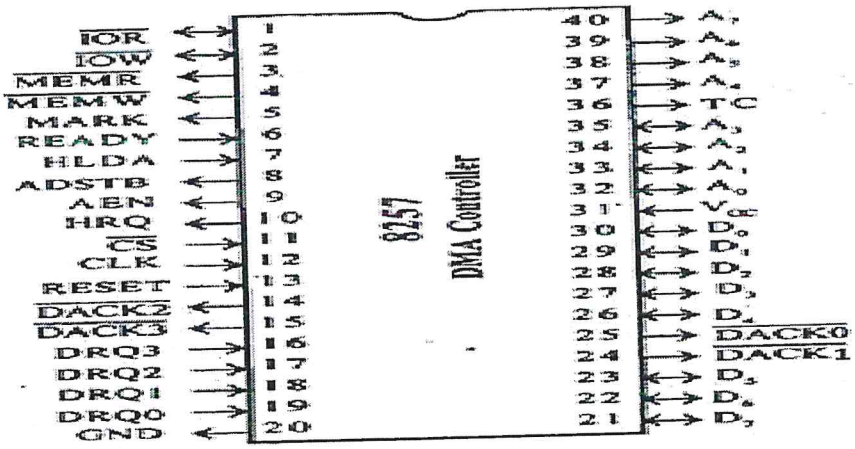
8257 Architecture

The following image shows the architecture of 8257 –



8257 Pin Description

The following image shows the pin diagram of a 8257 DMA controller –



DRQ_0–DRQ3

These are the four individual channel DMA request inputs, which are used by the peripheral devices for using DMA services. When the fixed priority mode is selected, then DRQ_0 has the highest priority and DRQ_3 has the lowest priority among them.

$DACK_0$ – $DACK_3$

These are the active-low DMA acknowledge lines, which updates the requesting peripheral about the status of their request by the CPU. These lines can also act as strobe lines for the requesting devices.

D_0 – D_7

These are bidirectional, data lines which are used to interface the system bus with the internal data bus of DMA controller. In the Slave mode, it carries command words to 8257 and status

word from 8257. In the master mode, these lines are used to send higher byte of the generated address to the latch. This address is further latched using ADSTB signal.

IOR

It is an active-low bidirectional tri-state input line, which is used by the CPU to read internal registers of 8257 in the Slave mode. In the master mode, it is used to read data from the peripheral devices during a memory write cycle.

IOW

It is an active low bi-direction tri-state line, which is used to load the contents of the data bus to the 8-bit mode register or upper/lower byte of a 16-bit DMA address register or terminal count register. In the master mode, it is used to load the data to the peripheral devices during DMA memory read cycle.

CLK

It is a clock frequency signal which is required for the internal operation of 8257.

RESET

This signal is used to RESET the DMA controller by disabling all the DMA channels.

A_0 - A_3

These are the four least significant address lines. In the slave mode, they act as an input, which selects one of the registers to be read or written. In the master mode, they are the four least significant memory address output lines generated by 8257.

CS

It is an active-low chip select line. In the Slave mode, it enables the read/write operations to/from 8257. In the master mode, it disables the read/write operations to/from 8257.

A_4 - A_7

These are the higher nibble of the lower byte address generated by DMA in the master mode.

READY

It is an active-high asynchronous input signal, which makes DMA ready by inserting wait states.

HRQ

This signal is used to receive the hold request signal from the output device. In the slave mode, it is connected with a DRQ input line 8257. In Master mode, it is connected with HOLD input of the CPU.

HLDA

It is the hold acknowledgement signal which indicates the DMA controller that the bus has been granted to the requesting peripheral by the CPU when it is set to 1.

MEMR

It is the low memory read signal, which is used to read the data from the addressed memory locations during DMA read cycles.

MEMW

It is the active-low three state signal which is used to write the data to the addressed memory location during DMA write operation.

ADST

This signal is used to convert the higher byte of the memory address generated by the DMA controller into the latches.

AEN

This signal is used to disable the address bus/data bus.

TC

It stands for 'Terminal Count', which indicates the present DMA cycle to the present peripheral devices.

MARK

The mark will be activated after each 128 cycles or integral multiples of it from the beginning. It indicates the current DMA cycle is the 128th cycle since the previous MARK output to the selected peripheral device.

V_{cc}

It is the power signal which is required for the operation of the circuit.

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Department of Computer Applications and Technology

Date : 31.10.2022 **Duration : 1 Hr** **Class : II B.C.A**
Subject Name & Code: Data Structures & SZ23A

Section A (5 x 2 = 10)

(Answer any **FIVE** questions)

CO5,6 BL1 1. Define Graph.

CO1 BL1 2. Define array.

CO1,6 BL2 3. Differentiate between stack and queue.

CO4,6 BL1 4. Define heap.

CO5 BL1 5. Examine cut vertex.

CO3,6 BL6 6. Formulate Division method in hashing.

CO4,6 BL4 7. Point out some of the applications of trees.

Section B (1 x 5 = 5)

(Answer any **ONE** question)

CO5,6 BL2 8. Discuss an algorithm for Breadth First Search Traversal.

CO4 BL1 9. Describe the concept of AVL tree.

Section C (1 x 10 = 10)

(Answer any **ONE** question)

CO2,6 BL2 10. Discuss an algorithm of radix sort with suitable example.

CO4,6 BL1 11. Describe the concept of binary search tree.

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ANSWER KEY

Subject Name & Code : Data Structures & SZ23A **Class : II B.C.A**

Section A (5 x 2 = 10)
(Answer any **FIVE** questions)

CO5,6 BL1 1. Define Graph.

Graph is a non-linear data structure consisting of vertices and edges. The vertices are sometimes also referred to as nodes and the edges are lines or arcs that connect any two nodes in the graph. More formally a Graph is composed of a set of vertices(V) and a set of edges(E). The graph is denoted by G(E, V).

CO1 BL1 2. Define array.

Arrays are defined as the collection of similar types of data items stored at contiguous memory locations. It is one of the simplest data structures where each data element can be randomly accessed by using its index number.

CO1,6 BL2 3. Differentiate between stack and queue.

STACK	QUEUE
It is a linear data structure in which elements can be inserted and deleted only from one side of the list, called the **top**	It is a linear data structure in which elements can be inserted only from one side of the list called **rear**, and the elements can be deleted only from the other side called the **front.**
A stack follows the **LIFO** (Last In First Out) principle	The queue follows the **FIFO** (First In First Out) principle
The insertion of an element into the stack is called **push** operation, and the deletion of an element from the stack is called **pop** operation	The insertion of an element in a queue is called an **enqueue** operation and the deletion of an element is called a **dequeue** operation.

CO4,6 BL1 4. Define heap.

Heap is a special Tree-based data structure in which the tree is a complete binary tree. The operations are heapify, insertion, deletion, peek.

CO5 BL1 5. Examine cut vertex.

A vertex whose deletion along with incident edges results in a graph with more components than the original graph. Also known as articulation point.

CO3,6 BL6 6. Formulate Division method in hashing.

$H(k) = k \% size$

CO4,6 BL4 7. Point out some of the applications of trees.

1. Store hierarchical data, like folder structure, organization structure, XML/HTML data.
2. Binary Search Tree is a tree that allows fast search, insert, delete on a sorted data. It also allows finding closest item

3. Heap is a tree data structure which is implemented using arrays and used to implement priority queues.

4. B-Tree and B+ Tree : They are used to implement indexing in databases.

5. Syntax Tree: Scanning, parsing , generation of code and evaluation of arithmetic expressions in Compiler design.

Section B (1 x 5 = 5)

(Answer any **ONE** question)

CO5,6 BL2 8. Discuss an algorithm for Breadth First Search Traversal.

Step 1: SET STATUS = 1 (ready state) for each node in G

Step 2: Enqueue the starting node A and set its STATUS = 2 (waiting state)

Step 3: Repeat Steps 4 and 5 until QUEUE is empty

Step 4: Dequeue a node N. Process it and set its STATUS = 3 (processed state).

Step 5: Enqueue all the neighbours of N that are in the ready state (whose STATUS = 1) and set their STATUS = 2

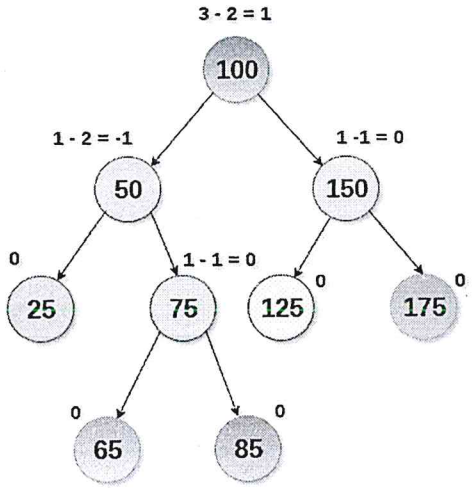
CO4 BL1 9. Describe the concept of AVL tree.

AVL Tree can be defined as height balanced binary search tree in which each node is associated with a balance factor which is calculated by subtracting the height of its right sub-tree from that of its left sub-tree. Tree is said to be balanced if balance factor of each node is in between -1 to 1, otherwise, the tree will be unbalanced and need to be balanced.

Balance Factor (k) = height (left(k)) - height (right(k))

If balance factor of any node is 1, it means that the left sub-tree is one level higher than the right sub-tree. If balance factor of any node is 0, it means that the left sub-tree and right sub-tree contain equal height. If balance factor of any node is -1, it means that the left sub-tree is one level lower than the right sub-tree.

An AVL tree is given in the following figure. We can see that, balance factor associated with each node is in between -1 and +1. therefore, it is an example of AVL tree.



AVL Tree

Section C

(1 x 10 = 10)

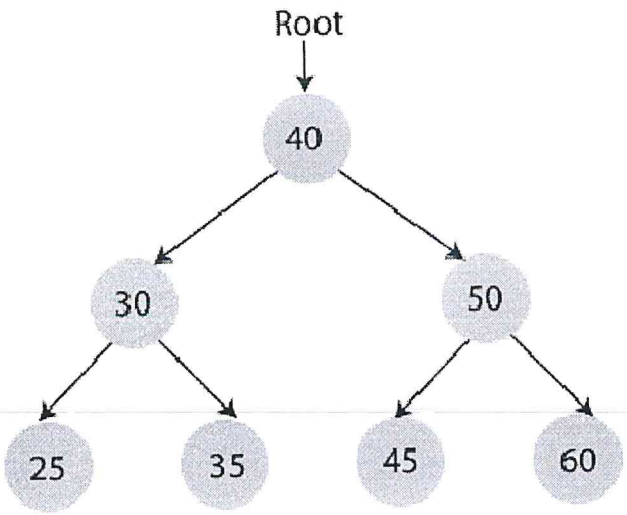
(Answer any **ONE** question)

CO2,6 BL2 10. Discuss an algorithm of radix sort with suitable example.

1. RadixSort(arr)
2. max = largest element in the given array
3. d = number of digits in the largest element (or, max)
4. Now, create d buckets of size 0 - 9
5. **for** i -> 0 to d
6. sort the array elements using counting sort according to the digits at the ith place

CO4,6 BL1 11. Describe the concept of binary search tree.

A binary search tree follows some order to arrange the elements. In a Binary search tree, the value of left node must be smaller than the parent node, and the value of right node must be greater than the parent node. This rule is applied recursively to the left and right subtrees of the root.



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I UNIT TEST ANSWERKEY SEPTEMBER 2022

CLASS: III BCA **TIME: 1 Hour**
Subject Name & Code :Operating system ***Max: 25 Marks***

Section A (5 x 2 = 10)

(Answer any **FIVE** questions)

CO1 B1 1. State the goals of operating system?

Operating Systems are designed to accomplish two main goals: (i) To make computer systems more convenient to use, and (ii) To make computer hardware more efficient

CO1,2 B1 2. Define context switching.

A context switch is a procedure that a computer's CPU (central processing unit) follows to change from one task (or process) to another while ensuring that the tasks do not conflict.

CO1 B1 3. List the three types of scheduler?

1. Long-Term Scheduler or Job Scheduler.
2. Short-Term Scheduler or CPU Scheduler.
3. Medium-Term Scheduler.

CO1 B1 4. Enumerate the interprocess communication?

Interprocess communication (IPC) is a set of programming interfaces that allow a programmer to coordinate activities among different program processes that can run concurrently in an operating system. This allows a program to handle many user requests at the same time.

CO2 B1 5. Define deadlock?

A deadlock is a situation in which two computer programs sharing the same resource are effectively preventing each other from accessing the resource, resulting in both programs ceasing to function.

CO 2 B6 6. Write the Monitor syntax in OS.

Monitors are **a programming language component that aids in the regulation of shared data access.**

```
monitor {
    //shared variable declarations
  data variables;
  Procedure P1() { ... }
  Procedure P2() { ... }
```

Procedure Pn() { ... }
Initialization Code() { ... }
}

CO 2 B2 7. Discuss about Critical region.

Critical Regions that part of the program which accesses the shared memory or file is called the critical region or critical section.

Section B (1 x 5 = 5)

(Answer any **ONE** question)

CO1 B4 8. Explain the operating system services.

The Following are the services provided by an operating system -

- Program execution
- Control Input/output devices
- Program creation
- Error Detection and Response
- Accounting
- Security and Protection
- File Management
- Communication

CO2 B3 9. Illustrate about synchronization hardware in detail.

Synchronization hardware i.e. hardware-based solution for the critical section problem which introduces the **hardware instructions** that can be used to resolve the critical section problem effectively.

1. TestAndSet Hardware Instruction

```
do{
while(TestAndSet(lock))
critical section
lock=false;
remainder section
}while(1);
```

2. Swap Hardware Instruction

```
do{
key=lock;
while(key==lock)
swap(lock,key)
critical section
lock=false;
remainder section
}while(1);
```

Section C (1 x 10 = 10)

(Answer any **ONE** question)

CO1 B2 10. Describe the features of any two CPU scheduling algorithm.

CPU scheduling Algorithm

1. First Come First Serve (FCFS)
2. Shortest-Job-First (SJF) Scheduling
3. Priority Scheduling
4. Round Robin Scheduling
5. Multilevel Queue Scheduling
6. Multilevel Feedback Queue Scheduling

1. **First Come First Serve (FCFS)** is an operating system scheduling algorithm that automatically executes queued requests and processes in order of their arrival.

Advantages-

- It is simple and easy to understand.
- It can be easily implemented using queue data structure.
- It does not lead to starvation.

Disadvantages-

- It does not consider the priority or burst time of the processes.
- It suffers from **convoy effect**.

2. **Shortest Job First**

In SJF scheduling, the process with the lowest burst time, among the list of available processes in the ready queue, is going to be scheduled next.

Advantages of SJF

1. Maximum throughput
2. Minimum average waiting and turnaround time

Disadvantages of SJF

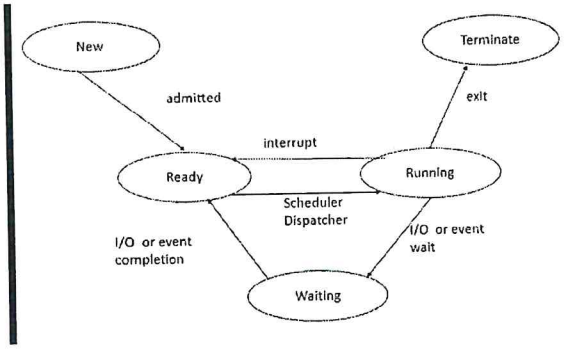
1. May suffer with the problem of starvation
2. It is not implementable because the exact Burst time for a process can't be known in advance.

CO2 B3 11. Sketch the state transition Processes with neat diagram .

A process is a program in execution and it is more than a program code called as text section and this concept works under all the operating system because all the task perform by the operating system needs a process to perform the task.

Each process may be in any one of the following states –

- **New** – The process is being created.
- **Running** – In this state the instructions are being executed.
- **Waiting** – The process is in waiting state until an event occurs like I/O operation completion or receiving a signal.
- **Ready** – The process is waiting to be assigned to a processor.
- **Terminated** – the process has finished execution.



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Department of computer Applications and Technology

Date : 02.11.2022 **Duration :One Hour** **Class :I BCA**

Subject Name & Code : Problem Solving Using Python & SE21A

Section A (5 x 2 = 10)

(Answer any **FIVE** questions)

CO1	B1	1. Define String Literals
CO1	B6	2. Write about the term Implicit and Explicit Line Joining.
CO2	B2	3. Describe about Control Structures
CO2	B1	4. Define List
CO2	B1	5. Define Boolean Flag.
CO3	B2	6. Describe about Function ? How to define it in Python?
CO2	B2	7.Distinguish List and Tuple.

Section B (1 x 5 = 5)

(Answer any **ONE** question)

CO2	B2	8. Explain how to create a list and any five list Operations.
CO1	B2	9. Explain about Expressions and Operator Precedence in Python.

Section C (1 x 10 = 10)

(Answer any **ONE** question)

CO2	B1	10. Define Selection Control and Explain about its Different types.
CO3	B2	11. Explain the concept of value-returning and non-value returning functions.

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Answer Key

Class :I BCA

Subject Name & Code : Problem Solving Using Python & SE21A

Section A (5 x 2 = 10)
(Answer any **FIVE** questions)

CO1 B1 1. Define String Literals

String literals in python are surrounded by either single quotation marks, or double quotation marks. 'hello' is the same as "hello".

CO1 B6 2. Write about the term Implicit and Explicit Line Joining.
When we want to join many logical lines to render a suitable condition, we can use the backslash characters (\). This character (\) will join the logical lines together as if they are declared in one single line. Such method of joining the lines using the backslash(\) is known as explicit line joining
In Python implicit line joining we uses parentheses, square brackets or curly braces to split the expression in multiple lines.

CO2 B2 3. Describe about Control Structures

The control flow of a Python program is regulated by conditional statements, loops, and function calls. Python has *three* types of control structures:

- **Sequential** - default mode
- **Selection** - used for decisions and branching
- **Repetition** - used for looping, i.e., repeating a piece of code multiple times.

CO2 B1 4. Define List

Lists are used to store multiple items in a single variable. Lists are one of 4 built-in data types in Python used to store collections of data, the other 3 are Tuple, Set, and Dictionary, all with different qualities and usage. Lists are created using square bracket.

CO2 B1 5. Define Boolean Flag.
The bool() function allows you to evaluate any value, and give you True or False in return. When you compare two values, the expression is evaluated and Python returns the Boolean answer.

CO3 B2 6. Describe about Function ? How to define it in Python?

A function is a block of code which only runs when it is called.You can pass data, known as parameters, into a function.

A function can return data as a result. The idea is to put some commonly or repeatedly done tasks together and make a function so that instead of writing the same code again and again for different inputs, we can do the function calls to reuse code contained in it over and over again.

CO2 B2 7.Distinguish List and Tuple.

S.NO	LIST	TUPLE
1	Lists are mutable	Tuples are immutable
2	The implication of iterations is Time-consuming	The implication of iterations is comparatively Faster
3	The list is better for performing operations, such as insertion and deletion.	Tuple data type is appropriate for accessing the elements
4	Lists consume more memory	Tuple consumes less memory as compared to the list
5	Lists have several built-in methods	Tuple does not have many built-in methods.
6	The unexpected changes and errors are more likely to occur	In tuple, it is hard to take place.

Section B (1 x 5 = 5)

(Answer any **ONE** question)

CO2 B2 8. Explain how to create a list and any five list Operations.

1. Access elements of a list

We can access the elements of a python list using the indexes — [0], [1], etc. The index starts at 0, so the index of the 'n'th element of a list is 'n-1'.

2. Adding (or Appending) elements to a list

Elements can be added (or appended) to the python lists using the append and insert function. Using the insert function, we can add elements at any position of a list. The function takes 2 arguments: 1) Index at which we want to insert the element. 2) The element that we want to insert.

The append function is used to add elements to the end of a list.

3. Sorting Lists

We can sort the elements of the list in ascending or descending order. In the below code, we are sorting the subject list in ascending and descending order (using "reverse = True").

4. Update elements of a list

Because lists are changeable, we can update the elements of the lists using the index of the elements. For example, in the code below we are updating 'Science' to 'Computer' using the index of 'Science'.

5. Delete elements of a list

We can easily delete the element of a list using the very intuitive remove function. Suppose, we want to delete 'Java' from our subject list, then we can delete it using the remove function and provide 'Java' as an argument.

CO1 B2 9. Explain about Expressions and Operator Precedence in Python.

Experssion:

An expression is a combination of operators and operands that is interpreted to produce some other value. In any programming language, an expression is evaluated as per the precedence of its operators. So that if there is more than one operator in an expression, their precedence decides which operation will be performed first. We have many different types of expressions in Python.

Constant Expressions: These are the expressions that have constant values only.

Example

```
# Constant Expressions

x = 15 + 1.3

print(x)
```

Operator Precedence:

Operators	Meaning
()	Parentheses
**	Exponent
	Unary plus, Unary minus, Bitwise NOT

*, /, //, %	Multiplication, Division, Floor division, Modulus
+, -	Addition, Subtraction
<<, >>	Bitwise shift operators
&	Bitwise AND
^	Bitwise XOR
|	Bitwise OR
==, !=, >, >=, <, <=, is, is not, in, not in	Comparisons, Identity, Membership operators
not	Logical NOT
and	Logical AND
or	Logical OR

Section C (1 x 10 = 10)

(Answer any **ONE** question)

CO2 B1 10. Define Selection Control and Explain about its Different types.

Selection: if statement

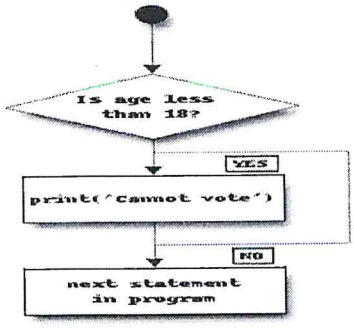
People make decisions on a daily basis. What should I have for lunch? What should I do this weekend? Every time you make a decision you base it on some criterion. For example, you might decide what to have for lunch based on your mood at the time, or whether you are on some kind of diet. After making this decision, you act on it. Thus decision-making is a two step process – first deciding what to do based on a criterion, and secondly taking an action.

Decision-making by a computer is based on the same two-step process. In Python, decisions are made with the if statement, also known as the selection statement. When processing an if statement, the computer first evaluates some criterion or condition. If it is met, the specified action is performed. Here is the syntax for the if statement:

```
if condition:
    if_body
```

When it reaches an if statement, the computer only executes the body of the statement only if the condition is true. Here is an example in Python, with a corresponding flowchart:

```
if age < 18:
    print("Cannot vote")
```



As we can see from the flowchart, the instructions in the if body are only executed if the condition is met (i.e. if it is true). If the condition is not met (i.e. false), the instructions in the if body are skipped.

The else clause

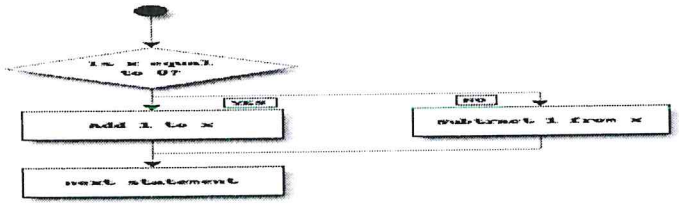
An optional part of an if statement is the else clause. It allows us to specify an alternative instruction (or set of instructions) to be executed if the condition is *not* met:

```
if condition:
   if_body
else:
   else_body
```

To put it another way, the computer will execute the if body if the condition is true, otherwise it will execute the else body. In the example below, the computer will add 1 to x if it is zero, otherwise it will subtract 1 from x:

```
if x == 0:
   x += 1
else:
   x -= 1
```

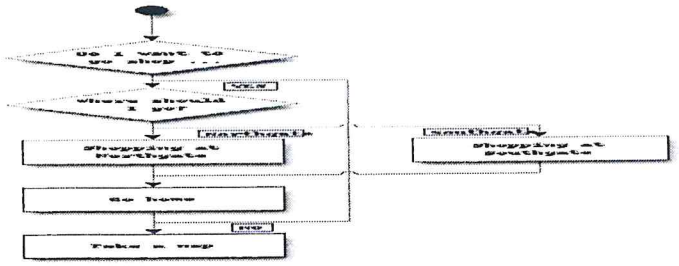
This flowchart represents the same statement:



The computer will execute one of the branches before proceeding to the next instruction.

Nested if statements

In some cases you may want one decision to depend on the result of an earlier decision. For example, you might only have to choose which shop to visit if you decide that you are going to do your shopping, or what to have for dinner after you have made a decision that you are hungry enough for dinner.



In Python this is equivalent to putting an if statement within the body of either the if or the else clause of another if statement. The following code fragment calculates the cost of sending a small parcel. The post office charges R5 for the first 300g, and R2 for every 100g thereafter (rounded up), up to a maximum weight of 1000g:

```
if weight <= 1000:
   if weight <= 300:
      cost = 5
   else:
      cost = 5 + 2 * round((weight - 300)/100)

   print("Your parcel will cost R%d." % cost)

else:
   print("Maximum weight for small parcel exceeded.")
   print("Use large parcel service instead.").
```

CO3 B2 11. Explain the concept of value-returning and non-value returning functions.

Value Return Type:

A **return statement** is used to end the execution of the function call and "returns" the result (value of the expression following the return keyword) to the caller. The statements after the return statements are not executed. If the return statement is without any expression, then the special value None is returned. A **return statement** is overall used to invoke a function so that the passed statements can be executed.

Note: *Return statement can not be used outside the function.*

Syntax:

```
def fun():
   statements
```

return [expression]

Example:

```
def cube(x):
  r=x**3
  return r
```

Example:

```
# Python program to

# demonstrate return statement

def add(a, b):

   # returning sum of a and b

   return a + b

def is_true(a):

   # returning boolean of a

   return bool(a)

# calling function

res = add(2, 3)

print("Result of add function is {}".format(res))

res = is_true(2<5)

print("\nResult of is_true function is {}".format(res))
```

Output:

Result of add function is 5

Result of is_true function is True

Returning Multiple Values

In Python, we can return multiple values from a function. Following are different ways.

- **Using Object:** This is similar to C/C++ and Java, we can create a class (in C, struct) to hold multiple values and return an object of the class.

Example

```
# A Python program to return multiple

# values from a method using class

class Test:

    def __init__(self):

        self.str = "geeksforgeeks"

        self.x = 20

# This function returns an object of Test

def fun():

    return Test()

# Driver code to test above method

t = fun()

print(t.str)

print(t.x)
```

Output

```
geeksforgeeks
20
```

Non Value Return Type-Void Functions

You will see that in Python, None refers to a literal kind of type NoneType which comes in use for denoting the absence of a value. Moreover, it is generally assigned to a variable for denoting that the variable does not point to any object. Through the program given below, you can see how it shows that void functions return None:

```
def add(num1, num2):

 print("Sum is", num1 + num2)

 return_val = add(300, 500)
```

```
print(return_val)
```

Output:

```
Sum is 800

None
```

Moreover, add () function certainly returns None. Thus, one can say that in Python, all functions return value whether usage of the return statement is done or not. But, this does not imply that one can make use of void functions like a value-returning function.

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Date : 14.09.2022 **Duration : 1** **Class : III BCA**

Subject Name & Code: RDBMS &

Section A (5 x 2 = 10)

(Answer any **FIVE** questions)

CO 1 BL 1 1. Define DBMS.
CO 1 BL 2 2. Distinguish between data and information.
CO 1 BL 3 3. Sketch the neat diagram in DBMS Architecture.
CO 4 BL 2 4. Describe data types in SQL.
CO 4 BL 6 5. Formulate ALTER Query in SQL.
CO 4 BL 4 6. Point out DML Commands with two examples.
CO 4 BL 3 7. Demonstrate BETWEEN Operators in SQL.

Section B (1 x 5 = 5)

(Answer any **ONE** question)

CO 1 BL 2 8. Discuss advantages and disadvantages in DBMS.
CO 4 BL 5 9. Summarize the DDL Commands with Constraints.

Section C (1 x 10 = 10)

(Answer any **ONE** question)

CO 1 BL 4 10. Categorize the various components in DBMS
CO 4 BL 3 11. Illustrate sub query in RDBMS.

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Department of Computer Applications and Technology

Answer Key- I Internal Test

Date : 14.09.2022 **Duration : 1** **Class : III BCA**

Subject Name & Code: RDBMS &

Section A (5 x 2 = 10)

(Answer any **FIVE** questions)

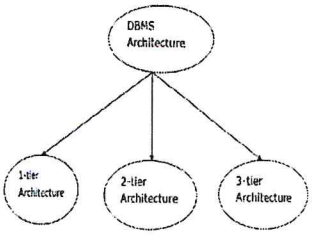
CO 1 BL 1 1. Define DBMS.

A database management system (DBMS) is **software to create and manage databases**, allowing users to create, read, update and delete data in a database.

CO 1 BL 2 2. Distinguish between data and information.

Data is an individual unit that contains raw materials which do not carry any specific meaning. Information is a group of data that collectively carries a logical meaning.

CO 1 BL 3 3. Sketch the neat diagram in DBMS Architecture.



CO 4 BL 2 4. Describe data types in SQL.

The data type of a column defines what value the column can hold: integer, character, money, date and time, binary, and so on.

CO 4 BL 6 5. Formulate ALTER Query in SQL.

ALTER TABLE *table_name*
ADD *column_name datatype*;

ALTER TABLE *table_name*
DROP COLUMN *column_name*;

CO 4 BL 4 6. Point out DML Commands with two examples.

SELECT − Retrieve data from the database. INSERT − Insert data into a table. UPDATE − Update existing data within a table. DELETE − Delete records from a database table.

CO 4 BL 3 7. Demonstrate BETWEEN Operators in SQL.

The BETWEEN operator is used in the WHERE conditions to filter records within the specified range. The range of values can be strings, numbers, or dates.

Section B (1 x 5 = 5)

(Answer any **ONE** question)

CO 1 BL 2 8. Discuss advantages and disadvantages in DBMS.

Advantage of DBMS

1. Improved data sharing:

- The DBMS helps create an environment in which end users have better access to more and better-managed data.

2. Improved data security:

- The more users access the data, the greater the risks of data security breaches. Corporations invest considerable amounts of time, effort, and money to ensure that corporate data are used properly.

- A DBMS provides a framework for better enforcement of data privacy and security policies.

3. Better data integration:

- Wider access to well-managed data promotes an integrated view of the organization's operations and a clearer view of the big picture.
- It becomes much easier to see how actions in one segment of the company affect other segments.

4. Minimized data inconsistency:

- Data inconsistency exists when different versions of the same data appear in different places.
- The probability of data inconsistency is greatly reduced in a properly designed database.

5. Improved data access:

- The DBMS makes it possible to produce quick answers to ad hoc queries.
- The DBMS sends back an answer (called the query result set) to the application.

6. Improved decision making:

- Better-managed data and improved data access make it possible to generate better-quality information, on which better decisions are based.
- The quality of the information generated depends on the quality of the underlying data.
- Increased end-user productivity

Disadvantage of DBMS

1. Increased costs:

- Database systems require sophisticated hardware and software and highly skilled personnel.
- The cost of maintaining the hardware, software, and personnel required to operate and manage a database system can be substantial. Training, licensing, and regulation compliance costs are often overlooked when database systems are implemented.

2. Management complexity:

- Database systems interface with many different technologies and have a significant impact on a company's resources and culture.

3. Maintaining currency:

- To maximize the efficiency of the database system, you must keep your system current.
- Therefore, you must perform frequent updates and apply the latest patches and security measures to all components.
- Given the heavy investment in technology and personnel training, companies might be reluctant to change database vendors.

4. Frequent upgrade/replacement cycles:

- DBMS vendors frequently upgrade their products by adding new functionality. Such new features often come bundled in new upgrade versions of the software.

- Some of these versions require hardware upgrades. Not only do the upgrades themselves cost money, but it also costs money to train database users and administrators to properly use and manage the new features.

CO 4 BL 5 9. Summarize the DDL Commands with Constraints.

Data Definition Language (DDL) commands are used to create, manipulate, and modify objects in Snowflake, such as users, virtual warehouses, databases, schemas, tables, views, columns, functions, and stored procedures.

Section C (1 x 10 = 10)

(Answer any **ONE** question)

CO 1 BL 4 10. Categorize the various components in DBMS

- ✓ Hardware.
- ✓ Software.
- ✓ Data.
- ✓ Procedures.
- ✓ Database Access Language.
- ✓ People.

CO 4 BL 3 11. Illustrate sub query in RDBMS.

Use Subquery with SELECT, UPDATE, INSERT, DELETE statements along with the operators like =, <, >, >=, <=, IN, BETWEEN, etc. A subquery is a query within another query. The outer query is known as the main query, and the inner query is known as a subquery.

(CO: Mark CO/CO2/CO3/CO4/CO5/CO6) (BL: Blooms Taxonomy Level 1/2/3/4/5/6)

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Date: 15.09.2022 **Duration: 1 Hour** **Class: III BCA**

Subject Name & Code: Principles of Information Security

Section A (5 x 2 = 10)
(Answer any **FIVE** questions)

CO1 BL1 1. Define Information System

CO1 BL1 2. State about principles of IS

CO 1 BL1 3. Define data responsibility

CO2 BL3 4. Illustrate security policy

CO2 BL6 5. Write about major goals in IS

CO 2 BL1 6. Define contextualising of IS

CO 2 BL1 7.Define Risk

Section B (1 x 5 = 5)
(Answer any **ONE** question)

CO1 BL2 8. Describe about System Security Assurance

CO1 BL2 9. Explain the goals of Security testing

Section C (1 x 10 = 10)
(Answer any **ONE** question)

CO2 BL2 10. Discuss about the minimal protection

CO2 BL2 11. Demonstrate Security Architecture

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Answer Key

Date: 15.09.2022 **Duration: 1 Hour** **Class: III BCA**

Subject Name & Code: Principles of Information Security

1. Define Information System
   Information system, an integrated set of components for collecting, storing, and processing data and for providing information, knowledge

2. State about principles of IS

   The basic tenets of information security are confidentiality, integrity and availability.

3. Define data responsibility
   Data responsibility in humanitarian action is the safe, ethical and effective management of personal and non-personal data for operational response. It is a critical issue for the humanitarian system to address and the stakes are high.

4. Illustrate security policy.
   A security policy is a document that states in writing how a company plans to protect its physical and information technology (IT) assets.

5. Write about major goals in IS

- Protect the confidentiality of data.
- Preserve the integrity of data.
- Promote the availability of data for authorized users.

6. Define contextualising of IS

   Data contextualization means adding related information to any data to make it more actionable. Trends, patterns, and correlations stand out against a background of context. When you start integrating data into various sets that provide context for IT events, you get a lot more value from the data.

7. Define Risk
   Information System-Related Security Risk. Definition(s): A measure of the extent to which an entity is threatened by a potential circumstance or event, and typically a function of: (i) the adverse impacts that would arise if the circumstance or event occurs; and (ii) the likelihood of occurrence.

Section B

(Answer any ONE question)

8. Describe about System Security Assurance

   Information assurance and security is the management and protection of knowledge, information, and data. It combines two fields: Information assurance, which focuses on ensuring the availability, integrity, authentication, confidentiality, and non-repudiation of information and systems

9. Explain the goals of Security testing.

   Goal of Security Testing: The goal of security testing is to: To identify the threats in the system. To measure the potential vulnerabilities of the system. To help in detecting every possible security risks in the system.

Section C

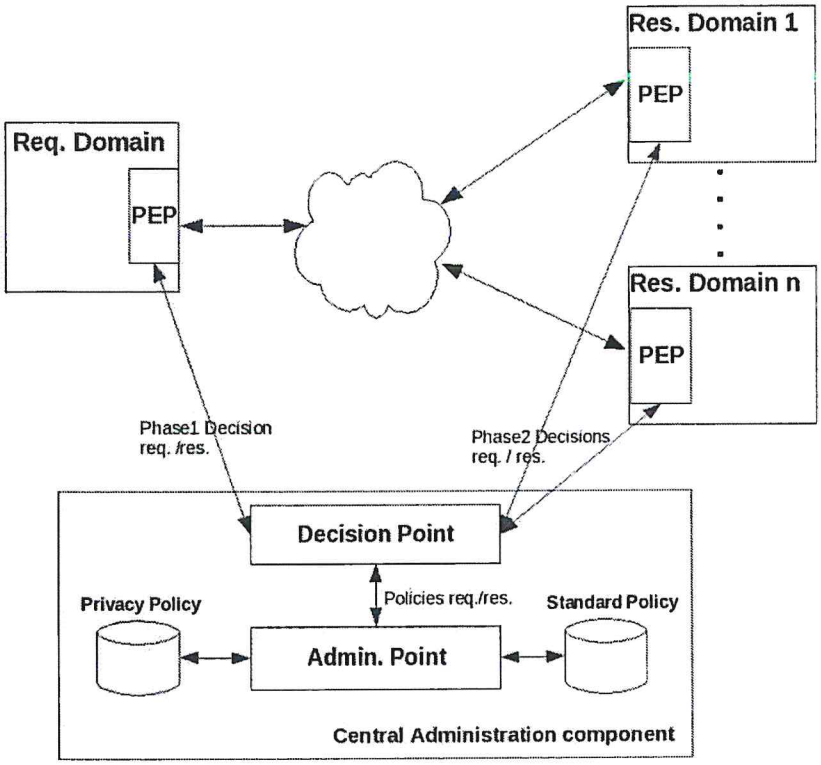
(Answer any ONE question)

10. Discuss about the minimal protection.

Information security (InfoSec) enables organizations to protect digital and analog information. InfoSec provides coverage for cryptography, mobile computing, social media, as well as infrastructure and networks containing private, financial, and corporate information. Cybersecurity, on the other hand, protects both raw and meaningful data, but only from internet-based threats. Organizations implement information security for a wide range of reasons. The main objectives of InfoSec are typically related to ensuring confidentiality, integrity, and availability of company information. Since InfoSec covers many areas, it often involves the implementation of various types of security, including application security, infrastructure security, cryptography, incident response, vulnerability management, and disaster recovery.

11. Demonstrate Security Architecture

While security architecture has many definitions, ultimately it is a set of security principles, methods and models designed to align to your objectives and help keep your organization safe from cyber threats. Security architecture translates the business requirements to executable security requirements.



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I UNIT TEST ANSWERKEY SEPTEMBER-2022

Class : III BCA

Subject Name & Code : Software Engineering

Section A (5 x 2 = 10)

(Answer any **FIVE** questions)

CO1 BL6 1. Write the definition of Software Engineering

Software engineering as the application of a systematic, disciplined, which is a computable approach for the development, operation, and maintenance of software.

CO2 BL5 2. Summarize the users of SRS Document

Users, customers, and marketing personnel, Software developers, Test engineers, User documentation writers, Pro ject managers, Maintenance engineers

CO 2 BL4 3. Distinguish between requirements analysis and specification?

the requirements analysis activity is to analyse the gathered requirements to remove all ambiguities, incompleteness, and inconsistencies from the gathered customer requirements and to obtain a clear understanding of the software to be developed.

requirementsspecification, the analyst starts to systematically organise the requirements in the form of an SRS document

CO2 BL3 4. Sketch out the good characteristics of SRS Document.

Concise, Implementation-independent, Traceable, Modifiable

CO1 BL4 5. Compare Process and Methodology

the term process has a broader scope and addresses either all the activities taking place during software development. A methodology, on the other hand, prescribes a set of steps for carrying out a specific life cycle activity

CO 1 BL2 6. Interpret the Agile Model

In the agile model, the requirements are decomposed into many small parts that can be incrementally developed. The agile model adopts an iterative approach.

CO 1 BL1 7. State the phase containment of errors.

The principle of detecting errors as close to their point of introduction as possible is known as phase containment of errors

Section B (1 x 5 = 5)

(Answer any **ONE** question)

CO1 BL2 8. Summarize the advantages and disadvantages of Agile Model.

The agile methods derive much of their agility by relying on the tacit knowledge of the team members about the development project and informal communications to clarify issues, rather than spending significant amounts of time in preparing formal documents and reviewing them. Though this eliminates some overhead, but lack of adequate documentation may lead to several types of problems, which are as follows:Lack of formal documents leaves scope for confusion and important decisions taken during different phases can be misinterpreted at later points of time by different team members. In the absence of any formal documents, it becomes difficult to get important project decisions such as design decisions to be reviewed by external experts. When the project completes and the developers disperse, maintenance can become a problem.

CO1 BL4 9. Survey the different stages of SDLC.

A software development life cycle (SDLC) model (also called software life cycle model and software development process model) describes the different activities that need to be carried out for the software to evolve in its life cycle.1.Requirement Analysis and Specification 2.Design 3.Coding 4.Testing 5.Maintenance

Section C(1 x 10 = 10)

(Answer any **ONE** question)

CO1 BL4 10. . Compare the relative advantages of RAD, iterative waterfall, and the evolutionary models of software development

Agile model versus iterative waterfall model

The waterfall model is highly structured and systematically steps through requirements-capture, analysis, specification, design, coding, and testing stages in a planned sequence.In contrast, while using an agile model, progress is measured in terms of the developed and delivered functionalities. In agile model, delivery of working versions of a software is made in several increments.

Agile versus exploratory programming

Agile development model's frequent re- evaluation of plans, emphasis on face-to-face communication, and relatively sparse use of documentation are similar to that of the exploratory style

Agile model versus RAD model

The important differences between the agile and the RAD models are the following: Agile model does not recommend developing prototypes, but emphasises systematic development of each incremental feature. In contrast, the central theme of RAD is based on designing quick-anddirty prototypes, which are then refined into production quality code. Agile projects logically break down the solution into features that are incrementally developed and delivered. The RAD approach does not recommend this. Instead, developers using the RAD model focus on developing all the features of an application by first doing it badly and then successively improving the code over time

CO2 BL1 11. Enumerate the main activities carried out during requirements analysis and specification phase?

Requirements analysis and specification phase mainly involves carrying out the following two important activities: • Requirements gathering and analysis • Requirements specification REQUIREMENTS GATHERING AND ANALYSIS The complete set of requirements are almost never available in the form of a single document from the customer. Gathered requirements need to be analysed to remove several types of problems that frequently occur in the requirements that have been gathered piecemeal from different sources. We can conceptually divide the requirements gathering and analysis activity into two separate tasks: • Requirements gathering • Requirements analysis

Requirements Gathering1.Studying existing documentation 2.Interview 3.Interview 4.Scenario analysis

Requirements Analysis After requirements gathering is complete, the analyst analyses the gathered requirements to form a clear understanding of the exact customer requirements and to weed out any problems in the gathered requirements.**SOFTWARE REQUIREMENTS SPECIFICATION** (SRS) After the analyst has gathered all the required information regarding the software to be developed, and has removed all incompleteness, inconsistencies, and anomalies from the specification, he starts to systematically organise the requirements in the form of an SRS document

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Date : 13.09.2022 **Duration : One hour** **Class : II BCA**

Subject Name & Code: Java Programming & SZ23B

Section A (5 x 2 = 10)
(Answer any **FIVE** questions)

CO1 BL1 1. Define OOP

CO1 BL1 2. State about Data Abstraction

CO 1 BL1 3. Define JRE

CO2 BL3 4. Illustrate type casting in Java

CO2 BL6 5. Write about any two features of Java

CO 2 BL1 6. Define JRE

CO 2 BL1 7.Define API

Section B (1 x 5 = 5)
(Answer any **ONE** question)

CO1 BL2 8. Describe about the Data types in Java Programming

CO1 BL2 9. Explain Variables in Java with an example.

Section C (1 x 10 = 10)
(Answer any **ONE** question)

CO2 BL2 10. Discuss any two Control statements in Java

CO2 BL2 11. Demonstrate Operators and Statements in Java

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Subject Name & Code: Java Programming & SZ23B
Answer key

1. Define OOP

   Object-oriented programming (OOP) is **a style of programming characterized by the identification of classes of objects closely linked with the methods (functions) with which they are associated.** It also includes ideas of inheritance of attributes and methods.

2. State about Data Abstraction

   Data Abstraction is **a process of hiding unwanted or irrelevant details from the end user.** It provides a different view and helps in achieving data independence which is used to enhance the security of data. The database systems consist of complicated data structures and relations.

3. Define JRE

   A Java runtime environment (JRE) is **a set of components to create and run a Java application.** A JRE is part of a Java development kit (JDK) .

4. Illustrate type casting in Java

   Type casting is when you assign a value of one primitive data type to another type. In Java, there are two types of casting: **Widening Casting** (automatically) - converting a smaller type to a larger type size
   `byte -> short -> char -> int -> long -> float -> double`

5. Write about any two features of Java

- Object Oriented. In Java, everything is an Object.
- Platform Independent.
- Simple

6.Define JRE

The Java Runtime Environment (JRE) is **software that Java programs require to run correctly.** Java is a compute

6. Define API

An application programming interface (API), in the context of Java, is **a collection of prewritten packages, classes, and interfaces with their respective methods, fields and constructors.**

7. Describe about the Data types in Java Programming.

Data types are divided into two groups: **Primitive data types - includes byte , short , int , long , float , double , boolean and char. Non-primitive data types - such as String , Arrays and Classes** (you will learn more about these in a later chapter).

Section B

(Answer any **ONE** question)

8. Explain Variables in Java with an example.

In Java, there are different types of variables, for example: **String - stores text, such as "Hello". String values are surrounded by double quotes. int - stores integers (whole numbers), without decimals, such as 123 or -123.**

9. Explain Variables in Java with an example.

Variables are **containers for storing data values**. In Java, there are different types of variables, for example: String - stores text, such as "Hello". String values are surrounded by double quotes.

Section C

(Answer any **ONE** question)

10. Discuss any two Control statements in Java

It controls the flow of a program. An 'if' statement in java determines the sequence of execution between a set of two statements.

11. Demonstrate Operators and Statements in Java

Operator in Java is a symbol that is used to perform operations. For example: +, -, *, /

Operator Type	Category	Precedence
Logical	logical AND	&&
	logical OR	||
Ternary	ternary	? :
Assignment	assignment	= += -= *= /= %= &= ^= |= <<= >>= >>>=

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I UNIT TEST ANSWERKEY SEPTEMBER -2022

Class :II BCA
Subject Name & Code : Computer Organization& SZ23C

Section A (5 x 2 = 10)

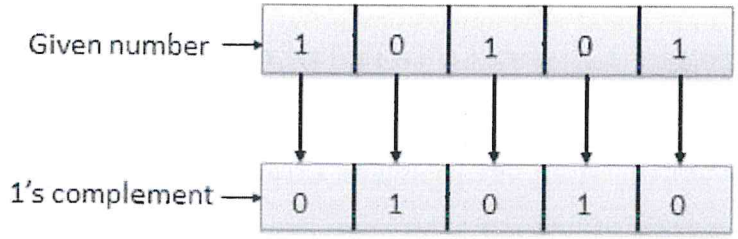
(Answer any **FIVE** questions)

CO1 B1 1. Define Complements

Complements are used in the digital computers in order to simplify the subtraction operation and for the logical manipulations.

1's complement

The 1's complement of a number is found by changing all 1's to 0's and all 0's to 1's. This is called as taking complement or 1's complement. Example of 1's Complement is as follows.

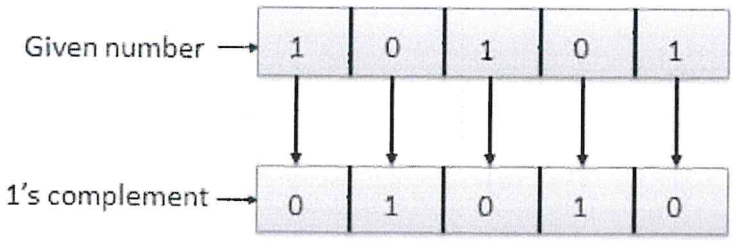


2's complement

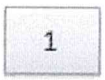
The 2's complement of binary number is obtained by adding 1 to the Least Significant Bit (LSB) of 1's complement of the number.

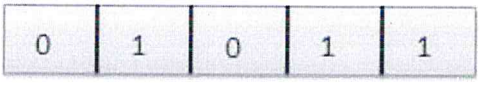
2's complement = 1's complement + 1

Example of 2's Complement is as follows.



Add 1 +





CO1 B1 2. Identify the term BUS

A bus is a subsystem that is used to connect computer components and transfer data between them. For example, an internal bus connects computer internals to the motherboard. A "bus topology" or design can also be used in other ways to describe digital connections.

A bus may be parallel or serial. Parallel buses transmit data across multiple wires. Serial buses transmit data in bit-serial format.

CO1 B2 3. Describe the major components of CPU

A CPU includes three major components that are as follows –

Register Set

The register set contrasts from one system to another. The register set includes several registers which contain general-purpose registers and special-purpose registers. The general-purpose registers do not implement any particular function. They save the temporary information that is needed by a program. The special-purpose registers execute various functions for the CPU.

ALU

The ALU implements all the arithmetic, logical, and shift operations by supporting important circuitry that provides these evaluations.

Control Unit

The control unit fetches the instructions from the main memory, decodes the instructions, and then executes them.

The CPU interacts with the main memory and input/output devices. The CPU reads and writes data to and from the memory system and transfers data to and from the I/O devices.

CO1 B1 4. State Micro operation?

In computer central processing units, **micro-operations** (also known as micro-ops) are the functional or atomic, operations of a processor. These are low level instructions used in some designs to implement complex machine instructions. They generally perform operations on data stored in one or more registers. They transfer data between registers or between external buses of the CPU, also performs arithmetic and logical operations on registers.

In executing a program, operation of a computer consists of a sequence of instruction cycles, with one machine instruction per cycle. Each instruction cycle is made up of a number of smaller units – *Fetch, Indirect, Execute and Interrupt cycles.*

CO2 B1 5. Define Stack Pointer

stack pointer is a small register that stores the memory address of the last data element added to the stack or, in some cases, the first available address in the stack. A stack is a specialized buffer that is used by a program's functions to store data such as parameters, local variables and other function-related information. The stack pointer -- also referred to as the extended stack pointer (ESP) -- ensures that the program always adds data to the right location in the stack.

The stack stores data from the top down, following a last in, first out (LIFO) data structure. This means that the program adds data to the top of the stack and removes data from the top of the stack. In this way, the top of the stack always contains the most recently stored data that has not yet been removed.

CO2 B1 6. Define Pipeline

The term Pipelining refers to a technique of decomposing a sequential process into sub-operations, with each sub-operation being executed in a dedicated segment that operates concurrently with all other segments.

The most important characteristic of a pipeline technique is that several computations can be in progress in distinct segments at the same time. The overlapping of computation is made possible by associating a register with each segment in the pipeline. The registers provide isolation between each segment so that each can operate on distinct data simultaneously.

CO2 B1 7.Define an RISC

RISC stands for Reduced Instruction Set Computers. It was introduced to execute as fast as one instruction per clock cycle. This RISC pipeline helps to simplify the computer architecture's design.

It relates to what is known as the Semantic Gap, that is, the difference between the operations provided in the high-level languages (HLLs) and those provided in computer architectures.

Section B (1 x 5 = 5)

(Answer any **ONE** question)

CO1 B2 8. Describe about Arithmetic and Logic micro operation with example

The operations implemented on data stored in registers are known as micro-operations. A micro-operation is a basic operation implemented on the data saved in one or more registers.

There are various micro-operations including addition, subtraction, increment, and decrement.

Add Micro-Operation

It is described by the following statement –

$R3 \rightarrow R1 + R2$

The following statement instructs the information or contents of register R1 to be inserted to data or content of register R2 and the sum must be converted to register R3.

Subtract Micro-Operation

Example –

$R3 \rightarrow R1 + R2' + 1$

Subtract micro-operation are using minus operator we create **1's complement** and add 1 to the register which obtains subtracted, i.e **R1 - R2** is similar to **R3 → R1 + R2' + 1**

Increment/Decrement Micro-Operation

In Increment and decrement micro-operations, it is usually implemented by adding and subtracting 1 to and from the register respectively.

R1 → R1 + 1

R1 → R1 – 1

The following table demonstrates the symbolic representation of several Arithmetic Micro-operations.

Symbolic Representation	**Description**
R3 ← R1 + R2	The contents of R1 plus R2 are moved to R3.
R3 ←R1$ R1 - R2	The contents of R1 minus R2 are moved to R3.
R2 ←R1$ R2'	Complement the contents of R2 (1's complement).
R2 ←R1$ R2' + 1	2's complement the contents of R2 (negate).
R3 ← R1 + R2' + 1	R1 plus the 2's complement of R2 (subtraction).
R1 ←R1$ R1 + 1	It can increment the contents of R1 by one.
R1 ←R1$ R1 - 1	It can decrement the contents of R1 by one.

Logic microoperations specify binary operations for strings of bits stored in registers. These operations consider each bit of the register separately and treat them as binary variables. For example, the exclusive-OR microoperation with the contents of two registers R 1 and R2 is symbolized by the statement.

P: R1 +- R1 Ell R2

It specifies a logic microoperation to be executed on the individual bits of the registers provided that the control variable P = 1. As a numerical example, assume that each register has four bits. Let the content of R1 be 1010 and the content of R2 be 1 100. The exclusive-OR microoperation stated above symbolizes the following logic computation:

1010 Content of R 1 1 100

Content of R2 0110

Content of R 1 after P = 1

The content of R1, after the execution of the microoperation, is equal to the bit-by-bit exclusive-OR operation on pairs of bits in R2 and previous values of Rl. The logic microoperations are seldom used in scientific computations, but they are very useful for bit manipulation of binary data and for making logical decisions.

special symbols:

Special symbols will be adopted for the logic microoperations OR, AND, and complement, to distinguish them from the corresponding symbols used to express Boolean functions. The symbol V will be used to denote an OR microoperation and the symbol 1\ to denote an AND microoperation. The complement microoperation is the same as the 1's complement and uses a bar on top of the symbol that denotes the register name. By using different symbols, it will be possible to differentiate between a logic microoperation and a control (or Boolean) function. Another reason for adopting two sets of symbols is to be able to distinguish the symbol + , when used to symbolize an arithmetic plus, from a logic OR operation. Although the + symbol has two meanings, it will be possible to distinguish between them by noting where the symbol occurs. When the symbol + occurs in a microoperation, it will denote an arithmetic plus. When it occurs in a control (or Boolean) function, it will denote an OR operation. We will never use it to symbolize an OR microoperation. For example, in the statement.

P + Q: R1 +- R2 + R3, R4 <- R5 V R6

the + between P and Q is an OR operation between two binary variables of a control function. The + between R2 and R3 specifies an add microoperation. The OR microoperation is designated by the symbol V between registers R5 and R6.

CO2 B1 9. List in detail about instruction formats with examples.

An instruction is a set of codes that the computer processor can understand. The code is usually in 1s and 0s, or machine language. It contains instructions or tasks that control the movement of bits and bytes within the processor.

Example of some instruction sets –

- **ADD** – Add two numbers together.
- **JUMP** – Jump to designated RAM address.
- **LOAD** – Load information from RAM to the CPU.

Types of Instruction Set

Generally, there are two types of instruction set used in computers.

Reduced Instruction set Computer (RISC)

A number of computer designers recommended that computers use fewer instructions with simple constructs so that they can be executed much faster within the CPU without having to use memory as often. This type of computer is called a Reduced Instruction Set Computer.

The concept of RISC involves an attempt to reduce execution time by simplifying the instruction set of computers.

Characteristics of RISC

The characteristics of RISC are as follows –

- Relatively few instructions.
- Relatively few addressing modes.
- Memory access limited to load and store instructions.
- All operations done within the register of the CPU.
- Single-cycle instruction execution.
- Fixed length, easily decoded instruction format.
- Hardwired rather than micro programmed control.

A characteristic of RISC processors' ability is to execute one instruction per clock cycle. This is done by overlapping the fetch, decode and execute phases of two or three instructions by using a procedure referred as pipelining.

Complex Instruction Set Computer (CISC)

CISC is a computer where a single instruction can perform numerous low-level operations like a load from memory and a store from memory, etc. The CISC attempts to minimize the number of instructions per program but at the cost of an increase in the number of cycles per instruction.

The design of an instruction set for a computer must take into consideration not only machine language constructs but also the requirements imposed on the use of high level programming languages.

The goal of CISC is to attempt to provide a single machine instruction for each statement that is written in a high level language.

Characteristics of CISC

The characteristics of CISC are as follows –

- A large number of instructions typically from 100 to 250 instructions.
- Some instructions that perform specialized tasks and are used infrequently.
- A large variety of addressing modes- typically from 5 to 20 different modes.
- Variable length instruction formats.
- Instructions that manipulate operands in memory.

Section C (1 x 10 = 10)

(Answer any ONE question)

CO2 B1 10. Define the RISC? Relate in detail about RISC pipeline

RISC stands for Reduced Instruction Set Computers. It was introduced to execute as fast as one instruction per clock cycle. This RISC pipeline helps to simplify the computer architecture's design.

It relates to what is known as the Semantic Gap, that is, the difference between the operations provided in the high-level languages (HLLs) and those provided in computer architectures.

To avoid these consequences, the conventional response of the computer architects is to add layers of complexity to newer architectures. This also increases the number and complexity of instructions together with an increase in the number of addressing modes. The architecture which resulted from the adoption of this "add more complexity" are known as Complex Instruction Set Computers (CISC).

The main benefit of RISC to implement instructions at the cost of one per clock cycle is continually not applicable because each instruction cannot be fetched from memory and implemented in one clock cycle correctly under all circumstances.

The method to obtain the implementation of an instruction per clock cycle is to initiate each instruction with each clock cycle and to pipeline the processor to manage the objective of single-cycle instruction execution.

RISC compiler gives support to translate the high-level language program into a machine language program. There are various issues in managing complexity about data conflicts and branch penalties are taken care of by the RISC processors, which depends on the adaptability of the compiler to identify and reduce the delays encountered with these issues.

Principles of RISCs Pipeline

There are various principles of RISCs pipeline which are as follows –

- Keep the most frequently accessed operands in CPU registers.
- It can minimize the register-to-memory operations.
- It can use a high number of registers to enhance operand referencing and decrease the processor memory traffic.
- It can optimize the design of instruction pipelines such that minimum compiler code generation can be achieved.
- It can use a simplified instruction set and leave out those complex and unnecessary instructions.

Let us consider a three-segment instruction pipeline that shows how a compiler can optimize the machine language program to compensate for pipeline conflicts.

A frequent collection of instructions for a RISC processor is of three types are as follows –

- **Data Manipulation Instructions** – Manage the data in processor registers.
- **Data Transfer Instructions** – These are load and store instructions that use an effective address that is obtained by adding the contents of two registers or a register and a displacement constant provided in the instruction.
- **Program Control Instructions** – These instructions use register values and a constant to evaluate the branch address, which is transferred to a register or the program counter (PC).

CO1 B1 11. Examine about various Data type Representations with Examples

In computer organization, data refers to the symbols that are used to represent events, people, things a

Data Representation

The data can be represented in the following ways:

Data

Data can be anything like a number, a name, notes in a musical composition, or the color in a photo representation can be referred to as the form in which we stored the data, processed it and transmitted it. store the data in digital format, we can use any device like computers, smartphones, and iPads. Electron is used to handle the stored data.

Digitization

Digitization is a type of process in which we convert information like photos, music, number, text into d Electronic devices are used to manipulate these types of data. The digital revolution has evolved with th phases, starting with the big, expensive standalone computers and progressing to today's digital world. the world, small and inexpensive devices are spreading everywhere.

Binary Digits

The **binary digits** or bits are used to show the digital data, which is represented by 0 and 1. The binary be called the smallest unit of information in a computer. The main use of binary digit is that it ca information or data in the form of 0s and 1s. It contains a value that can be on/off or true/false. On or t represented by the 1, and off or false will be represented by the 0. The digital file is a simple file, which collect data contained by the storage medium like the flash drive, CD, hard disk, or DVD.

Representing Numbers

The number can be represented in the following way:

Numeric Data

Numeric data is used to contain numbers, which helps us to perform arithmetic operations. The digital c a binary number system so that they can represent numeric data. The binary number system can only be r by two digits 0 and 1. There can't be any other digits like 2 in the system. If we want to represent nu binary, then we will write it as 10.

Representing Numbers

DECIMAL (BASE 10)	BINARY (BASE 2)
0	0
1	1
2	10
3	11
4	100
5	101
6	110
7	111
8	1000
9	1001
10	1010
11	1011
1000	1111101000

Representing Text

The text can be represented in the following ways:

Character Data

Character data can be formed with the help of symbols, letters, and numerals, but they can?t l calculations. Using the character data, we can form our address, hair colour, name, etc. Character dat takes the data in the form of text. With the help of the text, we can describe many things like our fa mother name, etc.

Digital Devices

Several types of codes are employed by the **digital devices** to represent character data, including Unico and other types of variants. The full form of ASCII is American Standard Code for Information Intercha type of character encoding standard, which is used for electronic communication. With the telecommunication equipment, computers and many other devices, ASCII code can represent the text. code needs 7 bits for each character, where the unique character is represented by every single b uppercase letter A, the ASCII code is represented as 1000001.

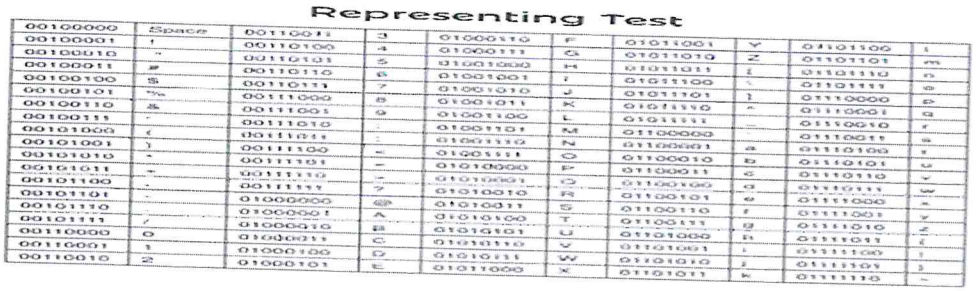
Extended ASCII can be described as a superset of ASCII. The ASCII set uses 7 bits to represent every but the Extended ASCII uses 8 bits to represent each character. The extended ASCII contains 7 bits characters and 1 bit for additional characters. Using the 7 bits, the ASCII code provides code for 1 symbols or characters, but Extended ASCII provides code for 256 unique symbols or characters. For the letter A, the Extended ASCII code is represented as 01000001.

Unicode

Unicode is also known as the universal character encoding standard. Unicode provides a way through individual character can be represented in the form of web pages, text files, and other documents. Using can only represent the basic English characters, but with the help of Unicode, we can represent characte languages around the World.

ASCII code provides code for 128 characters, while Unicode provide code for roughly 65,000 characte

help of 16 bits. In order to represent each character, ASCII code only uses 1 bit, while Unicode supp bytes. The Unicode encoding has several different types, but UTF-8 and UTF-16 are the most comr UTF-8 is a type of variable length coding scheme. It has also become the standard character encodir used on the web. Many software programs also set UTF-8 as their default encoding.



ASCII Code

ASCII code can be used for numerals like phone numbers and social security numbers. ASCII text con and unformatted text. This type of file will be saved in a text file format, which contains a name endin These files are labelled differently on different systems, like Windows operating system labelled the "Text document" and Apple devices labelled these files as "Plain Text". There will have no formatting in text files. If we want to make the documents with styles and formats, then we have to embed formattin the text.

Representing Bits and Bytes

The bits and bytes can be represented in the following ways:

Bits and Bytes

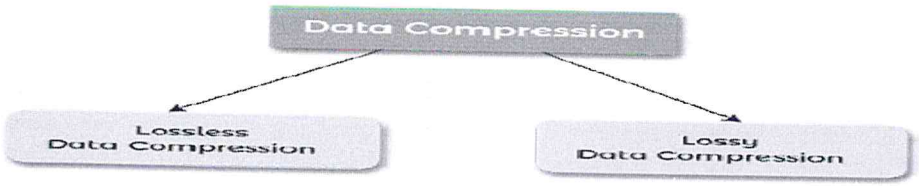
In the field of digital communication or computers, bits are the most basic unit of information or small data. It is short of binary digit, which means it can contain only one value, either 0 or 1. So bits can be r by 0 or 1, - or +, false or true, off or on, or no or yes. Many technologies are based on bits and byte extensively useful to describe the network access speed and storage capacity. The bit is usually abbre lowercase b.

Data Compression

The digital data is compressed to reduce transmission times and file size. Data compression is the reducing the number of bits used to represent data. Data compression typically uses encoding tec compress the data. The compressed data will help us to save storage capacity, reduce costs for storage increase file transfer speed.

Compression uses some programs, which also uses algorithms and functions to find out the way to redu size. Compression can be referred "zipping". The process of reconstructing files will be known as un extracting. The compressed files will contain .gz, or.tar.gz, .pkg, or .zip at the end of the files. Compress

divided into two techniques: Lossless compression and Lossy compression.



Lossless Compression

As the name implies, lossless compression is the process of compressing the data without any loss of inf data. If we compressed the data with the help of lossless compression, then we can exactly recover the o from the compressed data. That means all the information can be completely restored by lossless compre

Many applications want to use data loss compression. For example, lossless compression can be used in of ZIP files and in the GNU tool gzip. The lossless data compression can also be used as a component technologies of lossy data compression. It is generally used for discrete data like word processing file records, some images, and information of the video.



According to this image, when we compress the original data using the lossless, we are able to rest original data.

Lossy Compression

Lossy compression is the process of compressing the data, but that data cannot be recovered 100% of ori This compression is able to provide a high degree of compression, and the result of this compression smaller compressed files. But in this process, some number of video frames, sound waves and original removed forever.

If the compression is greater, then the size of files will be smaller. Business data and text, which n restoration, will never use lossy compression. Nobody likes to lose the information, but there are a lot c are very large, and we don't have enough space to maintain all of the original data or many times, we dc all the original data in the first place. For example, videos, photos and audio recording files to capture the our world. In this case, we use lossy compression.

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I UNIT TEST ANSWERKEY SEPTEMBER 2022

Subject Name & Code: Data Structures **Class : II B.C.A**

Section A (5 x 2 = 10)

(Answer any **FIVE** questions)

CO1,6 BL2 1. Explain linked list.

A linked list is the collection of nodes that are randomly stored. Each node consists of two fields, i.e., **data** and **link**. Here, data is the value stored at that particular node, and the link is the pointer that holds the address of the next node.

CO1 BL2 2. Explain recursion.

When function is called within the same function, it is known as recursion. The function which calls the same function is known as recursive function.

CO1,6 BL2 3. Summarize the use of singly linked list.

It is used to implement stacks and queues. To prevent the collision between the data

in the hash map, we use a singly linked list.

CO2,6 BL1 4. Define queue.

A Queue is a linear structure which follows a particular order in which the operations are performed. The order is First In First Out (FIFO).

CO2 BL1 5. Define prefix, infix, postfix notation.

Infix Notation

a - b + c, where operators are used in-between operands.

Prefix Notation

In this notation, The operator is written before the operands. For example, +ab. This is equivalent to its infix notation a + b. Prefix notation is also known as Polish Notation.

Postfix Notation

This notation style is known as Reversed Polish Notation. The operator is written after the operands. For example, ab+. This is equivalent to its infix notation a + b.

CO2,6 BL1 6. Define circular queue.

Circular Queue is a linear data structure in which the operations are performed based on FIFO (First In First Out) principle and the last position is connected back to the first position to make a circle. It is also called 'Ring Buffer'.

CO1,3 BL2 7. Differentiate linked list and array.

An array is a collection of elements of a similar data type.	A linked list is a collection of objects known as a node where node consists of two parts, i.e., data and address.
Array elements store in a contiguous memory location.	Linked list elements can be stored anywhere in the memory or randomly stored.
Array works with a static memory. Here static memory means that the memory size is fixed and cannot be changed at the run time.	The Linked list works with dynamic memory. Here, dynamic memory means that the memory size can be changed at the run time according to our requirements.

Section B (1 x 5 = 5)

(Answer any **ONE** question)

CO1 BL2 8. Discuss an algorithm for binary search and explain with an example.

```
binarySearch(arr, x, low, high)
    repeat till low = high
        mid = (low + high)/2
        if (x == arr[mid])
        return mid
          else if (x > arr[mid])
           low = mid + 1
```

else

high = mid - 1

Input: arr[] = {10, 20, 30, 50, 60, 80, 110, 130, 140, 170}, x = 110

Output: 6

Explanation: Element x is present at index 6.

Input: arr[] = {10, 20, 30, 40, 60, 110, 120, 130, 170}, x = 175

Output: -1

Explanation: Element x is not present in arr[].

CO2 BL1 9. Tabulate the following expression into postfix notation

(a+b)*(c/d)+(e*f)/(g+h)

(a+b*c)+((d*e+f)*g)

Postfix ab+cd/*ef*gh+/+

Postfix abc*+ed*f+g*+

Section C (1 x 10 = 10)

(Answer any **ONE** question)

CO1 BL2 10. Describe the concept of singly linked list with suitable example.

A singly linked list is a type of linked list that is *unidirectional*, that is, it can be traversed in only one direction from head to the last node (tail). Each element in a linked list is called a node. A single node contains *data* and a pointer to the *next* node which helps in maintaining the structure of the list. The first node is called the head; it points to the first node of the list and helps us access every other element in the list. The last node, also sometimes called the tail, points to NULL which helps us in determining when the list ends.

Operations of Singly Linked List

- Search a node
- Add a node
- Remove a node

CO2 BL1 11. Examine various operation of stack.

- Stack is an ordered list of similar data type.
- Stack is a LIFO(Last in First out) structure .

Operation of stack

- push() function is used to insert new elements into the Stack
- pop() function is used to remove an element from the stack. Both insertion and removal are allowed at only one end of Stack called Top.
- Stack is said to be in Overflow state when it is completely full and is said to be in Underflow state if it is completely empty.

Algorithm for PUSH operation

1. Check if the stack is full or not.
2. If the stack is full, then print stack is full and exit the program.
3. If the stack is not full, then increment the top and add the element.

Algorithm for POP operation

1. Check if the stack is empty or not.
2. If the stack is empty, then print stack is empty and exit the program.
3. If the stack is not empty, then print the element at the top and decrement the top.

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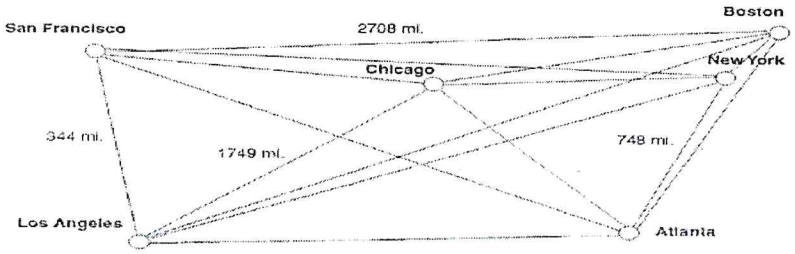
I UNIT TEST ANSWERKEY SEPTEMBER 2022

Class :I BCA
Subject Name & Code: PYTHON & SE21A

Section A (5 x 2 = 10)
(Answer any **FIVE** questions)

CO1 B1 1. Define Travelling Salesman Problem

- The **Traveling Salesman Problem** (Figure 1-3) is a classic computational problem in Computer Science. The problem is to find the shortest route of travel for a salesman needing to visit a given set of cities.



CO1 B1 2. Define the term Algorithm

- **An Algorithm is a step by step procedure for solving any problem.**
- Algorithms solve *general* problems (determining whether the given number is a prime number), and not specific ones (determining whether 12345 is a prime number).
- Algorithms, therefore, are general computational methods used for solving particular problem instances.

CO1 B2 3. Describe the Brute Force Approach

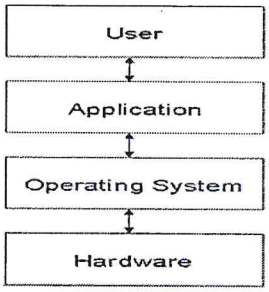
- In a **Brute Force** approach, the lengths of all possible routes would be calculated and compared to find the shortest one.
- For ten cities, the number of possible routes is 10! or over three and a half million (3,628,800). For twenty cities, the number of possible routes is 20! or over two and a half quintillion (2,432,902,008,176,640,000).
- A similar problem exists for the game of Chess (Figure 1-4). A **Brute Force Approach** for a Chess-Playing program would be to "look ahead" to *all* the eventual outcomes of every move that can be made in deciding each next move.

CO1 B1 4. State Computer Hardware?

- **Computer Hardware is the collection of physical parts of a Computer System.**
- It includes all the important components of the *Central Processing Unit* (CPU) and *Main Memory*.
- It also includes *Peripheral Components* such as a Keyboard, Monitor, Mouse, and Printer.

CO1 B1 5. Define Operating Systems

- **An Operating System (OS) is a program that acts as an interface between the User and the Computer Hardware.**
- It is a System Software that controls the overall operation of the Computer.
- Every Computer must have at least one OS to run other programs.



CO1 B1 6. Define the Syntax and Semantics?

- *Syntax* and S*emantics* are the important concepts that can be applied to all languages.
- The **Syntax** of a language is a set of characters and the acceptable arrangements (sequences) of those characters.
- The **Semantics** of a language is the meaning associated with each syntactically correct sequence of characters.
- Every language has its own Syntax and Semantics.

CO1 B1 7.Define an Interpreter.

An Interpreter is a Translator used to convert the programs written in High-Level Language to Low-Level language. It converts the program one line at a time and reports the errors detected while doing the conversion

Section B (1 x 5 = 5)

(Answer any **ONE** question)

CO1 B2 8. Describe about the Essence of Computational Problem Solving in python.

- Solving problems by the use of Computation is known as Computational Problem Solving.
- In order to solve a problem computationally, two things are needed:
  - A **representation** that captures all the relevant aspects of the problem, and

- An **algorithm** that solves the problem by use of the representation.

- Trying all possible solutions to a given problem is referred to as a **Brute Force Approach.**
- A representation that leaves out details of what is being represented is a form of **abstraction**. The use of abstraction is common in Computer Science.
- The Python programming language provides an easy means of representing sequences of values.
- As an example Computational Problem, suppose that we needed to write a program that displays the Month Calendar for any given month and year, as shown in Figure 1-2.

May 2020

Sun	Mon	Tues	Wed	Thurs	Fri	Sat
					1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30
31						

Figure 1-2 Month Calendar

- The representation of this problem is straightforward.
- Only a few values need to be maintained—the month and year, the number of days in each month, the names of the days of the week, and the day of the week that the first day of the month falls on.
- Most of these values are either provided by the user (such as the month and year) or easily determined (such as the number of days in a given month).

CO1 B1 9. State the method Variables and Identifiers and its rules.

Variables and Identifiers

- A **Python Variable** is a reserved memory location used to store values. **Variables** are containers for storing data values.
- A **Python Identifier** is a name given to entities like Class, Functions, Variables, etc. It helps to differentiate one entity from another
- **A Variable is a name given to a location in memory where a data value is stored.**

Example:

num = 10

- A Variable can be assigned different values during a program's execution.
- Wherever a variable appears in a program (except on the left-hand side of an assignment statement), *it is the value associated with the variable that is used*, and not the variable's name,

  num + 1 → 10 + 1 → 11

- **The Assignment Operator = is used to assign a value to a Variable.**

  num = 10 num = num + 1

- In computing, an assignment statement, it is used to increment the value of a given variable by one.
- It makes clear that *the right side of an assignment is evaluated first and then the result is assigned to the variable on the left.*
- Variables may also be assigned to the value of another variable or expression.

  num = 10 k = num

- Variables num and k are both associated with the same literal value 10 in memory. To see this, the built-in function id can be used.

```
>>>id(num)          >>>id(k)
505494040           505494040
```

- The id function produces a unique number identifying a specific value (object) in memory.
- **An Immutable Value is a value that cannot be changed.**
- In Python the same variable can be associated with values of different type during program execution.

```
var = 12        integer
var = 12.45     float
var = 'Hello'   string
```

Rules for Python Variables:

- A Variable Name must start with a letter or an underscore character.
- A Variable Name cannot start with a number.
- A Variable Name can only contain alpha-numeric characters and underscores (A-Z, 0-9,
- and _).
- The name of the Variable cannot have special characters such as %, $, # etc.
- Keywords cannot be used as Variable Names.
- A Variable can be of any length.
- Variable Names are case sensitive (age, Age and AGE are three different variables)

Assigning Multiple Values to Multiple Variables

- Python allows us to assign multiple values to multiple variables in one line:

Example:x,y,z= "Orange", "Banana", "Cherry"
print(x)
print(y)
print(z)

- And we can assign the *same* value to multiple variables in one line:

x=y=z= "Orange"
print(x)
print(y)
print(z)

- An Identifier is a sequence of one or more characters used to provide a name for a given program element.
- **A Python Identifier is a name used to identify a Variable, Function, Class, Module or other Object.**

Rules:

- An Identifier can be a combination of uppercase letters (A-Z), lowercase letters, (a-z), digits (0-9) or an underscore(_).
- The underscore character, _, is also allowed to aid in the readability of long Identifier names. It should not be used as the *first* character, however, as Identifiers beginning with an underscore have special meaning in Python.
- An Identifier cannot start with a digit.
- Keywords cannot be used as **Identifiers**.
- The special characters like !, @, #, $, % etc cannot be used in an Identifier.
- An **Identifier** can be of any length.
- Spaces are not allowed as part of an Identifier.
- Python Identifier names are case sensitive.

Examples of valid and invalid identifiers in Python are given in Figure 2-2.

Valid Identifiers	Invalid Identifiers	Reason for Invalid
totalSales	'totalSales'	Quotes not allowed
totalsales	total sales	Spaces not allowed

salesFor2020	2020Sales	Cannot begin with a digit
Sales_for_2020	_2020Sales	Could not begin with an underscore

Section C (1 x 10 = 10)

(Answer any **ONE** question)

CO1 B2 10. Describe the Features of Python

Features of Python

- There are many features in Python. Some of the essential features of Python are listed below.

1. Easy to Learn and Use

- Python is easy to learn as compared to other programming languages. Python code looks like simple English words. There is no use of semicolons or brackets, and the indentations define the code block.

2. Interpreted Language

- Python is an interpreted language because Python code is executed line by line at a time. This makes it easier to debug our code.

3. Platform-Independent

- Python is platform-independent. If we write a program, it will run on different platforms like **Windows, Mac** and **Linux**. We don't need to write them separately for each platform.

4. Free and Open-Source

- Python is freely available. It can be downloaded from the Python Official Website **www.python.org**. Python is an open-source programming language. This means that its source code is available to the public. We can download it, change it, use it, and distribute it.

5. Object-Oriented

- Python supports procedure-oriented programming as well as object-oriented programming. In *procedure-oriented* languages, the program is built around procedures or functions which are nothing but reusable pieces of programs. In *object-oriented* languages, the program is built around objects which combine data and functionality. The object-oriented procedure helps the programmer to write reusable code and develop applications in less code.

6. High-Level Language

- Python has been designed to be a high-level programming language. This means that when we write a code in Python, we do not need to remember the system architecture as well as the memory management.

7. Extensible

- A programming language is said to be extensible if it can be extended to other languages. Python code can also be written in other languages like C++, making it a highly extensible language.

8. Expressive

- Python needs to use only a few lines of code to perform complex tasks. For example, to display Hello World, we simply need to type one line - print("Hello World"). Other languages like Java or C would take up multiple lines to execute this.

9. Large Standard Library

- Python has a large standard library which provides a rich set of module and functions so we do not have to write our own code for every single thing. There are many libraries present in Python such as regular expressions, unit-testing, web browsers, etc.

10. Dynamically Typed Language

- Python is a dynamically-typed language. That means the type (for example- int, double, long, etc.) for a variable is decided at run time, not in advance. Because of this feature we don't need to specify the type of variable.

CO1 B1 11. Examine about the various process of Computational problem solving method in python.

The Process of Computational Problem Solving

- Computational Problem Solving does not simply mean the act of Computer Programming.
- It is a *process*, with programming being only one of the steps.
- Before a program is written, a design for the program must be developed. And before a design can be developed, the problem to be solved must be well understood.
- Once written, the program must be thoroughly tested. These steps are outlined in Figure 1-15.

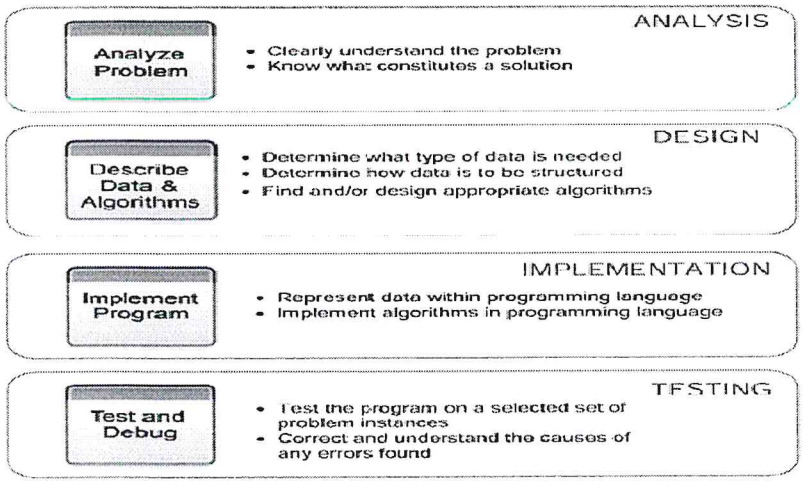


Figure 1-15 Process of Computational Problem Solving

1.5.1 Problem Analysis

- Problem Analysis involves identifying the problem and establishing the causes and effects related to that problem.

Understanding the Problem

- Understanding the problem is the first step of any Problem Solving.
- Once a problem is clearly understood, the fundamental computational issues for solving it can be determined.
- For each of the problems, the representation is straightforward.
- For the Month Calendar problem, there are two algorithmic tasks— determining the first day of a given month, and displaying the month calendar in the proper format. The first day of the month can be obtained by *direct calculation using* the algorithm provided.
- For both the Traveling Salesman Problem and the Game of Chess, the brute-force approach is infeasible.
- Thus, the computational issue for these problems is to find other, more efficient algorithmic approaches for their solution.

Knowing What Constitutes a Solution

- Besides clearly understanding a computational problem, one must know what constitutes a solution. For some problems, there is only one solution. For others, there may be a number (or infinite number) of solutions. Thus, a program may be stated as finding,
  - *A* solution
  - An *approximate* solution
  - A *best* solution
  - *All* solutions

- There may be more than one "best" solution for any given problem. In the Traveling Salesman problem there is only one solution (unless there exists more than one shortest route). For the game of chess, the solution is to win the game. Thus, since the number of chess games that can be played is on the order of 10^{120}, there are a comparable number of possible solutions to this problem.

1.5.2 Program Design

- **Program Design is the process that an organization uses to develop a Program.**

Describing the Data Needed

- For the Month Calendar problem, the data include the month and year (entered by the user), the number of days in each month, and the names of the days of the week. A useful structuring of the data is given below,

[*month, year*]

[31, 28, 31, 30, 31, 30, 31, 31, 30, 31, 30, 31]

['Sunday', 'Monday', 'Tuesday', 'Wednesday', 'Thursday', 'Friday', 'Saturday']

- The month and year are grouped in a single list since they are naturally associated. Similarly, the names of the days of the week and the number of days in each month are grouped. Finally, the first day of the month, as determined by the algorithm in Figure 1-8, can be represented by a single integer,
  0 – Sunday, 1 – Monday,…, 6 – Saturday

- For the Traveling Salesman problem, the distance between each pair of cities must be represented.
- For example, the distance from Atlanta to Los Angeles is 2175 miles. There is duplication of information in this representation, however. For each distance from x to y, the distance from y to x is also represented.
- Finally, for a chess-playing program, the location and identification of each chess piece needs to be represented. Various ways of representing chess boards have been developed, each with certain advantages and disadvantages. The appropriate representation of data is a fundamental aspect of Computer Science.

Describing the Needed Algorithms

- When solving a Computational Problem, either suitable existing algorithms may be found or new algorithms must be developed.
- For the Month Calendar problem, a day of the week algorithm already exists.
- For the Traveling Salesman problem, there are various algorithms that can be utilized, for solving problems with tens of thousands of cities.
- Finally, for the Game of Chess, since it is infeasible to look ahead at the final outcomes of every possible move, there are algorithms that make a best guess at which moves to make.

- Algorithms that work well in general but are not guaranteed to give the correct result for each specific problem are called ***heuristic algorithms***.

1.5.3 Program Implementation

- **Program Implementation is about making a program work.**
- Design decisions provide *general* details of the data representation and the algorithmic approaches for solving a problem.
- The details, however, do not specify which programming language to use, or how to implement the program. That is a decision for the implementation phase.
- In Python Programming, the implementation needs to be expressed in a syntactically correct and appropriate way, using the instructions and features available in Python.

1.5.4 Program Testing

- **Program Testing is the process of executing a program with the intent of finding errors.**
- Testing is done incrementally as a program is being developed, when the program is complete, and when the program needs to be updated.
- The general Truisms of Software Development are as follows:

1. Programming errors or pervasive, persistent, and inevitable.
2. Software Testing is an essential part of Software Development.
3. Any changes made in correcting a programming error should be fully understood as to why the changes correct the detected error.

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Department of Mathematics

Unit Test – I (2022-2023 Even Semester)
Answer Key

Date : 02/03/2023 **Duration : One hour** **Class :** II B.Sc., Mathematics

Subject Name & Code : **Mathematical Statistics - II / SM3AG**

Section-A (5 x 2 = 10)

(Answer any FIVE questions)

1. The population is a complete set of all possible observations of the type which is to be investigated.

2. A random sample is a sample selected in such a way that every item in the population has an equal chance of being included.

3. A systematic sample is selected at random sampling. When a complete list of the population is available, this method is used. We arrange the items in numerical, alphabetical geographical or any other order.

4. Sampling errors is inherent in the method of sampling. Sampling depends on chance and due to the existence of chance in sampling, the sampling errors occure.

5. Any statistical measure computed from population data is known as parameter.

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6. Any statistical measure computed from sample data is known as statistic.

7. The standard deviation of the sampling distribution of a statistic is known as its standard error.

Section B (1×5=5)

(Answer any ONE question)

8. The purpose of sampling is to get information about the population from the sample. The aim of sampling studies is to obtain the best possible values of the parameters.

Non-random sampling method:

(a) Judgement Sampling

The investigator has the power to select or reject any item in an investigation. The choice of sample items depends on the judgement of the investigator.

(b) Quota Sampling.

This sampling is similar to stratified sampling. The universe is divided into quota according to some characteristics. Each enumerator is then told to interview a certain number of persons

who are this quota. The selection of sample items depends on personal judgement.

(c) Convenience or Chunk Sampling

Chunk is a convenient slice of a population which is commonly referred to as a sample. It is obtained by selecting convenient population units.

(d) Sampling Distribution of a Statistic:

If we draw a sample of size n from a given finite population of size N, then the total number of possible sample is:

$$N_{C_n} = \frac{N!}{n!(N-n)!} = K \text{ (say)}$$

For each of these K samples we can computed some statistic $t = t(x_1, x_2 \ldots x_n)$ in particular the mean $\bar{x}$, the variance s^2, etc, as given below.

Sample Number	t	$\bar{x}$	s^2
1	t_1	$\bar{x}_1$	s_1^2
2	t_2	$\bar{x}_2$	s_2^2
3	t_3	$\bar{x}_3$	s_3^2
.	.	.	.
.	.	.	.
.	.	.	.
K	t_K	$\bar{x}_n$	s_K^2

The set of the values of the statistic so obtained, one for each sample, constitutes what is called the Sampling distribution of the statistic.

Section C (1×10= 10)

(Answer any ONE question)

10. Random Sampling method.

A random sample is a sample selected in such a way that every item in the population has an equal chance of being included.

Simple random Sample :

It is a technique in which Sample is so drawn that each and every unit in the population has an equal and independent chance of being included in the sample.

(i) Lottery method : In this method, all the items of the universe are numbered on separate slips of paper of same size, shape and colour.

(ii) Table of Random Numbers:

As the lottery method cannot be used when the population is infinite, the alternative method is that of using the table of random numbers

Restricted Random Sampling

(i) Stratified Sampling:

When the population is heterogeneous or of different segments with respect to the variable under study, then it is stratified.

(ii) Systematic Sampling:

A Systematic Sample is selected at random sampling. when a Complete list of the population is available.

(iii) Cluster Sampling or multistage sampling.

The whole population is divided into Sampling units, and these units are again divided into Sub-units. This process will Continue, when we reach a lease number.

II. Students t- Distribution:

The sampling distribution of any statistic in the standardised form is $N(0,1)$ asymptotically, ie as $n \to \infty$. In other words the sampling distribution of any statistic t is normally distributed with mean 0 and variance 1 and is given by

$$Z = \frac{t - E(t)}{SE(t)} \sim N(0,1) \text{ as } n \to \infty$$

The theory of large sample ($n > 30$) is based on the above property of the Sampling distribution.

Assumption for t – test :

The t- test is applied under the following assumptions :

1. Samples are drawn from normal population and are random.
2. For testing the equality of two population means, the population variance are regarded as equal
3. The population standard deviations may not be Known.
4. In case of two samples some adjustments in degrees of freedom for t are made.

Properties of t- test.

i) t- distribution is asymptotic to x- axis

ii) The shape of the curve of t-distribution varies with the degrees of freedom.

iii) t- distribution is a Symmetrical distribution with mean zero.

(iv) Its graph is similar to that of normal distribution.

v) The larger the number of degrees of freedom the more closely t-distribution resembles standard normal distribution.

vi) Sampling distribution of t does not depend on population parameter.

Application of t-Distribution.

1. To test the significance of a sample mean, when the population variance σ is unknown.
2. To test the significance of difference between two sample means the population variances being equal and unknown.
3. To test the significance of an observed sample correlation coefficient or difference between means of two samples.

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Department of Mathematics

Unit Test – I (2022-2023 Even Semester)

Date : 27.02.23 Scheme of Valuation Class : III B.Sc., Maths

Subject Name &Code :Algebraic Structures-II / SM26A

PART – A

1. Define Vector Space.

   a space consisting of vectors, together with the associative and commutative operation of addition of vectors, and the associative and distributive operation of multiplication of vectors by scalars.

2. Define Homomorphism of a Vector Space.

   A linear map is a homomorphism of vector spaces; that is, a group homomorphism between vector spaces that preserves the abelian group structure and scalar multiplication.

3. If $\dim_F V = 5$, find $\dim_F \mathrm{Hom}(V, V)$.

   If $\dim_F V = n$, then $\dim_F \mathrm{Hom}(V, V) = n^2$, so $\dim_F \mathrm{Hom}(V, V) = 25$

4. Define a Dual space.

   Given a vector space V, we define its dual space V^* to be the set of all *linear transformations* $\varphi: V \to F$. The φ is called a *linear functional*

5. Define Internal direct sum.

   Suppose you have a vector space (or more generally, an algebraic structure) V and two subspaces (or substructures) U and W of V. Then, V is said to be the internal direct sum of U and W if the following conditions hold:

   1. Every vector in V can be expressed uniquely as the sum of a vector from U and a vector from W. Mathematically, for every $v \in V$, there exist unique vectors $u \in U$ and $w \in W$ such that $v = u + w$.
   2. The intersection of U and W is the trivial subspace, i.e., $U \cap W = \{0\}$, where $\{0\}$ represents the zero vector.

   In this context, the "+" symbol denotes the operation of combining vectors from U and W to form vectors in V.

6. Define the annihilator A(W) of W, the Subspace of V.

   The annihilator of a subspace W of a vector space V, denoted as A(W), is a subspace of the dual space V^* consisting of all linear functionals that evaluate to zero on every vector in W

7. Define basis of a Vector space.

a basis of a vector space is a set of vectors that spans the entire vector space and is linearly independent. In other words, a basis is a minimal set of vectors that can be used to represent any vector in the vector space through linear combinations.

PART – B

8. Prove that the vectors (1,1,0), (3,1,3) and (5,3,3) are linearly independent.

To prove that the vectors (1,1,0), (3,1,3), and (5,3,3) are linearly independent, we need to show that the only solution to the equation:
$c1(1,1,0) + c2(3,1,3) + c3(5,3,3) = (0,0,0)$
is the trivial solution where $c1 = c2 = c3 = 0$.

9. With usual notation prove that $A(A(W)) = W$.

To prove that $A(A(W)) = W$, where $A(W)$ is the annihilator of the subspace W in a vector space V, we need to demonstrate two inclusions:

1. $A(A(W)) \subseteq W$
2. $W \subseteq A(A(W))$

.PART- C

10. If A and B are finite dimensional subspace of a vector space V. Prove that

(i) $\frac{A+B}{B} \cong \frac{A}{A \cap B}$ finite dimensional and (ii) $\dim(A+B) = \dim(A) + \dim(B) - \dim(A \cap B)$.

i) Prove that $(A+B)/B \simeq A/(A \cap B)$ is finite-dimensional:

First, recall that $(A+B)/B$ represents the set of cosets of B in A+B. A coset is a set of the form a + B, where a is an element of A+B and B is a subspace of V. To prove that $(A+B)/B$ is finite-dimensional, we'll show that $A/(A \cap B)$ is finite-dimensional and then we'll use a theorem that relates the dimensions of quotient spaces.

Consider the quotient space $A/(A \cap B)$. By the quotient space theorem, we have:

$\dim(A/(A \cap B)) = \dim(A) - \dim(A \cap B)$

11. State and Prove Gram-SchmidthOrthogonalisation process.

The Gram-Schmidt orthogonalization process is a method used to transform a set of linearly independent vectors into an orthogonal (or even orthonormal) set of vectors. Every inner product space has an orthogonal (orthonormal) basis.

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DEPARTMENT OF MATHEMATICS

UNIT TEST-I (2022-2023 EVEN SEMESTER)

CLASS: III-B.Sc.,(MATHS) SCHEME OF VALUATION SUB: REAL ANALYSIS-II

SECTION-A

(1) If for every $x \in G$, there exists a number $r > 0$ such that the entire open ball $B[x, r]$ is contained in G.

(2) To prove that a subset of R_d is a union of one-point set in R_d.

(3) We have to prove there is an open ball $B[x, r] \subset G_1 \cap G_2$

(4) (a) Both f and f^{-1} are continuous
(b) the set $G \subset M_1$ is open iff its image $f(G) \subset M_2$ is open.
(c) the set $F \subset M_1$ is closed iff its image $f(F) \subset M_2$ is closed.

(5) If E is a subset of a metric space M then we have to prove $E \subset \bar{E}$.

(6) Let M be a metric space. the subset A of M is said to be dense in M if $\bar{A} = M$.

(7) The set A is connected if
(a) It is impossible to find non-empty subsets A_1 and A_2 of M such that $A = A_1 \cup A_2$, $\bar{A}_1 \cap A_2 = \phi$, $A_1 \cap \bar{A}_2 = \phi$
(b) there is no set except ϕ and ϕ which is both open and closed in $\langle A, \rho \rangle$.

SECTION-B

(8) To prove: $\bar{E} = \bar{\bar{E}}$

$\rho(x, y) < r$ and $\rho(y, z) < t$

then $\rho(x, z) < r$

$\Rightarrow z \in B[x, r] \subset E$.

(9) To prove: $\overline{\bigcap_{F \in \mathcal{F}} F} = \bigcap_{F \in \mathcal{F}} F$

$B[x', r]$ contains a point $y \in \bigcap_{F \in \mathcal{F}} F$

$\Rightarrow B[x', r]$ contains $y \in F$.

Finally, $x \in \bigcap_{F \in \mathcal{F}} F$

SECTION – C

(10) To prove that: (i) f is continuous on M_1.

(ii) $f^{-1}(G)$ is open in M_1.

(11) To prove the following cases:

(i) f is continuous on M_1.

(ii) $f^{-1}(F)$ is closed in M_1.

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DEPARTMENT OF MATHEMATICS.

UNIT TEST - I (2022-2023). EVEN SEMESTER

CLASS: III B.Sc., MATHEMATICS ANSWER KEY

SUB : COMPLEX ANALYSIS

Section-A

1. CR equation in Polar co-ordinates

$$u_r = \frac{1}{r} v_\theta$$

$$u_\theta = -r v_r.$$

2 Harmonic function.

A real function of two real variables x & y that possesses continuous second order partial derivatives and that satisfies Laplace equation is called a harmonic function.

3 $w = \frac{1}{z}$: $u+iv = \frac{1}{x+iy} = \frac{x-iy}{(x+iy)(x-iy)}$

$$u+iv = \frac{x-iy}{x^2+y^2}$$

$$u(x,y) = \frac{x}{x^2+y^2}, \quad v = \frac{-y}{x^2+y^2}.$$

4. If $f(z) = z^2$ at any point z, find $f'(z)$.

$$f'(z) = 2z.$$

5. Sufficient condition for Analytic function:

If the partial derivatives u_x, u_y, v_x and v_y all cts in D and $u_x = v_y$ and $u_y = -v_x$. Then the function $f(z)$ is analytic in a domain D.

6. **Analytic function:**

A function is said to be analytic at a point if its derivative exists not only at that point but also in some neighbd of that point.

7. $u(x,y) = ax^2 - y^2 + xy$

$\phi_1 = 2ax + y$; $u_x = 2ax + y$

$\phi_1(z,0) = 2az$; $u_{xx} = 2a$

$\phi_2(x,y) = -2y + x$; $u_y = -2y + x$

$\phi_2(z,0) = z$; $u_{yy} = -2$

; since it is Harmonic function

$u_{xx} + u_{yy} = 0$

$2a - 2 = 0$

$\boxed{a = 1}$.

By Milne's Thomson method

$$f(z) = \int \phi_1(z,0)\,dz - i\int \phi_2(z,0)\,dz$$

$$= \int 2az\,dz - i\int z\,dz$$

$$u + iv = az^2 - \frac{iz^2}{2} = f(z)$$

$u_x =$ section -B.

8 Given, $f(z) = \omega = u + iv$ is analytic.

To prove: u and v satisfies Laplace equation

i.e., $u_{xx} + u_{yy} = 0$ and $v_{xx} + v_{yy} = 0$.

since $f(z)$ is analytic

$\therefore$ u and v satisfy C-R equations

$$u_x = v_y \rightarrow (1)$$

$$u_y = -v_x \rightarrow (2)$$

Diff (1) p.w.r to 'x' we get

$$\frac{\partial^2 u}{\partial x^2} = \frac{\partial^2 v}{\partial x \partial y} \rightarrow (3)$$

Diff ② p.w.r to 'y' we get

$$\frac{\partial^2 u}{\partial y^2} = -\frac{\partial^2 v}{\partial y \partial x} \rightarrow ④$$

$[\because u_{xy} = u_{yx}]$

$\therefore ⑤ + ④ \Rightarrow \frac{\partial^2 u}{\partial x^2} + \frac{\partial^2 u}{\partial y^2} = 0.$

$\therefore$ u satisfies Laplace eqn.

Diff ① p.w.r to y, we get, Diff ② p w.r to 'x' we get

$$\frac{\partial^2 u}{\partial y \partial x} = \frac{\partial^2 v}{\partial y^2} \rightarrow ⑤ \qquad \frac{\partial^2 u}{\partial x \partial y} = -\frac{\partial^2 v}{\partial x^2} \rightarrow ⑥$$

$⑤ + ⑥ \Rightarrow \frac{\partial^2 v}{\partial x^2} + \frac{\partial^2 v}{\partial y^2} = 0.$

$\therefore$ v satisfies Laplace equation

9. S.T an analytic function with constant modulus is constant.

Let $f(z) = u + iv$ be analytic.

C-R equations, $u_x = v_y$, $u_y = -v_x$

$$|f(z)| = \sqrt{u^2 + v^2} = c \neq 0,$$

$$|f(z)|^2 = u^2 + v^2 = c^2 \text{ (say)} \quad \text{i.e., } u^2 + v^2 = c^2.$$

diff p.w.r to 'x'

$2uu_x + 2vv_x = 0$

$uu_x + vv_x = 0 \rightarrow ①$

diff p.w.r to 'y'

$2uu_y + 2vv_y = 0$

$-uv_x + vu_x = 0.$

$vu_x - uv_x = 0 \rightarrow ②$

$① \times u + ② \times v \Rightarrow$

$$u^2 u_x + uvv_x + v^2 u_x - uvv_x = 0$$

$$(u^2 + v^2) u_x = 0$$

$$u_x = 0 \quad [\because u^2 + v^2 \neq 0.$$

$① \times v - ② \times u \Rightarrow$

$$uvu_x + v^2 v_x - uvu_x + u^2 v_x = 0.$$

$$(u^2 + v^2) v_x = 0$$

$$v_x = 0 \quad [\because u^2 + v^2 \neq 0]$$

$\therefore f'(z) = u_x + iv_x = 0 + i0$

$f'(z) = 0 \Rightarrow f(z) = c$ is constant.

(SCD) Section - c

10. Suppose that $f(z) = u+iv$ is defined in a neighbourhood of $z_0 = x_0+iy_0$ and that

(i) u_x, u_y, v_x, v_y exist everywhere in the neighbourhood

* $u_x = v_y$, $u_y = -v_x$ at (x_0, y_0) and

* u_x, u_y, v_x, v_y are cts at (x_0, y_0). Then $f'(z_0)$ exists and $f'(z_0) = u_x(x_0,y_0) + iv_x(x_0,y_0)$

Proof:

$$\lim_{h\to 0} \frac{f(z_0+h) - f(z_0)}{h} = u_x(x_0,y_0) + iv_x(x_0,y_0)$$

Step:1 Let $\epsilon > 0$ be given, since

$$\lim_{(h_1,h_2)\to(0,0)} \alpha_j(h_1,h_2) = 0, \quad \forall j \in \{1,2,3,4\}. \ \exists \delta > 0 \ni j \in \{1,2,3,4\}.$$

$$|\alpha_j(h_1,h_2)| < \epsilon/4, \text{ whenever } 0 < \sqrt{h_1^2+h_2^2} < \delta.$$

Step:2
$$\frac{f(z_0+h) - f(z_0)}{h} = u_x + iv_x + (\alpha_1 + i\alpha_3)\frac{h_1}{h} + (\alpha_2 + i\alpha_4)\frac{h_2}{h}.$$

Step:3
$$\left| \frac{f(z_0+h) - f(z_0)}{h} - (u_x + iv_x) \right| < \epsilon.$$

11. $f(z) = u+iv = \dfrac{\sin 2x}{\cosh 2y - \cos 2x}$, $f(z) = u+iv \to (1)$

$if(z) = iu - v \to (2)$

(1) + (2) $\Rightarrow$ $(F(z)) = U + iV$ $\therefore$ $V = \dfrac{\sin 2x}{\cosh 2y - \cos 2x}$

$\phi_2 = -\operatorname{cosec}^2 z$, $\phi_1(z,0) = 0$,

By Milne's Thomson method

$$F(z) = \int \phi_1(z,0)\,dz + i\int \phi_2(z,0)\,dz$$

$(1+i)f(z) = F(z) = i\cot z + c_1$

$$f(z) = \frac{i}{1+i}\cot z + c.$$

$$f(z) = \frac{1+i}{2}\cot z + c$$

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DEPARTMENT OF MATHEMATICS

SM3AE - MATHEMATICS-II (I-B.Sc.,(CS)- BATCH -I)

UNIT TEST-I ANSWER KEY

Part A: Answer any FIVE of the followings $(5 \times 2 = 10)$

1. Auxilary equation: $m^2 - 4m + 4 = 0, \Longrightarrow m_1 = 2 = m_2 = m$, the roots are real and equal.

   Complementry function: C.F= $(Ax + B)e^{mx} = (Ax + B)e^{2x}$

2. Auxilary equation: $m^2 - 4 = 0, \Longrightarrow m_1 = +2, m_2 = -2$, the roots are real and distinct.

   Complementry function: C.F= $(Ae^{m_1 x} + Be^{m_2 x}) = Ae^{2x} + Be^{-2x}$.

3. Given $z = ax + by + a^2 + b^2$,

   Differentiating z partially with respect to x, we get $\frac{\partial z}{\partial x} = a$,

   we know that $\frac{\partial z}{\partial x} = p \Longrightarrow p = a$.

   Differentiating z partially with respect to y, we get $\frac{\partial z}{\partial y} = b$,

   we know that $\frac{\partial z}{\partial y} = q \Longrightarrow q = b$.

   Subtitute a, b values in z we get, $z = px + qy + p^2 + q^2$.

4. Given $z = f(x + ay)$,

   Differentiating z partially with respect to x, we get $\frac{\partial z}{\partial x} = f'(x + ay)$,

   we know that $\frac{\partial z}{\partial x} = p \Longrightarrow p = f'(x + ay)$.

   Differentiating z partially with respect to y, we get $\frac{\partial z}{\partial y} = f'(x + ay) \cdot a$,

   we know that $\frac{\partial z}{\partial y} = q \Longrightarrow q = f'(x + ay) \cdot a. \Longrightarrow p \cdot a = q$.

5. If $u', u'', u''', \ldots$, are denotes the successive derivatives of$u$ and $v_1, v_2, v_3, \ldots$ are the successive integrals of the function$v$ then from this we arrive

at a formula for integration of $\int uvdx = uv_1 - u'v_2 + u''v_3 \ldots$ is called as the Bernoulli's formula for integration.

6. We know that $I_n = \int_0^{\frac{\pi}{2}} \cos^n x dx = (\frac{n-1}{n})(\frac{n-3}{n-2}) \cdots \frac{2}{3}$, when n is odd.
   put $n = 5 \Longrightarrow \int_0^{\frac{\pi}{2}} \cos^5 x dx = (\frac{5-1}{5})(\frac{5-3}{5-2}) = \frac{8}{15}$

7. When m is odd,n is even $I_{m,n} = \int_0^{\frac{\pi}{2}} \sin^m x cos^n x dx = \frac{((m-1)(m-3)-2)((n-1)(n-3)-1)}{(m+n-2)(m+n-4)-1}$.
   put $m = 3, n = 4 \Longrightarrow \int_0^{\frac{\pi}{2}} \sin^3 x cos^4 x dx = \frac{(3-1)(4-1)(4-3)}{(3+4-2)(3+4-4)(3+4-6)} = \frac{2}{5}$

Part B: Answer any ONE of the following $(1 \times 5 = 5)$

8. The given equation is of the form $Pp + Qq = R$, the Lagranges differential equations.
   The Auxillary equations are $\frac{dx}{P} = \frac{dy}{Q} = \frac{dz}{R} \Longrightarrow \frac{dx}{x} = \frac{dy}{y} = \frac{dz}{z}$ Solve by Lagranges grouping method
   Case(i) Consider first and second ratios
   $\frac{dx}{x} = \frac{dy}{y} \Longrightarrow$ Integrrationg on both sides $\int \frac{dx}{x} = \int \frac{dy}{y}$
   $\Longrightarrow log(x) = log(y) + logc_1 \Longrightarrow \frac{x}{y} = c_1$
   Case(ii) Consider second and third ratios
   $\frac{dy}{y} = \frac{dz}{z} \Longrightarrow$ Integrrationg on both sides $\int \frac{dy}{y} = \int \frac{dz}{z}$
   $\Longrightarrow log(y) = log(z) + logc_2 \Longrightarrow \frac{y}{z} = c_2$
   $\therefore$ The general solution is $\phi(\frac{x}{y}, \frac{y}{z}) = 0$.

9. Given $f(x) = x$ if $f(-x) = -x = -f(x)$ then the given function is odd.
   $\therefore f(x) = \sum_1^{\infty} b_n \sin nx$
   $b_n = \frac{2}{\pi} \int_0^{\pi} x \sin nx dx = \frac{2}{\pi}[(x)(\frac{-\cos nx}{n}) - (1)(\frac{-\sin nx}{n^2})]_0^{\pi} = \frac{2}{\pi}[-(\pi)\frac{(-1)^n}{n}] =$
   $\frac{2}{\pi}[(\pi)\frac{(-1)^{n+1}}{n}] = \frac{(-1)^{n+1}}{n}$
   $\therefore f(x) = \sum_1^{\infty} \frac{(-1)^{n+1}}{n} \sin nx$.

Part C: Answer the following question $(1 \times 10 = 10)$

10. Auxilary equation: $m^2 - 2m + 2 = 0, \Rightarrow m = 1 \pm i$, the roots are complex.

Complementry function: C.F$= e^{\alpha x}(A\cos\beta x + B\sin\beta x) = (Ax + B)e^{2x} = e^x(A\cos x + B\sin x)$

Particular Integral: P.I $= \frac{1}{D^2-2D+2}(e^{2x}\cos x)$.

Replace D by D+2 $\Longrightarrow PI = e^{2x}(\frac{1}{(D+2)^2-2(D+2)+2})(\cos x) = e^{2x}(\frac{1}{2D+1})(\cos x)$

$= e^{2x}(\frac{2D-1}{4D^2-1})(\cos x) = e^{2x}(\frac{2\sin x+\cos x}{5})$.

$\therefore$ The general solution is

$y = C.F + P.I = e^x(A\cos x + B\sin x) + e^{2x}(\frac{2\sin x+\cos x}{5})$.

11. Let $I_n = \int_0^{\frac{\pi}{2}} \sin^n x dx$ by applying integration by parts we get,

$I_n = [-\frac{1}{n}\sin^{n-1}x\cos x]_0^{\frac{\pi}{2}} + \frac{n-1}{n}\int_0^{\frac{\pi}{2}}\sin^{n-2}x dx \Longrightarrow I_n = (\frac{n-1}{n})I_{n-2}$

Continuing like this we get $I_n = (\frac{n-1}{n})(\frac{n-3}{n-2})(\frac{n-5}{n-4})I_{n-6}$

If n is even: $I_n = (\frac{n-1}{n})(\frac{n-3}{n-2})(\frac{n-5}{n-4})\cdots\frac{1}{2}I_0$,

where $I_0 = \int_0^{\frac{\pi}{2}}\sin^0 x dx = [\frac{\pi}{2} - 0] = \frac{\pi}{2}$.

$\therefore I_n = (\frac{n-1}{n})(\frac{n-3}{n-2})(\frac{n-5}{n-4})\cdots\frac{1}{2}\times\frac{\pi}{2}$.

If n is odd: $I_n = (\frac{n-1}{n})(\frac{n-3}{n-2})(\frac{n-5}{n-4})\cdots\frac{2}{3}I_1$,

where $I_1 = \int_0^{\frac{\pi}{2}}\sin^1 x dx = -[\cos\frac{\pi}{2} - \cos 0] = 1$.

$\therefore I_n = (\frac{n-1}{n})(\frac{n-3}{n-2})(\frac{n-5}{n-4})\cdots\frac{2}{3}\times 1$.

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DEPARTMENT OF MATHEMATICS
UNIT TEST – I (2022 – 2023 EVEN SEMESTER)
CLASS: I BCA/I B.Sc CS SUB: MATHEMATICS – II
SCHEME OF VALUATION

SECTION – A

(1) $L[f(t)] = \int_0^\infty e^{-st} f(t)\,dt$.

(2) $L[\cos^2 3t] = \frac{1}{2}\left[\frac{1}{s} + \frac{s}{s^2+12}\right]$

(3) $L[te^{-3t}] = \frac{1}{(s+3)^2}$

(4) $L^{-1}\left[\frac{s+1}{(s+1)^2+9}\right] = e^{-t}\cos 3t$

(5) $P.I = 5/2$

(6) $C.F = Ae^{x} + Be^{-x/2}$

(7) $y = A\cos 3x + B\sin 3x + \frac{e^{3x}}{18}$.

SECTION – B

(8) $L^{-1}\left[\frac{1}{(s-2)(s-3)(s+4)}\right] = -\frac{e^{2t}}{6} + \frac{e^{3t}}{7} + \frac{e^{-4t}}{42}$.

(9) $y = Ae^{x} + Be^{2x} + \frac{3\sin 2x - \cos 2x}{20}$.

SECTION – C

(10) $L^{-1}\left[\frac{-3s^2+20s-24}{(s-1)(s-2)^2}\right]$

Finally $y = -7e^{t} + 4e^{2t} + 4te^{2t}$.

(11) $y = Ae^{x} + Be^{3x} - \frac{e^{2x}\sin 3x}{10}$

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DEPARTMENT OF MATHEMATICS

SM3AE - MATHEMATICS-II (I-B.Sc.,(CS with AI)

UNIT TEST-I ANSWER KEY

Part A: Answer any FIVE of the followings $(5 \times 2 = 10)$

1. Auxilary equation: $m^2 + 2m - 3 = 0, \Longrightarrow m_1 = 2, m_2 = 1$, the roots are real and distinct.

   Complementry function: C.F= $(Ae^{m_1 x} + Be^{m_2 x}) = Ae^{2x} + Be^{x}$

2. Auxilary equation: $m^2 - 1 = 0, \Longrightarrow m_1 = +1, m_2 = -1$, the roots are real and distinct.

   Complementry function: C.F= $(Ae^{m_1 x} + Be^{m_2 x}) = Ae^{x} + Be^{-x}$.

3. Given $z = ax + by$,

   Differentiating z partially with respect to x, we get $\frac{\partial z}{\partial x} = a$,

   we know that $\frac{\partial z}{\partial x} = p \Longrightarrow p = a$.

   Differentiating z partially with respect to y, we get $\frac{\partial z}{\partial y} = b$,

   we know that $\frac{\partial z}{\partial y} = q \Longrightarrow q = b$.

   Subtitute a, b values in z we get, $z = px + qy$.

4. Given $z = f(x^2 + y^2)$,

   Differentiating z partially with respect to x, we get $\frac{\partial z}{\partial x} = f'(x^2+y^2) \cdot 2x$,

   we know that $\frac{\partial z}{\partial x} = p \Longrightarrow \frac{p}{2x} = f'(x^2 + y^2)$.

   Differentiating z partially with respect to y, we get $\frac{\partial z}{\partial y} = f'(x^2+y^2) \cdot 2y$,

   we know that $\frac{\partial z}{\partial y} = q \Longrightarrow \frac{q}{2y} = f'(x^2 + y^2)$. $\therefore \frac{p}{2x} = \frac{q}{2y} \Longrightarrow py = qx$ or

   $py - qx = 0$

5. Given $\nabla\phi = c$, We know that $\nabla\phi = \frac{\partial\phi}{\partial x}\vec{i} + \frac{\partial\phi}{\partial y}\vec{j} + \frac{\partial\phi}{\partial z}\vec{k} \Longrightarrow \nabla\phi = \frac{\partial(c)}{\partial x}\vec{i} + \frac{\partial(c)}{\partial y}\vec{j} + \frac{\partial(c)}{\partial z}\vec{k} = 0\vec{i} + 0\vec{j} + 0\vec{k} = 0.$

6. By definition of Solenoidal vector, it has to verify that $\nabla \cdot \vec{A} = 0$, so

   $\nabla\vec{A} = (\frac{\partial}{\partial x}\vec{i} + \frac{\partial}{\partial y}\vec{j} + \frac{\partial}{\partial z}\vec{k}) \cdot (x^2z^2\vec{i} + xyz^2\vec{j} - xz^3\vec{k}) = 0$

   $\therefore \vec{A}$ is solenoidal.

7. $\nabla\phi = x$, We know that $\nabla\phi = \frac{\partial\phi}{\partial x}\vec{i} + \frac{\partial\phi}{\partial y}\vec{j} + \frac{\partial\phi}{\partial z}\vec{k} \Longrightarrow \nabla\phi = \frac{\partial(x)}{\partial x}\vec{i} + \frac{\partial(x)}{\partial y}\vec{j} + \frac{\partial(x)}{\partial z}\vec{k} = 1\vec{i} + 0\vec{j} + 0\vec{k} = \vec{i}.$

   $|\nabla\phi| = \sqrt{1^2 + 0^2 + 0^2} = 1, \therefore$ The unit normal vector $= \frac{\nabla\phi}{|\nabla\phi|} = \vec{i}$

Part B: Answer any ONE of the following **(1 × 5 = 5)**

8. The given equation is of the form $Pp + Qq = R$, the Lagranges differential equations.

   The Auxillary equations are $\frac{dx}{P} = \frac{dy}{Q} = \frac{dz}{R} \Longrightarrow \frac{dx}{x} = \frac{dy}{y} = \frac{dz}{z}$ Solve by Lagranges grouping method

   Case(i) Consider first and second ratios

   $\frac{dx}{x} = \frac{dy}{y} \Longrightarrow$ Integrrationg on both sides $\int \frac{dx}{x} = \int \frac{dy}{y}$

   $\Longrightarrow log(x) = log(y) + logc_1 \Longrightarrow \frac{x}{y} = c_1$

   Case(ii) Consider second and third ratios

   $\frac{dy}{y} = \frac{dz}{z} \Longrightarrow$ Integrrationg on both sides $\int \frac{dy}{y} = \int \frac{dz}{z}$

   $\Longrightarrow log(y) = log(z) + logc_2 \Longrightarrow \frac{y}{z} = c_2$

   $\therefore$ The general solution is $\phi(\frac{x}{y}, \frac{y}{z}) = 0.$

9. By definition curl grad $\phi = \nabla \times \nabla\phi = \nabla \times (3(x^2 - yz)\vec{i} + 3(y^2 - zx)\vec{j} + 3(z^2 - xy)\vec{k})$

   $$\text{curl grad } \phi = \begin{vmatrix} \vec{i} & \vec{j} & \vec{k} \\ \frac{\partial}{\partial x} & \frac{\partial}{\partial y} & \frac{\partial}{\partial z} \\ 3(x^2 - yz) & 3(y^2 - zx) & 3(z^2 - xy) \end{vmatrix} = 0.$$

Part C: Answer the following question $(1 \times 10 = 10)$

10. Auxiliary equation: $m^2 + 2 = 0, \Rightarrow m = \pm\sqrt{2}i$, the roots are complex.

Complementary function: C.F $= e^{\alpha x}(A\cos\beta x + B\sin\beta x) = e^{0x}(A\cos\sqrt{2}x + B\sin\sqrt{2}x) = A\cos\sqrt{2}x + B\sin\sqrt{2}x$

Particular Integral: P.I $= \frac{1}{D^2+2}(e^{ax}\cos x)$.

Replace D by D + 1 $\Rightarrow PI = e^{ax}(\frac{1}{(D+1)^2+2})(\cos x) = e^{ax}(\frac{1}{2D+2})(\cos x)$

$= e^{ax}(\frac{2D-2}{4D^2-4})(\cos x) = e^{ax}(\frac{\sin x + \cos x}{4})$.

$\therefore$ The general solution is

$y = C.F + P.I = A\cos\sqrt{2}x + B\sin\sqrt{2}x + e^{ax}(\frac{\sin x + \cos x}{4})$.

11. Given $\vec{F} = (y^2 - z^2 + 3yz - 2x)\vec{i} + (3xz + 2xy)\vec{j} + (3xy - 2xz + 2z)\vec{k}$

By definition of Solenoidal vector, it has to verify that $\nabla \cdot \vec{F} = 0$,

$\nabla \cdot \vec{F} = (\frac{\partial}{\partial x}\vec{i} + \frac{\partial}{\partial y}\vec{j} + \frac{\partial}{\partial z}\vec{k}) \cdot ((y^2 - z^2 + 3yz - 2x)\vec{i} + (3xz + 2xy)\vec{j} + (3xy - 2xz + 2z)\vec{k}) \Rightarrow \nabla \cdot \vec{F} = -2 + 2x - 2x + 2 = 0$, $\therefore \vec{F}$ is solenoidal.

By definition of Irrotational vector, it has to verify that $\nabla \times \vec{F} = 0$,

$$\nabla \times \vec{F} = \begin{vmatrix} \vec{i} & \vec{j} & \vec{k} \\ \frac{\partial}{\partial x} & \frac{\partial}{\partial y} & \frac{\partial}{\partial z} \\ (y^2 - z^2 + 3yz - 2x) & (3xz + 2xy) & (3xy - 2xz + 2z) \end{vmatrix}$$

$\Rightarrow \nabla \times \vec{F} = 0$.

$\therefore \vec{F}$ is Irrotational.

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Department of Mathematics

UNIT TEST – I (2022-2023 EVEN SEM)

SUB : MATHEMATICS – II

CODE: SM3AE

CLASS : I BCA

DATE : 02.03.23

SECTION-A

1. Let a function $f(t)$ be continuous and defined for positive values of 't'. The Laplace Transformation of $f(t)$ associates a function s defined by the equation $L[f(t)] = F(s) = \int_0^\infty e^{-st} f(t)\,dt$.

2. $L[\cos^2 3t] = L\left[\frac{1+\cos 6t}{2}\right]$

$= L\left[\frac{1}{2}\right] + L\left[\frac{\cos 6t}{2}\right]$

$= \frac{1}{2}\left[\frac{1}{s} + \frac{s}{s^2+36}\right]$

3. $L[t e^{-3t}] = \frac{1}{(s+3)^2}$, $L[e^{-3t}] = \frac{1}{s+3}$

4. $L^{-1}\left[\frac{(s+1)}{(s+1)^2+9}\right] = e^{-t} L^{-1}\left[\frac{s}{s^2+9}\right] = e^{-t}\cos 3t$

5. $P.I = \frac{10\,e^{0x}}{D^2-4D+4} = \frac{10}{0-0+4} = \frac{10}{4} = \frac{5}{2}$

6. $C.F = Ae^{x} + Be^{-\frac{1}{2}x}$

$m^2 - \frac{m}{2} - \frac{1}{2} = 0$

$2m^2 - m - 1 = 0$

$(m-1)(m+\frac{1}{2}) = 0$

7. $C.F = A\cos 3x + B\sin 3x$

$P.I = \frac{e^{3x}}{D^2+9}$ $\quad D^2 = -9$, $D = 3$

$= \frac{e^{3x}}{+9+9}$ $\quad P.I = \frac{e^{3x}}{18}$

$m^2 = -9$

$m = \pm i3$

$y = A\cos 3x + B\sin 3x + \frac{e^{3x}}{18}$

SECTION-B

8. $L^{-1}\left[\frac{1}{(s-2)(s-3)(s+4)}\right]$ ⇒ using Partial Fraction method

$$\frac{1}{(s-2)(s-3)(s+4)} = \frac{A}{s-2} + \frac{B}{s-3} + \frac{C}{s+4}$$

$$L^{-1}\left[\frac{1}{(s-2)(s-3)(s+4)}\right] = \frac{1}{-6}L^{-1}\left[\frac{1}{s-2}\right] + \frac{1}{7}L^{-1}\left[\frac{1}{s-3}\right] + \frac{1}{42}\left[\frac{1}{s+4}\right]$$

$$= \frac{e^{2t}}{-6} + \frac{e^{3t}}{7} + \frac{e^{-4t}}{42}$$

9. $C.F = Ae^{x} + Be^{2x}$ $\quad m^2-3m+2=0$

$$P.I = \frac{\cos 2x}{D^2-3D+2} = \frac{\cos 2x}{-4-3D+2} = \frac{\cos 2x}{-3D-2} \quad D^2=-4$$

$$= -\frac{\cos 2x}{(3D+2)} \times \frac{(3D-2)}{(3D-2)} = -\frac{[-3(2\sin 2x) - 2\cos 2x]}{9D^2-4}$$

$$= \frac{6\sin 2x + 2\cos 2x}{9(-4)-4} = \frac{2[3\sin 2x + \cos 2x]}{-40} \quad (20)$$

$$y = Ae^{x} + Be^{2x} - \frac{[3\sin 2x + \cos 2x]}{20}$$

SECTION-C

10. $y(t) = L^{-1}\left[\frac{-3s^2+20s-24}{(s-2)(s^2-3s+2)}\right]$

$$y(t) = L^{-1}\left[\frac{-3s^2+20s-24}{(s-2)(s-1)(s-2)}\right]$$

$$y(t) = -7e^{t} + 4e^{2t} + 4te^{2t}$$

$C.F = Ae^{x} + Be^{3x}$

$m^2 - 4m + 3 = 0$

$3 \quad -1 \quad -3$

-4

$P.I = \dfrac{e^{2x} \sin 3x}{D^2 - 4D + 3}$

$= e^{2x} \cdot \dfrac{\sin 3x}{(D+2)^2 - 4(D+2) + 3}$

$= e^{2x} \cdot \dfrac{\sin 3x}{D^2 + 4D + 4 - 4D - 8 + 3}$

$= e^{2x} \cdot \dfrac{\sin 3x}{D^2 - 1}$

$D^2 = -3^2$

$= -9$

$= e^{2x} \cdot \dfrac{-\sin 3x}{-9-1}$

$P.I = e^{2x} \dfrac{-\sin 3x}{-10}.$

$y = Ae^{x} + Be^{3x} - e^{2x} \dfrac{\sin 3x}{10}$ //

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DEPARTMENT OF MATHEMATICS

SM3AE - MATHEMATICS-II (I-B.Sc.,(ECS))

UNIT TEST-I ANSWER KEY

Part A: Answer any FIVE of the followings **(5 × 2 = 10)**

1. Auxilary equation: $m^2+9=0, \Longrightarrow m=\pm 3i$. the roots are complex.
   Complementry function: C.F$= e^{0x}(A\cos 3x + B\sin 3x) = (A\cos 3x + B\sin 3x)$

2. P.I $= \frac{1}{D^2-4D+13}(e^{2x}) = \frac{e^{2x}}{9}$.

3. Auxilary equation: $m^2-m-2=0, \Longrightarrow m=2,-1$. the roots are real and distinct.
   Complementry function: C.F$= Ae^{2x}+Be^{-x}$
   P.I $= \frac{1}{D^2-D-2}(2e^{0x}) = \frac{2}{-2} = -1$.
   $\therefore$ The General Solution is, $y = Ae^{2x}+Be^{-x}-1$

4. Let a function f be defined for $t \geq 0$. We define the Laplace Transform of f, denoted by $F(S)$ or $L[f(t)]$ as $\int_0^\infty e^{-st}f(t)dt = F(s)$.

5. $L[1] = \int_0^\infty e^{-st}(1)dt = [\frac{e^{-st}}{-s}]_0^\infty = \frac{1}{s}$

6. $L[3e^{5t}+5\cos t] = 3(\frac{1}{s-5}) + 5(\frac{s}{s^2+1})$

7. We know that $L[t^n] = \frac{n!}{s^{n+1}}$, put $n=2, \Longrightarrow L[t^2] = \frac{2!}{s^{2+1}} = \frac{2}{s^3}$

Part B: Answer any ONE of the following **(1 × 5 = 5)**

8. Auxilary equation: $m^2+16=0, \Longrightarrow m = \pm\sqrt{-16} = \pm 4i$, the roots are complex.

Complementary function $C.F = e^{0x}(A\cos 4x + B\sin 4x) = e^{0x}(A\cos 4x + B\sin 4x) = A\cos 4x + B\sin 4x$

Particular Integral $P.I = \frac{1}{D^2+16}(\cos 4x) = \left(\frac{1}{-4^2+16}\right)(\cos 4x) = \left(\frac{1}{0}\right)(\cos 4x)$

Which is not possible, Multiply x to the numerator and differentiate the denominator

$P.I = \left(\frac{x}{2D}\right)(\cos 4x) = \frac{x(\sin 4x)}{8} = \frac{x}{8}\sin 4x$

$\therefore$ The general solution is

$y = C.F + P.I = A\cos 4x + B\sin 4x + \frac{x}{8}\sin 4x$

9. $L(t^2e^{-3t}) = L[t^2]_{s\to s+3} = \left[\frac{2}{s^3}\right]_{s\to s+3} = \frac{2}{(s+3)^3}$

Part C: Answer the following question **(1 × 10 = 10)**

10. Auxiliary equation: $m^2 - 4m + 13 = 0 \Rightarrow m = 2 \pm 3i$, the roots are complex

Complementary function $C.F = e^{mx}(A\cos\beta x + B\sin\beta x) = e^{2x}(A\cos 3x + B\sin 3x)$

Particular Integral $P.I = \frac{1}{D^2-4D+13}(e^{2x}\cos 3x)$

Replace D by D + 2 $\Rightarrow P.I = e^{2x}\left(\frac{1}{(D+2)^2-4(D+2)+13}\right)(\cos 3x) = e^{2x}\left(\frac{1}{D^2+9}\right)(\cos 3x)$

$= \left(\frac{e^{2x}}{2}\right)\frac{1}{D}(\cos 3x) = \left(\frac{e^{2x}}{6}\sin 3x\right)$

$\therefore$ The general solution is

$y = C.F + P.I = e^{2x}(A\cos 3x + B\sin 3x) + \frac{e^{2x}}{6}\sin 3x$.

11. Let $L[1 - e^t] = L[1] - L[e^t] = \frac{1}{s} - \frac{1}{s-1}$

$\therefore L\left[\frac{1-e^t}{t}\right] = \int_s^\infty \left(\frac{1}{s} - \frac{1}{s-1}\right) ds = \log\left[\frac{1}{1-\frac{1}{s}}\right]_s^\infty = -\log\left[\frac{1}{1-\frac{1}{s}}\right] = -\log\left[\frac{s}{s+1}\right]$

$\therefore L\left[\frac{1-e^t}{t}\right] = \log\left[\frac{s+1}{s}\right]$

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DEPARTMENT OF MATHEMATICS

UNIT-TEST-I (2022-2023) EVEN SEMESTER

CLASS: II-B.Com

SCHEME OF VALUATION

SUB: ELEMENTS OF OPERATIONAL RESEARCH

SECTION-A

(1) O.R. refers to Scientific methods (Statistical and mathematical modeling, experiment, simulation and optimization) applied to the solution of complex business problems.

(2) (i) To provide better performance in any given situation.
(ii) The process of doing this involves a lot of data collection and analysis of possible outcomes.

(3) The modern field of O.R. arose during World War II. In the World War II era, Operational research was defined as "a scientific method of providing executive departments with a quantitative basis for decisions regarding the operations under their control."

(4) (i) Research and development
(ii) Personnel Management (iii) production management.

(5) Assignment problem is to minimise the cost or time of completing a number of jobs by a number of persons.

(6) Transportation problem is to minimise the cost of distributing a product from a number of sources or origins to a number of destinations.

(7) Unbalanced T.p. is defined as in which supply and demand are not equal.

SECTION-B

(8) (i) Magnitude of computation
(ii) Non-Quantifiable Factors
(iii) Distance between user and analyst
(iv) Time and money costs
(v) Implementation.

(9) The minimum assignment cost Rs. 59

SECTION – C

(10) (i) Linear programming (ii) Queuing theory
(iii) Inventory control method (iv) Network Analysis
(v) Replacement problems (vi) Sequencing
(vii) Integer programming (viii) Simulation
(ix) Dynamic programming (x) Decision and game theory

(11) The minimum total transportation cost = 12075

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Unit Test – I (2022-2023 Even Semester)

Answer Key

Date : 02/03/2023 **Duration : One hour** **Class :** II B.Sc., Computer Science

Subject Name & Code : Statistics-II / SP3AB

Section-A (5 x 2 = 10)

(Answer any **FIVE** questions)

1. An experiment is characterised by the property that its observations under a given set of circumstances do not always lead to the same observed outcomes but rather to different outcomes which follows a sort of statistical regularity.

2. A set of all possible outcomes from an experiment is called a sample space.

3. When an event is decomposable into a number of sample events, then it is called a compound event.

4. It is the total number of all the possible outcomes of an experiment.

5. If in an experiment the occurrence of an event precludes the happening of all other events in the same experiment, then these events are said to be mutually exclusive events.

6. If the happening of any one does not depend on the happening of the other. Events which are not independent are called dependent events.

7. A random variable x is a real valued function defined on a sample space of an experiment

Section B (1×5 = 5)

(Answer any ONE question)

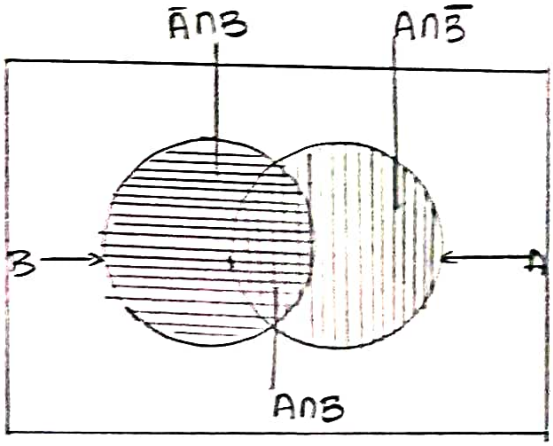
8. Addition Theorem of Probability

Statement: If A and B are any two events (Subsets of Sample Space S) and are not disjoint, then $P(A \cup B) = P(A) + P(B) - P(A \cap B)$.

Proof: We have

$A \cup B = A \cup (\bar{A} \cap B)$

where A and $\bar{A} \cap B$ are mutually disjoint.



$P(A \cup B) = P[A \cup (\bar{A} \cap B)]$

$= P(A) + P(\bar{A} \cap B)$

$= P(A) + [P(\bar{A} \cap B) + P(A \cap B)] - P(A \cap B)$

$= P(A) + P[(\bar{A} \cap B) \cup (A \cap B)] - P(A \cap B)$

$\therefore \bar{A} \cap B$ and $A \cap B$ are disjoint

$P(A \cup B) = P(A) + P(B) - P(A \cap B)$

7. Bayes theorem:

Statement:

If $E_1, E_2 \ldots E_n$ are mutually dissjoint events with $P(E_i) \neq 0$ $(i = 1, 2 \ldots n)$ then for any arbitrary event A which is a subset of $\bigcup_{i=1}^{n} E_i$ such that $P(A) > 0$, we have

$$P(E_i/A) = \frac{P(E_i)\, P(A/E_i)}{\sum_{i=1}^{n} P(E_i)\, P(A/E_i)}$$

proof:

Since $A \subset \bigcup_{i=1}^{n} E_i$

we have

$$A = A \cap \left(\bigcup_{i=1}^{n} E_i\right)$$

$$= \bigcup_{i=1}^{n} (A \cap E_i)$$

By distributive law.

Since $(A \cap E_i) \subset E_i$. $(i = 1, 2 \ldots n)$ are mutually dissjoint events, we have by addition theorem of probability

$$P(A) = P\left\{\bigcup_{i=1}^{n} (A \cap E_i)\right\}$$

$$= \sum_{i=1}^{n} P(A \cap E_i)$$

$$= \sum_{i=1}^{n} P(E_i)\, P(A/E_i)$$

by multiplication theorem of probability.

Also we have

$$P(A \cap E_i) = P(A)\, P(E_i/A)$$

$$\Rightarrow P(E_i/A) = \frac{P(A \cap E_i)}{P(A)}$$

$$= \frac{P(E_i)\, P(A/E_i)}{\sum_{i=1}^{n} P(E_i)\, P(A/E_i)}$$

section C (1×10=10)

(Answer any ONE question).

10. Multiplication theorem of probability

Statement:

For two events A and B,

$$P(A \cap B) = P(A)\, P(B/A), \quad P(A) > 0$$

$$= P(B)\, P(A/B), \quad P(B) > 0$$

Where $P(B/A)$ represents conditional probability of occurrence of B when the event A has already happened and $P(A/B)$ is the conditional probability of happening of A given that B has already happened.

Proof:

Suppose the sample space contains N occurences of which n_A occurences belong to the event A and n_B occurences belong to the evant B. Let n_{AB} be the number of occurences favourable to the compound event A∩B. Then the unconditional probabilities are given by

$$P(A) = \frac{n_A}{N}, \quad P(B) = \frac{n_B}{N} \text{ and } P(A \cap B) = \frac{n_{AB}}{N}$$

Now the conditional probability P(A/B) refers to the sample space of n_B occurences out of which n_{AB} occurences pertain to the occurence of A ie when B has already happened.

$$\therefore P(A/B) = \frac{n_{AB}}{n_B}$$

Similarly we have

$$P(B/A) = \frac{n_{AB}}{n_A}$$

Now $$P(A \cap B) = \frac{n_{AB}}{N}$$

$$= \frac{n_{AB}}{n_A} \frac{n_A}{N}$$

$$= P(B/A) \cdot P(A) \quad \text{(1)}$$

Now $P(A \cap B) = \frac{n_{AB}}{N}$

$$= \frac{n_{AB}}{n_B} \frac{n_B}{N}$$

$$= P(A/B)\ P(B) \quad \cdots \quad (2)$$

From (1) and (2) we get

$P(A \cap B) = P(A) \cdot P(B/A)$ $\quad P(A) > 0$ and

$P(A \cap B) = P(B)\ P(A/B)$. $\quad P(B) > 0$.

11. Limitations of classical probability

i) If the various outcomes of the random experiment are not equally likely or equally probable.

ii) If the exhaustive number of outcomes of the random experiments is infinite.

Limitations of Empirical probability.

If an experiment is repeated a large number of times the experimental conditions may not remain identical and homogeneous.

ii) The limit may not attain a unique value. however large N may be.

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Unit Test – I (2022-2023 Even Semester)

Answer Key

Date : 02/03/2023 **Duration : One hour** **Class :** II B.Sc., BIOCHEMISTRY

Subject Name & Code : Statistics-II / SP3AB

Section-A (5 x 2 = 10)

(Answer any FIVE questions)

1. An experiment is characterised by the property, that its observations under a given set of circumstances do not always lead to the same observed outcome but rather to different outcomes. which follows a sort of statistical regularity. It is called a random experiment.

2. A set of all possible outcomes from an experiment is called a sample space.

3. When an event is decomposable into a number of simple events, then it is called a compound event.

4. It is the total number of all the possible outcomes of an experiment.

5. If in an experiment the occurrence of an event rules out the happening of all other events in the same experiment, then these events are said to be mutually exclusive events.

6. If the happening of any one does not depend on the happening of the other. Events which are not independent are called dependent events.

7. A random variable x is a real valued function defined on a sample space of an experiment.

Section B. (1 x 5 = 5)

(Answer any ONE question)

8. Addition theorem of Probability

Statement: If A and B are any two events (subsets of sample space S) and are not disjoint, then

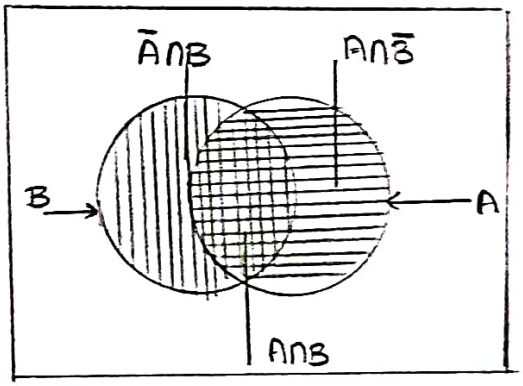
$$P(A \cup B) = P(A) + P(B) - P(A \cap B)$$

Proof:

we have

$$A \cup B = A \cup (\bar{A} \cap B)$$

where A and $\bar{A} \cap B$ are mutually disjoint



$$P(A \cup B) = P[A \cup (\bar{A} \cap B)]$$

$$= P(A) + P(\bar{A} \cap B)$$

$$= P(A) + [P(\bar{A} \cap B) + P(A \cap B)] - P(A \cap B)$$

$$= P(A) + P[(\bar{A} \cap B) \cup (A \cap B)] - P(A \cap B)$$

$\because (\bar{A} \cap B)$ and $(A \cap B)$ are disjoint

$$P(A \cup B) = P(A) + P(B) - P(A \cap B)$$

9 Bayes theorem.

Statement: If $E_1, E_2 \ldots E_n$ are mutually disjoint events with $P(E_i) \neq 0 \ (i = 1, 2 \ldots n)$ then for any arbitrary event A which is a subset of $\bigcup_{i=1}^{n} E_i$ such that $P(A) > 0$, we have

$$P(E_i/A) = \frac{P(E_i)\,P(A/E_i)}{\sum_{i=1}^{n} P(E_i)\,P(A/E_i)}$$

Proof: Since $A \subset \bigcup_{i=1}^{n} E_i$

we have $A = A \cap \left(\bigcup_{i=1}^{n} E_i\right)$

$= \bigcup_{i=1}^{n} (A \cap E_i)$ By distributive law.

Since $(A \cap E_i) \subset E_i \ (i = 1, 2 \ldots n)$ are mutually disjoint events, we have by addition theorem of probability

$$P(A) = P\left\{\bigcup_{i=1}^{n} (A \cap E_i)\right\}$$

$$= \sum_{i=1}^{n} P(A \cap E_i)$$

$$= \sum_{i=1}^{n} P(E_i)\,P(A/E_i)$$

by multiplication theorem of probability

Also we have

$$P(A \cap E_i) = P(A)\,P(E_i/A)$$

$$\Rightarrow P(E_i/A) = \frac{P(A \cap E_i)}{P(A)}$$

$$= \frac{P(E_i)\,P(A/E_i)}{\sum_{i=1}^{n} P(E_i)\,P(A/E_i)}$$

Section C (1×10 = 10)

(Answer any ONE question)

10. Multiplication theorem of probability

Statement: For two events A and B

$$P(A \cap B) = P(A) \cdot P(B/A), \quad P(A) > 0$$
$$= P(B)\ P(A/B), \quad P(B) > 0$$

where $P(B/A)$ represents conditional probability of occurrence of B when the event A has already happened and $P(A/B)$ is the conditional probability of happening of A, given that B has already happened.

Proof:-

Suppose the sample space contains N occurences, of which n_A occurences belong to the event A and n_B occurences belong to the event B. Let n_{AB} be the number of occurences favourable to the compound event $A \cap B$. Then the unconditional probabilities are given by

$$P(A) = \frac{n_A}{N}, \quad P(B) = \frac{n_B}{N}, \text{ and } P(A \cap B) = \frac{n_{AB}}{N}$$

Now the conditional probability $P(A/B)$ refers to the sample space of n_B occurences out of which n_{AB} occurences pertain to the occurence of A i.e when B has already happened.

$$\therefore P(A/B) = \frac{n_{AB}}{n_B}$$

Similarly $P(B/A) = \frac{n_{AB}}{n_A}$

Now $P(A \cap B) = \frac{n_{AB}}{N}$

$= \frac{n_{AB}}{N} \frac{n_A}{N}$

$= P(B/A)\, P(A)$ ... (1)

and $P(A \cap B) = \frac{n_{AB}}{N}$

$= \frac{n_{AB}}{n_B} \frac{n_B}{N}$

$= P(A/B)\, P(B)$ (2)

From (1) and (2) we get-

$P(A \cap B) = P(A) \cdot P(B/A)$ $\quad P(A) > 0$

and $P(A \cap B) = P(B)\, P(A/B)$ $\quad P(B) > 0$

(ii) Limitations of classical probability:

(i) If the various outcomes of the random experiment are not equally likely.

(ii) If the exhaustive number of outcomes of the random experiment is infinite or unknown.

Limitations of Empirical probability:

i) The limit may not attain a unique value however large N may be.

ii) If an experiment is repeated a large number of times, the experimental conditions may not remain identical and

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SRM ARTS AND SCIENCE COLLEGE
Department of Biotechnology
UNIT TEST 1 (EVEN SEMSTER)
ACADEMIC YEAR 2022-2023

ANSWER KEY

Date: 28-02-2023 **Duration:** 1 hour **Class:** II B. Sc. Biotechnology
Subject Name &code: Bioinstrumentation and Biostatistics SC34A Max: 25 marks

Section A

CO4 BL1 4. When the data is obtained from the biological sciences and medicine, we use the term "biostatistics".
CO4 BL1 5. Data are measurements or observation
CO4 BL1 6. A table is a systematic arrangement of statistical data in rows and columns
CO4 BL6 7. The data which are collected originally for the first time.
The data which are taken from records or data already available.

Section B (1 x 5 = 5 marks)

CO4 BL2,4 9. **Nominal Data:** Data of the Nominal level consist of name, labels and categories.
Ordinal Data: Data of the Ordinal level consist of data that can be ordered.
Interval Data: Data of the Interval level consist of data that can be ordered and differences are meaningful
Ratio Data: Data of the Ratio level consist of data that can be ordered; differences are meaningful and zero corresponding to none of the value.

Section C (1 x 10 = 10 marks)
(Answer any **ONE** question)

CO4 BL2,4 11.
Simple Bar Diagram: These diagrams represent only one particular type of data.
Multiple Bar Diagram: These diagrams represent more than one type of data at a time.
Sub-Divided Bar Diagram or **component Bar Diagram:** These diagrams present total values and parts in a set of data.
Percentage Bar Diagram: In percentage bar diagram the rectangles are drawn as per the percentage of the data. All the rectangles are equal in height.
Pie Diagram: Graphical depiction of data as slices of a pie. The frequency determines the size of the slice. The number of degrees in any slice is the relative frequency time's 360 degrees.
Pictograms: In pictogram data drawn in the form of pictures. It is simple and it helps laymen.
Cartograms: In cartogram the data are presented in the form of cartoons. It is simple and it helps layman

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UNIT TEST – I – (2022-2023 EVEN SEM)

SUB :- Elements of Operations Research CLASS :- II B.Com ISM

CODE :- CZ34A DATE :- 06.03.2023.

SECTION – A

1. Operation research is an analytical method of problem-solving and decision-making that is useful in the management of organizations.

2. The field of operation research provides a more powerful approach to decision making then ordinary software and data analytics tools.

3. (i) Agriculture (ii) in finance (iii) in industry (iv) in allocation and distribution (v) Marketing (vi) Personnel Management.

4. (i) A systems orientation (ii) interdisciplinary teams, (iii) application of scientific method

5. (i) Decision making (ii) Scientific approach (iii) Inter-disciplinary team approach (iv) system approach (v) Use of computers

6. $\text{Max } Z = c_1x_1 + c_2x_2 + \cdots + c_nx_n$.

Sub to Constraint.

$$a_{11}x_1 + a_{12}x_2 + \cdots + a_{1n}x_n \leq = \geq b_1$$

$$a_{21}x_1 + a_{22}x_2 + \cdots + a_{2n}x_n \leq = \geq b_2$$

$$\vdots$$

$$a_{m1}x_1 + a_{m2}x_2 + \cdots + a_{mn}x_n \leq = \geq b_n$$

$$x_1, x_2, x_3 \ldots x_n \geq 0.$$

7. The linear inequalities (or) equations (or) restrictions on the variables of a linear Programming problem are called ~~non-negative restrictions~~ constraints. The conditions $x \geq 0, y \geq 0$ are called non-negative restrictions.

SECTION-B

8. Techniques of OR.

(i) linear Programming
(ii) Transportation Problem
(iii) Assignment Problem
(iv) Queuing theory
(v) Game theory
(vi) Inventory Control models
(vii) Network analysis
(viii) Integer Programming.

9. limitations of LPP

(i) linear Programming methods are applicable only when values for costs, constants, etc.

(ii) According to the linear PP, the solution variables can have any values, whereas sometimes it happens that some of the variables can have only integral values.

(iii) There must be alternative courses of action.

(iv) Another necessary requirement is that decision variables should be integer valued and non-negative. the non-negativity condition shows that LP deals with real-life situations, for which negative quantities are generally illogical.

(v) Parameters appearing in LPP are assumed to be constant but in real-life situations, they are frequently neither known nor constant.

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10.

SECTION - C

Applications of operations research.

(1) Finance Budgeting and Investment

(2) Marketing

(3) Physical Distribution

(4) Purchasing, Procurement and Exploration

(5) Personnel

(6) Production

(7) Research and Development.

limitation of Operations research.

(1) There are certain problems which a decision-maker may have to solve only once.

(2) Sometimes the basic data are subject to frequent changes, Modification of O.R. models is a costly affair.

(3) Some times models do not represent the realistic situations in which decisions must be made.

(4) ~~after~~ decision-maker is not fully aware of the limitations of the models that he is using.

11.

	Preparation cost (Rs)	Man-days required	Profit in Rs. per acre
Corn			
Wheat			
Soyabeans			
Area			

Selling price $= Rs\,(2000x(1) + 3000y(0.75) + 1000z(2))$

$= Rs.\,(2000x + 2250y + 2000z)$

No of man-days required in sowing, cultivating and harvesting $= 5x + 6y + 5z$

Price of one man-day $= Rs.\,20$

Labour cost $= 20(5x + 6y + 5z) = 100x + 120y + 100z$

Fertilizer cost $= Rs(50x + 50y + 25z)$

Total price (Farmer) $=$ L.C + F.C

$= Rs.\,150x + 170y + 125z$

$Z = 1850x + 2080y + 1875z$

Sub to C

$x + y + z \leq 100$

$5x + 6y + 5z \leq 400$

$x, y, z \geq 0.$

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DEPARTMENT OF MATHEMATICS

UNIT TEST. - I (2022 - 2023) EVEN SEMESTER

CLASS : II B.COM (AKF) ANSWER KEY

SUB : ELEMENTS OF OPERATION RESEARCH / CZ34A

SECTION - A

1. Define OR:

OR is a scientific method of providing executive departments with a qualitative basis for decisions regarding the operations under their control.

2. List out the applications of OR.

a) Maximization of profit or minimization of cost
b) Assignment Problems
c) Inventory control problems
d) optimal allocation of available limited resources.
e) Transportation problems.

3. List the various phases of OR.

(i) Formulation of the Problem
(ii) Developing a mathematical model
(iii) Solving the model
(iv) controlling and updating
v) Validating the model
vi) Implementation.

4. Define linear Programming.

LP is a mathematical tool for choosing a best alternative from a set of feasible alternatives, in a scenario where the objective function and restrictions are expressed as linear function.

5. Write any two advantages of LP.

(i) It approaches a problem in a scientific way

(ii) It facilitates logical thinking and provides better insight into complex problems.

6. List any two limitations of LP.

(i) LP technique cannot solve business Problems involving variables related in a non-linear manner.

(ii) It cannot be applied to Problems where variables cannot be stated quantitatively.

7. Write any two advantages of OR.

(i) Leads to optimum use of available limited resources

(ii) Suggests improvement to the existing system.

section-B

8 Explain the application of OR.

1) Financial Management
2) Production Management
3) Procurement Management
4) Marketing Management
5) physical Distribution
6) Personnel department.
7) Manufacturing
8) Project
9) Human resources
10) Logistics.

9. Explain the basic assumptions of LPP.

(1) Additivity
(2) Proportionality
(3) Divisibility
(4) Certainty
(5) Fitness
(6) Optimality

Section-C

10. Explain the types of OR. Technique

* Linear Programming is a mathematical model which indicates how to use the available limited resources to achieve a given objective, profit, maximisation or minimisation cost.

- Game theory is a concerned with a method of determining an optimum strategy in the face of an opponent who will be having a strategy of his own not known to others.

* Network Analysis contains PERT and CPM. They are robust management tools for planning and controlling complex jobs involving multiple activities.

* Dynamic Programming is a mathematical technique of optimisation using multi-stage decision process.

* Replacement models are used to determine when a capital equipment should be replaced economically by another of the same type or a different one.

* Queueing theory helps the management in deciding on the optimal no. of counters so as to satisfy the customers while keeping the overall cost at a minimum level.

* Sequencing problems involves to determining an appropriate order for a series of job to be operated using limited number of service facilities in such a way as to minimise the total time taken for finishing all the jobs.

11. **Solution:**

Time.	A	B	maximum
Production constraint:	0.2hrs.	0.4 hrs	200hrs
	x_1	-	400tons
Production constraint:	-	x_2	300 tones

objective function

$$\max z = Rs.300x_1 + 600x_2$$

subject to constraints.

$$0.2x_1 + 0.4x_2 \leq 200$$

$$x_1 \leq 400$$

$$x_2 \leq 300 \quad x_1, x_2 \geq 0.$$

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UNIT TEST – I – (2022-2023 EVEN SEM)

SUB :- OPERATIONS RESEARCH

CODE : BB34A

CLASS : II BBA

DATE : 02.03.2023.

SECTION – A

1. Operation research is an analytical method of problem-solving and decision-making that is useful in the management of organizations.

2. The field of operation research provides a more powerful approach to decision making than ordinary software and data analytics tools.

3. OR has effectively penetrated numerous scientific fields. It is helpful in numerous significant areas.
(i) Financial Planning & Budgeting. (ii) Data Analytics (iii) Industry (iv) Production (v) Marketing (vi) Research & Development (vii) Agriculture. (viii) Business operation.

4. The three phases of the process are formulation, analysis, and interpretation.

5. The linear Programming Problems is a problem that is concerned with finding the optimal value of the given linear function. The optimal value can be either maximum value or minimum value.

6. The objective function is to

maximize $Z = c_1x_1 + c_2x_2 + \cdots + c_nx_n$

Subject to the constraints

$$a_{11}x_1 + a_{12}x_2 + \cdots + a_{1n}x_n \leq b_1$$

$$a_{21}x_1 + a_{22}x_2 + \cdots + a_{2n}x_n \leq b_2$$

$$\vdots$$

$$a_{m1}x_1 + a_{m2}x_2 + \cdots + a_{mn}x_n \leq b_m$$

$$x_1, x_2, \ldots x_n \geq 0.$$

7. (i) Primary focus on decision making.
(ii) Scientific approach.
(iii) It is interdisciplinary model.
(iv) Model building and Mathematical manipulation provide the Methodology.
(v) Use the high speed computer.

SECTION – B.

8. Algorithm of Graphical Method:-

(i) Identify the problem for the decisions variables the objective function and the constraint restrictions.
(ii) set up the mathematical formulation of problem.
(iii) Draw the graph representing all the constraints of the problem and identify the feasible region. The feasible region is the intersection of all the region represented by the constraints of the problem and is restricted to the 1st quadrant only.
(iv) The feasible region is obtained in step 3 may be

bounded (or) unbounded. Compute the co-ordinates of the all the corners points of the feasible region.

(5) find out the value of the objective function at each corner point determined in step: 4.

(6) select the corner point that optimizes (max or min) the value of the objective function. It gives the optimum solution.

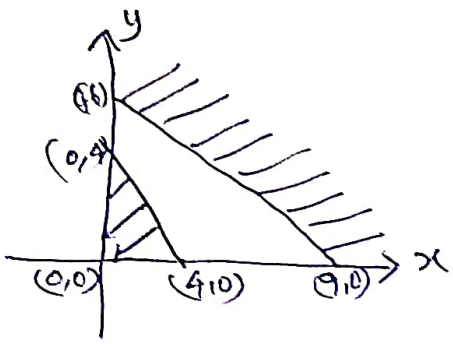
9. $\text{mini } z = -3x + 4y$

Sub to C $\quad x + y \leq 4,\ 2x + 3y \geq 18,\ x; y \geq 0.$

$x + y = 4 \rightarrow (4,0), (0,4)$

$2x + 3y = 18 \rightarrow (0,6)\ (9,0)$

There is no feasible solution.



SECTION - C

10. $\text{Max } z = 4x_1 + 10x_2 + 0s_1 + 0s_2 + 0s_3$

S to C

$$2x_1 + x_2 + s_1 + 0s_2 + 0s_3 = 50$$
$$2x_1 + 5x_2 + 0s_1 + s_2 + 0s_3 = 100$$
$$2x_1 + 3x_2 + 0s_1 + 0s_2 + s_3 = 90$$

$s_1 = 50,\ s_2 = 100,\ s_3 = 90$

$\text{Max } z = 200,\ x_1 = 0,\ x_2 = 0.$

11. $\text{Max } z = -\text{Mini } z$

$\text{Max } z = -x_1 + 3x_2 - 2x_3 + 0s_1 + 0s_2 + 0s_3$

S to C

$$3x_1 - x_2 + 2x_3 + s_1 + 0s_2 + 0s_3 = 7$$
$$-2x_1 + 4x_2 + 0x_3 + 0s_1 + s_2 + 0s_3 = 12$$
$$-4x_1 + 3x_2 + 8x_3 + 0s_1 + 0s_2 + s_3 = 10$$

$\text{Mini } z = -11,\ x_1 = 4,\ x_2 = 5,\ x_3 = 0.$

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SRM ARTS AND SCIENCE COLLEGE

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Unit Test – I (2022-2023 Even Semester)
Answer Key

Date : 28-2-2023 **Duration : One hour** **Class : I M.Com**

Subject Name & Code : **Quantitative Techniques for Business Decisions**

Section A (5 x 1 = 5 marks)

(Answer any **FIVE** questions)

1. Trial: The experiment is known as trial.

2. Total number of possible outcomes

3. Set of all the outcomes of event

4. (i) mean = np , (ii) variance = npq

5. A decision tree shows the order of decision and outcome. A decision tree consists of node and arcs

6. Subset, or part of a population

7. It is a constant that describes a population.

Section B (2 x 5 = 10 marks)

(Answer any **TWO** questions)

8. **Statement:** If A and B are the two event of a random experiment with P (A) > 0 and P (B) >0

Then $P(A \cap B) = P(A)\, P(B|A)$

$= P(B)\, P(A|B)$ .....

9. $P(4) = \frac{\text{Number of favourable event}}{\text{Number of exhaustive event}} = \frac{1}{6}$

$P(\text{Even number}) = \frac{\text{Number of favourable event}}{\text{Number of exhaustive event}} = \frac{3}{6} = \frac{1}{2}$

$P(\text{Odd Number}) = \frac{\text{Number of favourable event}}{\text{Number of exhaustive event}} = \frac{3}{6} = \frac{1}{2}$

10. Mean $= \lambda$, variance $= \lambda$

11. Central limits theorem that the mean of random sample drawn from any distribution with $E(X) = \mu$ and $V(X) = \sigma^2$ will have an approximately normal distribution with $E(\bar{X}) = \mu$ and $V(\bar{X}) = \sigma^2$.

Section C (1 x 10 = 10 marks)

(Answer any **ONE** question)

12. Statement: The probability of event A given that event B has subsequently occurred is

$$P(A_j|B) = \frac{P(A_j)\, P(B|A_j)}{\sum_{j=1}^{n} P(A_j)\, P(B|A_j)}, \quad \text{.....}$$

13. Simple Random Sampling (SRS): This method requires that each unit in the population gets an equal chance.....

Systematic Sampling: This method requires that every k^{th} member (or items) of the population be selected to form the required random sample.....

Stratified Sampling: This method requires that the population be classified into a number of smaller homogeneous strata or subgroups.....

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Department of Mathematics

UNIT TEST-II (Answer key)-(2022-2023 EVEN)

SUB:- STATICS
CODE:- SM24B

CLASS:- II B.Sc Maths
DATE:-

SECTION-A

1. It is the measure of the force of gravity acting on a body. ($W = mg$).

2. Tension is a force along the length of a medium especially a force carried by a flexible medium such as a rope or cable.

3. Limiting friction is described as the friction created when two static surfaces come into contact with each other.

4. Hooke's law defines the linear relationship b/w stress and strain within the elastic region.

$\sigma = E\varepsilon$

σ = stress
E = modulus of elasticity (or) young's modulus
ε = strain.

5. The center of mass depends upon the position of the object. In the solar system, the mass of an object turns to zero. The centre of mass depends upon the distribution of mass along with the shape of an object. The center of mass changes when the external force acted upon the object.

6. A body is in stable equilibrium under the action of gravity if its center of mass is directly over its base of support.

7. The centre of gravity for regular bodies lies at the centre of the body. Therefore, the centre of gravity of a uniform ring is situated at the centre of the ring.

SECTION – B

8. Let P be the force required to support the body and μ be the coefficient of friction.

Case (i) when plane make inclination of 30°

in this case, $R = 6g \cos 30^\circ$

$\mu R = 6g \sin 30^\circ$ [limiting equilibrium]

$\therefore \mu = \tan 30^\circ = \frac{1}{\sqrt{3}}$

Case (ii) when plane raised to the slope of 60°

in this case,

$S = 6g \cos 60^\circ$, $P + \mu S = 6g \sin 60^\circ$

$P + \frac{1}{\sqrt{3}} (6g \cos 60^\circ) = 6g \sin 60^\circ$

$P = 6g \left(\frac{\sqrt{3}}{2} - \frac{1}{2\sqrt{3}} \right) = 2\sqrt{3}\, g$

$P = 2\sqrt{3}$ kg-wt.

9. $r^2 = a^2 \cos 2\theta$

since one loop of the lemniscate of Bernoullis 0 to $\frac{\pi}{4}$., we can integrate from $\frac{\pi}{4}$ to $\frac{5\pi}{4}$

area of polar region

$$A = \frac{1}{2}\int_{\frac{\pi}{4}}^{\frac{5\pi}{4}} (r(\theta))^2 d\theta.$$

Substituting $r^2 = a^2 \cos 2\theta$,

we get $A = \frac{1}{2}\int_{\pi/4}^{5\pi/4} a^2 \cos 2\theta \, d\theta = \frac{a^2}{2}$.

Integrating this expression over the entire area of one loop of the lemniscate of Bernoulli,

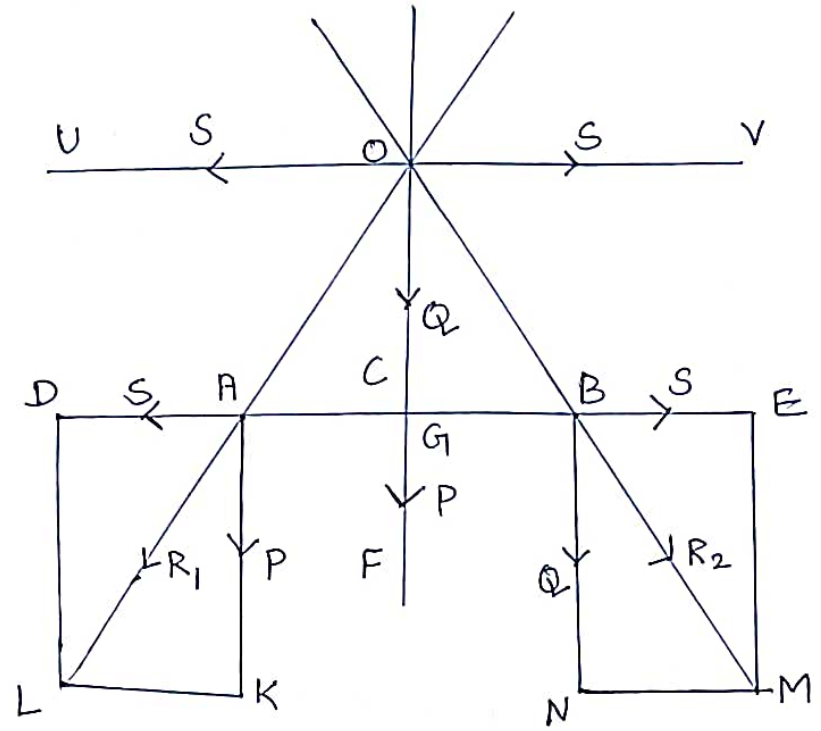
$$M_x = \int_{\pi/4}^{5\pi/4} (r\cos\theta)(a^2\cos 2\theta)\, d\theta \Big/ a^2/2$$

$M_x = 0$.

$\therefore$ The coordinate of C.G is $(0, 0)$.

SECTION–C

10. Let P and Q be like parallel Forces acting at A and B of a rigid body and represented by AK and BN respectively.



Now Resultant of P and Q = P(A) + Q(B)

$\Rightarrow$ P(A) + S(A) + S(B) + Q(B)

$\Rightarrow$ $R_1(A) + R_2(B)$

$\Rightarrow$ $R_1(O) + R_2(O)$

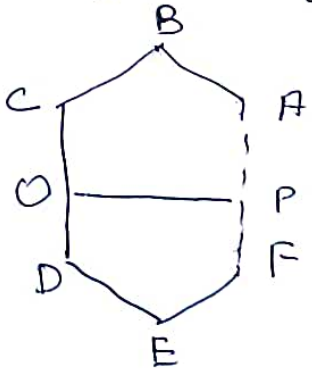
$\Rightarrow$ P(OF) + S(OU) + Q(OG) + S(OV) $\Rightarrow$ P(OF) + Q(OG)

$\Rightarrow$ A force of magnitute P + Q acting at O along OC.

$\Rightarrow$ A force of magnitude P + Q acting at C parallel to given force and acts in the same direction as that of P and Q.

11. A rod of length 5a is bent, Five sides of a regular hexagon.

$$GM = \frac{OM}{5} = \frac{1}{5}\frac{\sqrt{3}}{2}a .$$



ΔCDM is equilateral

[Area of an equilateral triangle $= \frac{\sqrt{3}}{2}a$]

$h = \frac{\sqrt{3}}{2}c.$

$$GA^2 = (GM + MP)^2$$

$$= \left(\frac{\sqrt{3}}{10}a + \frac{\sqrt{3}}{2}a\right)^2 + \frac{a^2}{4}$$

$$= 3a^2\left(\frac{36}{100}\right) + \frac{a^2}{4} = \frac{133}{100}a^2$$

$$G.A = \sqrt{1.33}\,a$$

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Department of Mathematics

Unit Test – II (2022-2023 Even Semester)

Answer Key

Date : 13.4.2023 **Duration : One hour** **Class :** III BSc mathematics

Subject Name & Code : Mathematical statistics - II / SMBAG

Section A (5 x 2 = 10)

(Answer any FIVE questions)

1. The interval estimation of the population parameter is the estimation of the population parameter by an interval around the point.

2. The statistical hypothesis that is set up for testing a hypothesis is known as Null Hypothesis.

3. A test of statistical hypothesis, when the alternative hypothesis is one tailed is called as one tailed test.

4. The standard deviation of the sampling distribution of a statistic is known as its standard error.

5. The sampling distribution of any statistic in its standardised form is $N(0,1)$ asymptotically i.e., as $n \to \infty$. In other words the sampling distribution of any statistic t is normally distributed with mean 0 and variance 1 and is given by

$$Z = \frac{t - E(t)}{SE(t)} \sim N(0,1) \text{ as } n \to \infty$$

The theory of large sample ($n > 30$) is based on the above property of the sampling distribution.

6. The following are the assumption of ANOVA

i) The observations are independent

ii) parent population from which observations are taken is normal

iii) various treatment and environment effects are additive in nature

7. The case when there are two factors which may affect the variate values x_{ij}. eg. the yield of milk may be affected by difference in treatments.

Section B

$(1 \times 5 = 5)$

(Answer any ONE question)

8. TYPE I Error : It is the error of rejecting null hypothesis H_0 when it is true. When a null hypothesis is true, but the difference is significant and the hypothesis is rejected, then a TYPE I Error is made.

TYPE II Error : It is the error of accepting the null hypothesis H_0 when it is false. In other words when a null hypothesis is false, but the difference is insignificant and the hypothesis is accepted, a type II error is made.

9. Let us consider the case when there are two factors which may affect the variate values x_{ij}, e.g the yield of milk may be affected by difference in treatments ie., rations as well as the difference in variety ie breed and stock of the cows. Let us now Suppose that the N cows are divided into h different groups or classes according to their breed and stock. each group Containing K cows and then let us consider the effect of K treatments on the yield of milk.

Let the suffix i refer to the treatments and j refer to the varieties then the yield of milk x_{ij} $(i: 1, 2, \ldots K, j: 1, 2 \ldots h)$ of $N = h \times K$ cows furnish the data for the comparison of the treatments. The yields may expressed as variate values in the following $K \times h$ two way table.

					Mean	Total
	X_{11}	X_{12} ... X_{1j}		X_{1h}	$\bar{X}_1$	T_1
	X_{21}	X_{22} ... X_{2j}		X_{2h}	$\bar{X}_2$	T_2
	X_{i1}	X_{i2} ... X_{ij}		X_{ih}	$\bar{X}_i$	T_i
	X_{K1}	X_{K2} ... X_{Kj}		X_{Kh}	$\bar{X}_K$	T_K
Mean	$\bar{X}_{.1}$	$\bar{X}_{.2}$ ... $\bar{X}_{.j}$		$\bar{X}_{.h}$	$\bar{X}$	
Total	$T_{.1}$	$T_{.2}$ ... $T_{.j}$		$T_{.h}$		G

section C

(Answer any ONE question) $1 \times 10 = 10$

10. Neyman pearson Lemma :

Let $K > 0$, be a constant and w be a Critical region of size α such that

$$W = \left\{ x \in S : \frac{f(x, \theta_1)}{f(x, \theta_0)} > K \right\}$$

$$\Rightarrow \quad W = \left\{ x \in S : \frac{L_1}{L_0} > K \right\}$$

and

$$\bar{W} = \left\{ x \in S : \frac{L_1}{L_0} < K \right\}$$

Where L_0 and L_1 are the likelihood function of the sample observations $x = (x_1, x_2, \ldots x_n)$ under H_0 and H_1 respectively. Then W is the most powerful critical region of the test hypothesis $H_0 : \theta = \theta_0$ against the alternative $H_1 : \theta = \theta_1$

Proof: We are given

$$P(X \in W / H_0) = \int_W L_0 dx = \alpha$$

The power of the region is

$$P(X \in W / H_1) = \int_W L_1 dx = 1 - \beta \text{ (say)}$$

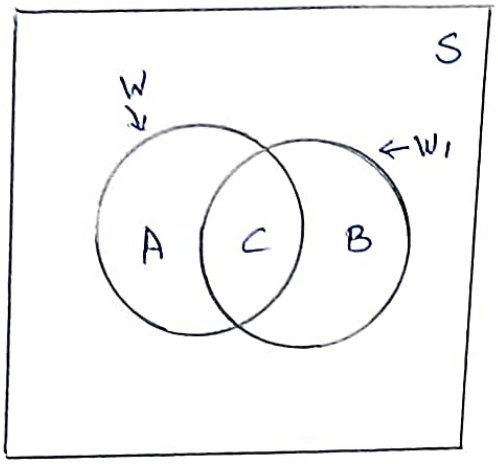
In order to establish the lemma, we have to prove that there exists no other critical region, of size less than or equal to α, which is more powerful than W. Let W_1 be another critical region of size $\alpha_1 \leq \alpha$ and power $1-\beta_1$ so that we have

$$P(X \in W_1 / H_0) = \int_{W_1} L_0 dx = \alpha_1 \quad \ldots \quad (1)$$

and $$P(X \in W_1 / H_1) = \int_{W_1} L_1 dx = 1 - \beta_1 \quad (2)$$

Now we have to prove that $1 - \beta \geq 1 - \beta_1$

Let $W = A \cup C$ and $W_1 = B \cup C$



(C may be empty, ie. W and W_1 may be disjoint)

If $\alpha_1 \leq \alpha$ we have

$$\int_{W_1} L_0\, dx \leq \int_{W} L_0 dx$$

$$\Rightarrow \int_{B\cup C} L_0\, dx \leq \int_{A\cup C} L_0 dx$$

$$\Rightarrow \int_{B} L_0 dx \leq \int_{A} L_0 dx$$

$$\Rightarrow \int_{A} L_0 dx \geqslant \int_{B} L_0 dx \quad \ldots \quad (3)$$

Since $A \subset W$.

$$\Rightarrow \int_{A} L_1\, dx > K \int_{A} L_0 dx \geqslant K \int_{B} L_0 dx \quad \ldots (4)$$

Also implies

$$\frac{L_1}{L_0} \leq K \quad \forall x \in \bar{W}$$

$$\Rightarrow \int_{\bar{W}} L_1\, dx \leq K \int_{\bar{W}} L_0\, dx$$

This result also holds for any subset of W, say $W \cap W_1 = B$. Hence

$$\int_B L_1 dx \leq K \int_B L_0 dx \leq \int_A L_1 dx$$

Adding $\int_C L_1 dx$ to both sides we get

$$\int_{W_1} L_1 dx \leq \int_W L_1 dx \Rightarrow 1-\beta \geq 1-\beta_1$$

Hence the lemma.

11.

								Total
T_1	15	19	5	16	16	19		84
T_2	43	47	64	51	72			277
T_3	27	32	10	25	61	23	29	243
T_4	63	65	70	52	93			343

$$\text{correction factor} = \frac{(84+277+243+343)^2}{23}$$

$$= 38991.7$$

$$\text{Treatment Sum of Square} = \frac{84^2}{6} + \frac{277^2}{5} + \frac{243^2}{7} + \frac{343^2}{5} - 38991.7$$

$$= 94995.47$$

Total Sum of Square

$= 15^2 + 19^2 + 5^2 + \ldots\ldots + 52^2 + 93^2 - 38991.7$

$= 12211.3$

Error Sum of Square

$= 12211.3 - 9495.47 = 2715.83$

ANOVA Table

Source	df	Sum of square	Mean Sum of Square	F-Ratio
Treatment	3	9495.5	3165.16	22.14
Error	19	2715.83	142.94	
Total	22	12211.3		

Result:

Calculated F-Ratio = 22.14

Table value (3, 19) df at 5% = 3.13

Inference:

Since the calculated value is greater than the table value, we reject the hypothesis at 5% level of significance among the four varities of Corn.

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UNIT Test – 2
(2022 – 2023 even)

Class : III B.Sc. Maths.

Sub : Algebraic Structures – 2 / SM26A

Answer Key

Part A.

1. Inner Product Space.

Let V be a Vector Space over C, Assume the function $\langle\ \rangle : V \times V \to C$ is defined for any $u, v \in V$ and satisfies the follow axioms.

i) $\langle u, v\rangle = \overline{\langle v, u\rangle}$

2) $\langle \alpha u + \beta v, w\rangle = \alpha\langle u, w\rangle + \beta\langle v, w\rangle$

3) $\langle u, u\rangle \geq 0$. & $\langle u, u\rangle = 0$ iff $u = 0$.

2. Example of inner Product space.

The Vector Space R^n with the dot Product $u \cdot v = a_1b_1 + a_2b_2 + \dots + a_nb_n$ where $u = [a_1, a_2, \dots a_n]^T$, $v = [b_1, b_2, \dots b_n]^T \in R^n$ is an inner Product Space.

3. $\|\alpha u\| = |\alpha| \|u\|$. for $\alpha_1 \in F$, $u \in V$.

$\|\alpha u\|^2 = \langle \alpha u, \alpha u\rangle = \alpha\langle u, \alpha u\rangle$

$= \alpha\bar{\alpha}\langle u, u\rangle = |\alpha|^2 \|u\|^2$

$\Rightarrow \|\alpha u\| = |\alpha| \|u\|$

4. Length of V.

Let V be an vector Space and let $u \in V$, the norm & length of V, denoted by $\|u\|$ is

$\|u\| = \sqrt{\langle u, u\rangle}$.

5) $W^{\perp}$

Let V be an inner Product Space. Let W be a subset of V. The orthogonal Complement of W denoted by $W^{\perp}$, is the set of all vectors in V which are orthogonal to every vector of S. i.e. $W^{\perp} = \{ x / x \in V \text{ and } \langle x, u \rangle = 0 \text{ for all } u \in W \}$

6. Length of $w_1 = \langle 3, 2, 1 \rangle =$

$\|w_1\|^2 = \langle w_1, w_1 \rangle = 3^2 + 2^2 + 1^2 = 9 + 4 + 1 = 14$

$\|w_1\| = \sqrt{14}$.

7. Let V be inner Product space, let $u, v, w \in V$ and $\alpha \in F$ then

$\langle \alpha u + \beta v, w \rangle = \langle \alpha u, w \rangle + \langle \beta, w \rangle$

$= \alpha \langle u, w \rangle + \langle \beta, w \rangle$

8) $W^{\perp}$ is subspace of W.

Clearly $0 \in W^{\perp}$, and hence $W^{\perp} \neq \phi$.

Now let $x, y \in W^{\perp}$, $\alpha, \beta \in F$

then $\langle x, u \rangle = \langle y, u \rangle$ for all $u \in W$

$\therefore \langle \alpha x + \beta y, u \rangle = \alpha \langle x, u \rangle + \beta \langle y, y \rangle = 0$ for all $u, v \in W$

$\therefore \alpha x + \beta y \in W^{\perp}$ Hence $W^{\perp}$ is a subspace of V.

9. $V = W \oplus W^{\perp}$

The finite dimensional vector space (inner Product) V can be expressed as the direct sum of the subspace W and its orthogonal complement of $W^{\perp}$, which denotes $V = W \oplus W^{\perp}$

10) Cauchy – Schwartz inequality

Let V be an inner Product space over F, then for any $u, v \in V$, then $|\langle u, v\rangle| \leq \|u\|\|v\|$

Proof: $y(t) = \langle u + tv, u + tv\rangle$

$= \langle u, u + tv\rangle + \langle tv, u + tv\rangle$

$= \langle u, u\rangle + 2\langle u, v\rangle t + \langle v, v\rangle t^2$

Thus $\langle u, u\rangle + 2\langle u, v\rangle t + \langle v, v\rangle t^2 = 0$.

has atmost one solution as $y(t) \geq 0$.

This implies the discriminant ≤ 0.

$\therefore (2\langle u, v\rangle)^2 - 4\langle u, v\rangle\langle v, v\rangle \leq 0$

it follows the Proof.

11) Gram – Schmidth orthogonalisation Process.

Given a set of linearly independent vectors $\{v_1, v_2, \ldots v_k\}$ in an inner Product space V. the Gram – Smidth orthogonalisation Process produces a set of orthogonal vectors $\{u_1, u_2, \ldots u_k\}$ such that the span of $\{u_1, u_2, \ldots u_i\}$ is the same as the span of $\{v_1, v_2, \ldots v_i\}$ for all i from 1 to k.

— x —

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DEPARTMENT OF MATHEMATICS

UNIT TEST – II (2022 – 2023) EVEN SEMESTER

CLASS : III – B.Sc.,(MATHS) SCHEME OF VALUATION SUB: REAL ANALYSIS – II

SECTION – A

(1) Let $\langle M, \rho \rangle$ be a metric space we say that a subset A of M is bounded if $\exists$ a positive number L such that $\rho(x, y) \leq L$.

(2) Let $\langle M, \rho \rangle$ be a metric space, A subset A of M is said to be totally bounded, if $\exists$ finite subsets $A_1, A_2, \cdots, A_n$ of M such that $\operatorname{diam} A_k < \epsilon$ and $A \subset \bigcup_{k=1}^{n} A_k$.

(3) A metric space $\langle M, \rho \rangle$ is said to be complete if every Cauchy sequence of points of M converges to a point in M.

(4) Contraction on M, if $\exists$ a real number α, such that $0 \leq \alpha < 1$ and $\rho(Tx, Ty) \leq \alpha \rho(x, y)$.

(5) A metric space $\langle M, \rho \rangle$ is said to be compact if $\langle M, \rho \rangle$ is both complete and totally bounded.

(6) Let M be a set. the family $\mathcal{F}$ of sets $A \subset M$ is said to form a covering of M. if $M \subset \bigcup_{A \in \mathcal{F}} A$.

(7) To prove that R^2 is compact, if and only if A is closed and bounded.

SECTION – B

(8) first we have to prove totally bounded, then $\operatorname{diam} A_k < 1$ and

$$\rho(x, y) < D + 2.$$

(9) $d(x_n, x_m) = \begin{cases} 0, & \text{if } n = m \\ 1, & \text{if } n \neq m \end{cases}$

$d(x_n, x_m) < \epsilon < 1/2 \quad (\because \epsilon = 1/2)$

then finally, $\lim_{n \to \infty} x_n = x \in R_d$.

SECTION – C

(10) Statement: (a) $F_1 \supset F_2 \supset \ldots \supset F_n \supset F_{n+1} \supset \cdots$

(b) diam $F_n \to 0$ as $n \to \infty$ then $\bigcap_{n=1}^{\infty} F_n$ contains precisely one point.

Then we have to prove the theorem.

(11) To prove: T has precisely one fixed point.

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UNIT TEST - II (Even semester) (2022-2023)

Department of Mathematics

Answer key

Class : III B.Sc Mathematics

Sub : Complex Analysis

Section-A

1. Linear fractional transformation:

It is a function of the form

$w: \frac{az+b}{cz+d}$, where $a,b,c,d \in C$, $ad-bc \neq 0$.

2. Define cross ratio.

Let z_1, z_2, z_3, z_4 be four distinct points in the extended complex plane.

$$(z_1, z_2, z_3, z_4) = \frac{(z_1-z_3)(z_2-z_4)}{(z_1-z_4)(z_2-z_3)}$$, if none of z_1, z_2, z_3, z_4 is ∞.

3. Given, $w_1 = -i$, $w_2 = 1$, $w_3 = -i$,

$z_1 = -1$, $z_2 = 0$, $z_3 = 1$

$$\frac{(w-1)(-i+i)}{(w+i)(-i-1)} = \frac{(z-0)(-1-1)}{(z-1)(-1-0)}$$

$$(w-1)(0) = \frac{z(-2)}{(z-1)(-1)}$$

$$-2z = -z+1$$

$$\boxed{z = -1}$$

4). $w = \frac{2z-5}{z+4}$

$z(z+4) = 2z-5$

$z^2+4z-2z+5=0$

$z^2+2z+5=0$

$z = \frac{-2 \pm \sqrt{-16}}{2} = \frac{-2 \pm i4}{2}$

$\boxed{z = -1 \pm 2i}$

$z = \frac{-b \pm \sqrt{b^2-4ac}}{2a}$

$z = \frac{-2 \pm \sqrt{4-4(1)(5)}}{2}$

$z = \frac{-2 \pm \sqrt{4-20}}{2}$

5). $w = \frac{3z-4}{z-1} \Rightarrow z = \frac{3z-4}{z-1}$

$z^2 - z - 3z + 4 = 0$

$z^2 - 4z + 4 = 0$

$(z-2)^2 = 0$

$z = 2.$

6). $w = 2 - \frac{2}{z}$, $z = 2 - \frac{2}{z} = z^2 - 2z + 2 = 0$

$z = \frac{2 \pm \sqrt{4-8}}{2} = \frac{2 \pm \sqrt{-4}}{2}$

$z = \frac{2 \pm i2}{2}$

$z = 1+i.$

7. $w = z+b.$

If $z = x+iy$, $w = u+iv$ and $b = b_1 + ib_2$ then the image of the point (x, y) in the z-plane is the point $(x+b_1, y+b_2)$ in the w-plane.

Section-B

8. Given, $\left| \frac{1}{w} - 3i \right| = 3 \Rightarrow \left| \frac{1}{u+iv} - 3i \right| = 3$

$\Rightarrow |1 - 3i(u+iv)| = 3|u+iv|$

$\Rightarrow |(1+3v) - i3u| = 3|u+iv|$

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$$(1+3v)^2 + 9u^2 = 9(u^2+v^2)$$

$$1+6v+9v^2+9u^2 = 9u^2+9v^2$$

$$6v+1 = 0.$$

Hence, the image of the circle $|z-3i|=3$ under $w=\frac{1}{z}$ in the z-plane is the straight line $6v+1=0$ in the w-plane.

9. Find the image of the half-plane $x>c_1$, $c_1>0$ under $w=1/z$, also find the fixed points of w.

Solution:

Given $w=\frac{1}{z}$, $z=\frac{1}{w}$

$$x+iy = \frac{u-iv}{u^2+v^2} \Rightarrow x = \frac{u}{u^2+v^2}, \quad y = \frac{-v}{u^2+v^2}$$

Given, $x>c_1$, $c_1>0$

$$\frac{u}{u^2+v^2} > c_1$$

$$u > c_1(u^2+v^2)$$

$$c_1(u^2+v^2) < u$$

$$u^2 - \frac{u}{c_1} + v^2 < 0$$

$$u^2 - 2u\frac{1}{2c_1} + \left(\frac{1}{2c_1}\right)^2 + v^2 < \left(\frac{1}{2c_1}\right)^2$$

$$\left(u-\frac{1}{2c_1}\right)^2 + v^2 < \left(\frac{1}{2c_1}\right)^2$$

the image is the interior of the circle in w-plane with centre $\left(\frac{1}{2c_1}, 0\right)$ & radius $= \frac{1}{2c_1}$.

Section-C

10. Discuss the transformation $w = e^z$.

$$w = e^z$$

Let $z = x + iy$ and $w = \rho e^{i\phi}$

$$\therefore \rho e^{i\phi} = e^x \cdot e^{iy}$$

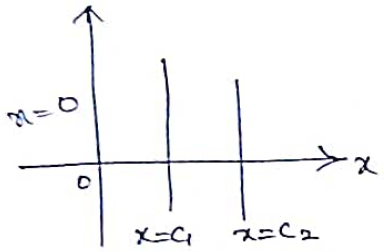
Hence $\rho = e^x$, $y = \phi$

$$u = e^x \cos y \longrightarrow (1)$$

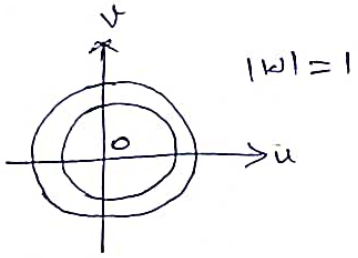
$$v = e^x \sin y \longrightarrow (2)$$

Eliminating 'y', we get

$$u^2 + v^2 = e^{2x} \longrightarrow (3)$$



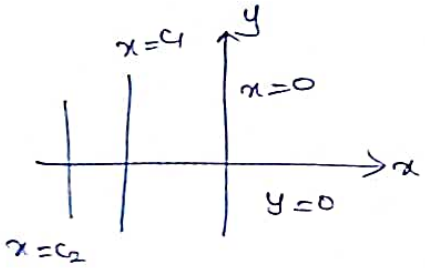
z-plane



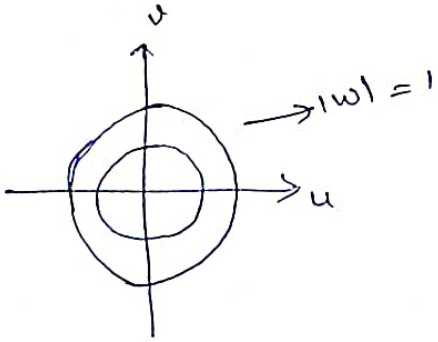
w-plane

When $x = -k$

$$u^2 + v^2 = e^{-2k}$$



z-plane



Eliminating of $x, v = u\tan y$

$$v = au$$

Hence, the real axis in the z-plane is transformed to real axis in the w-plane.

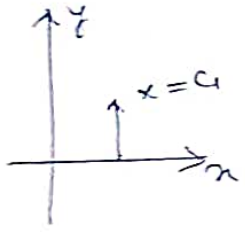
11. Discuss the transformation $w = z^2$.

Soln:

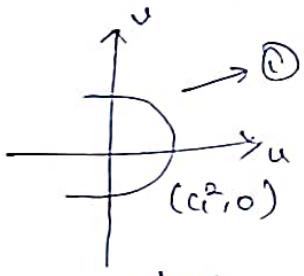
$$w = z^2$$
$$w = (x+iy)^2$$
$$w = x^2 - y^2 + 2ixy$$
$$u = x^2 - y^2 \quad , \quad v = 2xy$$

case (i)

$$x = c_1 \quad , \quad v = 2c_1 y$$
$$v^2 = -4c_1(u - c_1^2) \longrightarrow (1)$$



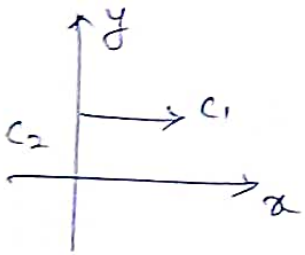
z-plane



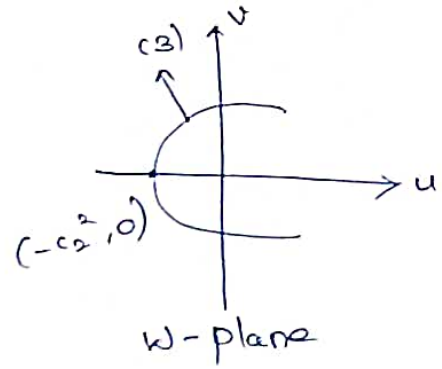
w-plane

case (ii)

$$y = c_2 \quad \Rightarrow \quad v^2 = 4c_2^2(u + c_2^2) \longrightarrow (2)$$



z-plane



w-plane

Angle between $x = c_1$ and $y = c_2$ in z-plane is 90° and angle between ① & ② in w-plane is also 90°

$\therefore$ $w = z^2$ is a conformal.

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UNIT TEST-II

(2022 - 2023 EVEN SEM) Answer key.

CLASS :- I CS B-II SUB :- Mathematics-II

SECTION-A

1. $\nabla\phi = \vec{i}\frac{\partial\phi}{\partial x} + \vec{j}\frac{\partial\phi}{\partial y} + \vec{k}\frac{\partial\phi}{\partial z}$

2. $\text{div}\ \vec{F} = 4x + 6y + 8z$

3. $\text{Curl}\ \vec{F} = \nabla \times \vec{F} = \begin{vmatrix} \vec{i} & \vec{j} & \vec{k} \\ \partial/\partial x & \partial/\partial y & \partial/\partial z \\ xz^2 & -2xyz & xz \end{vmatrix} = -2xy\vec{i} - (z-2xz)\vec{j} + (-2yz)\vec{k}$

4. $\nabla \times \vec{F} = 0$, Irrotational vector

5. $p^2+q^2=1$, $z = ax+by+c$

   $a^2+b^2=1 \Rightarrow b^2 = 1-a^2$

   $b = \pm\sqrt{1-a^2}$

   $z = ax + \sqrt{1-a^2}\,y + c$

   This is no singular

6. $z = pq$

7. $z = \frac{-x^2}{2} + \frac{x^2}{4}$.

SECTION-B.

8. $\nabla \cdot \vec{F} = 0$. $\nabla \times \vec{F} = \begin{vmatrix} \vec{i} & \vec{j} & \vec{k} \\ \partial/\partial x & \partial/\partial y & \partial/\partial z \\ y^2-z^2+3xy-2x & 3xz+2xy & 3xy-2xz+2z \end{vmatrix}$

   $= (3x-3x)\vec{i} - \vec{j}(3y-2z+2z-3y) + \vec{k}(3z+2y-2y-3z)$

   $= \vec{0}$.

9. $z = px+qy+\sqrt{1+p^2+q^2}$

   $z = ax+by+\sqrt{1+a^2+b^2}$ → Complete Integral

$$\sqrt{1+a^2+b^2} = \frac{1}{\sqrt{1-x^2-y^2}}, \quad a = \frac{-x}{\sqrt{1-x^2-y^2}}, \quad b = \frac{-y}{\sqrt{1-x^2-y^2}}$$

$$z^2 = 1-x^2-y^2$$

$$x^2+y^2+z^2 = 1.$$

PART – C

10. If $\vec{r} = x\vec{i} + y\vec{j} + z\vec{k}$, $|\vec{r}| = r$

$$\nabla \cdot (r^n \cdot \vec{r}) = (n+3) r^n.$$

$$\nabla \times (r^n \cdot \vec{r}) = 0.$$

11. $\frac{dx}{P} = \frac{dy}{Q} = \frac{dz}{R}$.

$$P = x(y^2-z^2)$$
$$Q = y(z^2-x^2)$$
$$R = z(x^2-y^2)$$

$$x^2+y^2+z^2 = a \quad \rightarrow (1)$$

$$xyz = b \quad \rightarrow (2)$$

The General ~~equation~~ is $\phi(x^2+y^2+z^2, xyz) = 0$.

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DEPARTMENT OF MATHEMATICS

SM3AE - MATHEMATICS-II (I-B.Sc.,(CS) with AI)

UNIT TEST-II ANSWER KEY

Part A: Answer any FIVE of the followings $(5 \times 2 = 10)$

1. We know that, $L(e^{at}) = \frac{1}{s-a}$, put $a = 3 \Longrightarrow L(e^{3t}) = \frac{1}{s-3}$

2. $\int_0^\infty e^{-st}(100)^0 dt = L[(100^0)] = L[1] = \frac{1}{s}$

3. We know that $L[\sin at] = \frac{a}{s^2+a^2}$, put $a = 3 \Longrightarrow L^{-1}[\frac{3}{s^2+3^2}] = [\sin 3t]$

4. If $\vec{F}$ be a vector function such that $\nabla \cdot \vec{F} = 0$ at all points in a given region then the vector $\vec{F}$ is Solenoidal.

5. Any integral which is to be evaluated along a curve is called a line integral. $\int_c \vec{F} \cdot d\vec{R}$ is called a line integral of $\vec{F}$ along C.

6. Let S be a closed surface enclosing a volume V in a region R with a vector point function $\vec{F}(x, y, z)$. Then $\iiint_v \vec{F}\, dV$ is called the volume integral of $\vec{F}$ over the volume V and ϕ is a scalar function then $\iiint_v \phi\, dV$ is also called volume integral of ϕ over V.

7. If $\vec{F}$ be a vector function such that Curl $\vec{F} = 0$ or $\nabla \times \vec{F} = 0$ at all points in a given region then the vector $\vec{F}$ is irrotational.

Part B: Answer any ONE of the following $(1 \times 5 = 5)$

8. (i) $L[t^2 + e^t \cos t] = L[t^2] + L[e^t \cos t] = \frac{2!}{s^3} + L[\cos t]_{s \to s-1} = \frac{2}{s^3} + [\frac{s}{s^2+1}]_{s \to s-2} = \frac{2}{s^3} + \frac{s-1}{(s-1)^2+1} = \frac{2}{s^3} + \frac{s-1}{(s^2-2s+2)}$
   (ii) $L^{-1}[\frac{10}{(s+2)^6}] = 10e^{-2t}L^{-1}[\frac{1}{s^6}] = \frac{e^{-2t}t^5}{12}$

9. Given $\vec{F} = (3x^2 + 6y)\vec{i} - 14yz\vec{j} + 20xz^2\vec{k}$
   $\vec{F} \cdot d\vec{r} = (3x^2 + 6y)dx - 14yzdy + 20xz^2dz$

From the given parametric equation $x = t, y = t^2, z = t^3$, it is clear that $t = 0$ from $(0,0,0)$ and $t = 1$ from $(1,1,1)$. More over $dx = dt, dy = 2tdt$ and $dz = 3t^2dt$.

$\int_c \vec{F} \cdot d\vec{r} = \int_0^1 [9t^2 - 28t^6 + 60t^9]dt = [(3 - 4 + 6) - (0)] = 5.$

Part C: Answer the following question $(1 \times 10 = 10)$

10. Let $I_n = \int_0^{\frac{\pi}{2}} \sin^n x dx$ by applying integration by parts we get,

$I_n = [-\frac{1}{n}\sin^{n-1} x \cos x]_0^{\frac{\pi}{2}} + \frac{n-1}{n}\int_0^{\frac{\pi}{2}} \sin^{n-2} x dx \Longrightarrow I_n = (\frac{n-1}{n})I_{n-2}$

Continuing like this we get $I_n = (\frac{n-1}{n})(\frac{n-3}{n-2})(\frac{n-5}{n-4})I_{n-6}$

If n is even: $I_n = (\frac{n-1}{n})(\frac{n-3}{n-2})(\frac{n-5}{n-4})\cdots\frac{1}{2}I_0,$

where $I_0 = \int_0^{\frac{\pi}{2}} \sin^0 x dx = [\frac{\pi}{2} - 0] = \frac{\pi}{2}.$

$\therefore I_n = (\frac{n-1}{n})(\frac{n-3}{n-2})(\frac{n-5}{n-4})\cdots\frac{1}{2} \times \frac{\pi}{2}.$

If n is odd: $I_n = (\frac{n-1}{n})(\frac{n-3}{n-2})(\frac{n-5}{n-4})\cdots\frac{2}{3}I_1,$

where $I_1 = \int_0^{\frac{\pi}{2}} \sin^1 x dx = -[\cos\frac{\pi}{2} - \cos 0] = 1.$

$\therefore I_n = (\frac{n-1}{n})(\frac{n-3}{n-2})(\frac{n-5}{n-4})\cdots\frac{2}{3} \times 1.$

11. (a) By definition div $\frac{\vec{r}}{r} = \nabla \cdot (\frac{\vec{r}}{r}) = [\Sigma\vec{i}\frac{\partial}{\partial x}(\frac{1}{r})] \cdot \vec{r} + \frac{3}{r} = [-\Sigma\vec{i}\frac{1}{r^2}\frac{\partial r}{\partial x}] \cdot \vec{r} + \frac{3}{r}$

$= -\frac{1}{r^2}[\Sigma x\vec{i}] \cdot \vec{r} + \frac{3}{r} = \frac{2}{r}.$

(b) As $\vec{r} = x\vec{i} + y\vec{j} + z\vec{k}$, by definition , we get

$\nabla(r^n\vec{r}) = (\frac{\partial}{\partial x}\vec{i} + \frac{\partial}{\partial y}\vec{j} + \frac{\partial}{\partial z}\vec{k}) \cdot (r^n x\vec{i} + r^n y\vec{j} + r^n z\vec{k}) = \frac{\partial(r^n x)}{\partial x} + \frac{\partial(r^n y)}{\partial y} +$

$\frac{\partial(r^n z)}{\partial z} = 3r^n + nr^{n-2}(x^2 + y^2 + z^2) == 3r^n + nr^n = (3 + n)r^n.$

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Department of Mathematics

Unit Test - II

(2022 - 2023 EVEN SEM)

CLASS :- I BCA

SUB :- Mathematics - II

Answer key.

SECTION-A

1. $\text{Div } \vec{F} = \nabla \cdot \vec{F} = \frac{\partial F_1}{\partial x} + \frac{\partial F_2}{\partial y} + \frac{\partial F_3}{\partial z}$

$$\text{curl } \vec{F} = \nabla \times \vec{F} = \begin{vmatrix} \vec{i} & \vec{j} & \vec{k} \\ \partial/\partial x & \partial/\partial y & \partial/\partial z \\ F_1 & F_2 & F_3 \end{vmatrix}.$$

2. If $\phi(x) = x^2 + 2y - z - 3$.

$$\nabla\phi = 2x\vec{i} + 2\vec{j} - \vec{k}$$

$$(\nabla\phi)_{(1,1,1)} = 2\vec{i} + 2\vec{j} - \vec{k}$$

3. $\nabla \cdot \vec{F} = 0$, $\nabla \cdot \vec{F} = \frac{\partial}{\partial x}(x+3y) + \frac{\partial}{\partial y}(y-2z) + \frac{\partial}{\partial z}(x+az)$

$$0 = 1 + 1 + a \Rightarrow a = -2.$$

4. If $\vec{r} = x\vec{i} + y\vec{j} + z\vec{k}$, S.T $\nabla \cdot \vec{r} = 3$

$$\nabla \cdot \vec{r} = \left(\vec{i}\frac{\partial}{\partial x} + \vec{j}\frac{\partial}{\partial y} + \vec{k}\frac{\partial}{\partial z}\right)(x\vec{i} + y\vec{j} + z\vec{k})$$

$$= 1 + 1 + 1 = 3.$$

5. $\sqrt{p} + \sqrt{q} = 1$, $z = ax + by + c$, $\sqrt{b} = 1 - \sqrt{a}$.

$$b = (1 - \sqrt{a})^2$$

$$z = ax + (1 - \sqrt{a})^2 y + c$$

put $c = f(a)$

$$z = ax + (1 - \sqrt{a})^2 y + f(a)$$

D.W. to 'a'

$$x - \frac{(1-\sqrt{a})}{\sqrt{a}} y + f'(a) = 0$$

There is no ~~solution~~ singular Integral.

6. $z = (x+a)(y+b)$

$p = (y+b) \quad q = (x+a)$

$z = pq$

7. $z = ax + by + a^2$

$$z = -\frac{x^2}{2} + \frac{x^2}{4}.$$

SECTION-B.

8. $\nabla \times \vec{F} = 0, \quad \frac{\partial \phi}{\partial x} = 6xy + z^3, \quad \frac{\partial \phi}{\partial y} = 3x^2 - z, \quad \frac{\partial \phi}{\partial z} = 3xz^2 - y$

$$\phi = 3x^2y + xz^3 - yz + C$$

9. $p = \frac{\partial z}{\partial y} = f'(x^3+2y)\,3x^2 + g'(x^3-2y)\,3x^2$

$$q = 2\left[f'(x^3+2y) - g'(x^3-2y)\right.$$

$$r = 9x^4\left[f''(x^3+2y) + g''(x^3-2y)\right. + 6x\left[f'(x^3+2y)+g'(x^3-2y)\right]$$

$$s = 6x^2\left[f''(x^3+2y) - g''(x^3-2y)\right]$$

$$t = 4\left[f''(x^3+2y) + g''(x^3-2y)\right]$$

$$4xr = 9x^5 t + 8p.$$

PART-C.

10. (i) $\nabla^2(r^n) = n(n+1)r^{n-2}$.

$$\nabla^2(r^n) = \sum \frac{\partial^2}{\partial x^2}(r^n)$$

$$= \sum \frac{\partial}{\partial x}\left[n r^{n-1}\frac{\partial r}{\partial x}\right]$$

$$= \sum \frac{\partial}{\partial x}\left[n x r^{n-2}\right]$$

$$= n r^{n-2}.[n-2+3]$$

$$= n(n+1)r^{n-2}$$

(ii) $\nabla \times \nabla^n r = 0$.

11. $\frac{dx}{P} = \frac{dy}{Q} = \frac{dz}{R}$

$P = x(y^2 - z^2)$

$Q = y(z^2 - x^2)$

$R = z(x^2 - y^2)$

$x^2 + y^2 + z^2 = a^2 \rightarrow (1)$

$xyz = b \rightarrow (2)$

The general solution is $\phi(x^2+y^2+z^2, xyz) = 0$.

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CLASS: II B.Sc(CS) UNIT TEST - II (2022-2023 EVEN Semester)

Subject: STATISTICS - II Subject code: SP343

ANSWER KEY

PART-A

1. A random variable x follows binomial distribution with pmf is defined by $P(X=x) = {}^{n}C_{x} p^{x} q^{n-x}$, $x=0,1,\ldots,n$ where $p+q=1$.

2. A random variable x follows poisson distribution with pmf is defined by $P(X=x) = \frac{e^{-\lambda}\lambda^{x}}{x!}$, $x = 0, 1, \ldots \infty$ $\lambda = np$ = finite.

3. (i) Mean = p (ii) Variance = np (iii) S.D = $\sqrt{npq}$

4. Let x be a random variable either discrete or continuous its cumulative distribution function or distribution function is defined as $F(x) = P(X \leq x)$

5. A continuous random variable x follows Normal distribution with pdf is defined by $f(x) = \frac{1}{\sigma\sqrt{2\pi}} e^{-\frac{(x-\mu)^2}{2\sigma^2}}$, where $-\infty < x < \infty$ $\sigma > 0$ $-\infty < \mu < \infty$

6. A continuous random variable x assuming non-negative values is said to be have an exponential distribution with parameter $\theta > 0$, if its pdf is given by $f(x) = \theta e^{-\theta x}$, $x \geq 0$.

7. $t = \frac{|\bar{x} - \mu|}{s/\sqrt{n}}$ ~ t - distribution with $(n-1)$ df.

A t-test is a statistical test that compares the means of two samples.

Part-B

8. Mean =>

Variance =>

9. The χ^2 test is one of the simplest and most widely used non-parametric tests in statistical works

It is defined as $\chi^2 = \sum \frac{(O_i - E_i)^2}{E_i}$ ~ chi-Square distribution with $(n-1)$ df. O_i - Observed frequency

E_i - Expected frequency.

Part-C

10. $L(p) = \prod_{i=1}^{n} f(x) = \prod_{i=1}^{n} n(x_i; p^{x_i} (1-p)^{n-x_i}$

$\log L(p) = \sum \log n(x_i + \log p \sum x_i + \log (1-p) \sum_{i=1}^{n} (n-x_i)$

$\frac{\partial \log L(p)}{\partial p} = 0 \Rightarrow 0 + \frac{\sum x_i}{p} - \frac{\sum (n-x_i)}{1-p}$

$\sum x_i - p\, n \cdot n = 0$

$\hat{p} = \frac{\sum x_i}{n \cdot n} = \frac{\bar{X}}{n}$

$$\boxed{\hat{p} = \frac{\bar{X}}{n}}$$

11. H_0: The two diet differ significantly as regards their effects on increase in weight

H_1: The two diet not differ significantly as regards their effects on increase in weight.

$$t = \frac{|\bar{x} - \bar{y}|}{\sqrt{s^2\left(\frac{1}{n_1} + \frac{1}{n_2}\right)}} \sim t \text{ distribution with } (n_1 + n_2 - 2) \text{ df}$$

where $s^2 = \frac{1}{n_1 + n_2 - 2}\left[\sum (x - \bar{x})^2 + \sum (y - \bar{y})^2\right]$

$\bar{x} = 28$, $\bar{y} = 32.8 \simeq 33$

$s^2 = 80.56$

$t = 1.142$

T.V (16 df) is 2.12

Result $t_c < T.V$

$1.142 < 2.12$ $\therefore$ H_0 is accepted at 5% level.

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Unit Test – II (2022-2023 Even Semester)

Answer Key

Date : 13.4.2023 **Duration : One hour** **Class :** II BSc Biochemistry

Subject Name & Code : STATISTICS-II / SP3AB

Section A (5 x 2 = 10)

(Answer any FIVE questions)

1. In point estimation a single statistic is used to provide an estimate of the population parameter.

2. The statistical hypothesis that is set up for testing a hypothesis is known as Null Hypothesis

3. The standard deviation of the sampling distribution of a statistic is known as its standard error.

4. The sampling distribution of any statistic is "the standard form is $N(0,1)$ asymptotically, ie as $n \to \infty$." In other words the sampling distribution of any statistic t is normally distributed with mean 0 and variance 1 and is given by

$$Z = \frac{t - E(t)}{SE(t)} \sim N(0,1) \text{ as } n \to \infty$$

The theory of large sample ($n > 30$) is based on the above property of the sampling distribution.

5. If X and Y are two independent chi-square variates with v_1 and v_2 d.f. respectively. then F-statistic is defined by $$F = \frac{X/v_1}{Y/v_2}$$

6. There are two types of analysis of variance
① one way classification and ② Two way classification.

7. The following assumptions are made
① The observations are independent
② parent population from which observations are taken is normal and
③ various treatment and environmental effects are additive in nature.

(1×5 = 5)

Section B
(Answer any ONE question)

8. TYPE I Error: It is the error of rejecting null hypothesis Ho when it is true. when a null hypothesis is true, but the difference is significant and the hypothesis is rejected. then a TYPE I Error is made.

TYPE II Error: It is the error of accepting the null hypothesis Ho when it is false. In other words when a null hypothesis is false, but the difference is insignificant and the hypothesis is accepted, a type II error is made.

9. Three Principles of experimental design

Replication: Replication means 'the repetition of the treatments under investigation.

Randomisation: Randomisation. a process of assigning the treatments to various experimental units in a purely chance manner. The following are the main objectives of randomisation.

i) The validity of the statistical tests of significance.

ii) The purpose of randomness is to assure that the sources of variation.

Local Control: The process of reducing the experimental error by dividing the relatively heterogeneous experimental area (field) into homogeneous blocks (due to physical contiguity as far as field experiments are concerned) is known as Local Control.

section. c $1 \times 10 = 10$

Answer any ONE question

10. $F = S_1^2 / S_2^2$

sample-I:

x	16	17	18	19	20	21	22	24	26	27	Total 210
$x - \bar{x}$	-5	-4	-3	-2	-1	0	1	3	5	6	
$(x-\bar{x})^2$	25	16	9	4	1	0	1	9	25	36	126

$\bar{x} = \frac{210}{10} = 21$

$$S_1^2 = \frac{\Sigma(X-\bar{X})^2}{n_1-1} = \frac{126}{10-1} = 14$$

Sample - II $\qquad \bar{Y} = \frac{\Sigma Y}{n} = \frac{336}{12} = 28$

Y	: 19	22	23	25	26	28	29	30	31	32	35	36	Total 336
$(Y-\bar{Y})$	: -9	-6	-5	-3	-2	0	1	2	3	4	7	8	
$(Y-\bar{Y})^2$	: 81	36	25	9	4	0	1	4	9	16	49	64	298

$$S_2^2 = \frac{\Sigma(Y-\bar{Y})^2}{n_2-1} = \frac{298}{12-1} = 27.0909$$

$$F = \frac{S_2^2}{S_1^2} \sim F(n_2-1, n_1-1)$$

$$= \frac{27.0909}{14} = 1.9351$$

Result: calculated value of F is 1.9351
Table value of F for (11,9) df at 5% level of Significance is 3.11

Inference:
Since calculated value of F is less than the table value at 5% level of Significance. Hence Ho may be accepted and we conclude that the two population have the same variance.

							Total	
							84	5
11. T_1	15	19	5	16	16	19	277	
T_2	43	47	64	51	72		243	
T_3	27	38	46	25	61	23 29	243	
T_4	63	65	70	52	93		343	

correction factor $= \frac{(84+277+243+343)^2}{23} = 32991.3$

Treatment Sum of Square = 9495.47

Total Sum of square = 12211.30

Error Sum of square = TSS − TrSS
= 12211.30 − 9495.47 = 2715.83

ANOVA Table:

Source	d.f	Sum of Square	Mean Sum of Squar	F-Ratio
Treatment	3	9495.47	3165.16	22.14
Error	19	2715.83	142.94	
Total	22	12211.3		

Result: Calculated F-ratio value = 22.14
Table Value (3,19) df at 5% = 3.13

Inference:
Since, the calculated value is greater than the table value, we reject the hypothesis at 5% level of significance among the four varities of corn.

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Department of Biotechnology

UNIT TEST I1 (EVEN SEMSTER)

ACADEMIC YEAR 2022-2023

Date: 13-04-2023 **Duration:** 1 hour **Class:** II B. Sc. Biotechnology

Subject Name &code: Bioinstrumentation and Biostatistics SC34A Max: 25 marks

ANSWER KEY

Section A

CO5 BL1 5. Correlation is study of relationship between two or more variables

CO5 BL1 6. Regression is to study the nature of relationship between the two variables.

CO5 BL6 7. The chi-square test is one of the simplest and most widely used non-parametric tests in statistical work. The chi square test was first used by Karl Pearson in the year 1890. It is defined as $\chi 2 = \sum (O_i - E\ i)^2 / E\ i$ with (n- 1) df. Where O_i refers to observed frequencies and E_i refers to the expected frequencies.

Section B

CO5 BL2 9.

Correlation	Regression
Correlation is the study of relationship between two or more variable.	Regression is to study the nature of relationship between the two variables.
It is symmetric X & Y ie. $r_{xy} = r_{yx}$	Not symmetric ie. $b_{xy} \neq b_{yx}$.
Correlation coefficient is independent of change of scale and origin.	Regression coefficients are independent of change origin but not scale.
Relative measure	Absolute measure

Section C

CO5 BL1 11. r = 0.9861

N = 5

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Department of Mathematics

Unit Test - II (2022 - 2023 EVEN SEMESTER)

Scheme of Valuation

CLASS: II - B.Com SUB: ELEMENTS OF OPERATIONS RESEARCH

Section - A

(1) A Situation in which players make rational decisions according to defined rules in an attempt to receive some sort of payoff.

(2) A dominant strategy occurs when one player has a stronger, more effective strategy over another player.

(3) pure strategy: players choose a strategy to select a single action and play it.

Mixed strategy: players randomize over the set of available actions according to some probability distribution.

(4) A payoff matrix is a table in which strategies of one player are listed in rows and those of the other player in columns.

(5) The sum of the payoffs to each player is constant for all possible outcomes of the game.

(6) A Saddle point is maximum of row minima coincides with the minimum of the column maxima.

The pay off at the saddle point is called value of the game.

(7) (i) All the competitive problems cannot be analyzed with the help of game theory.

(ii) The techniques of solving games involving mixed strategies particularly in case of large pay-off matrix is very complicated.

SECTION – B

(8) (i) Number of persons or groups playing the game.
(ii) Number of activities which may be finite or infinite.
(iii) Type of Strategy.
(iv) Each player has a number of alternative available during a particular play.
(v) The amount of information about the past activities of other players to a player.

(9) Value of the game = 12.

SECTION – C

(10) Value of the game $V = \frac{-46}{21}$

(11) Strategy for A = $\left(\frac{4}{9}, \frac{11}{45}, \frac{14}{45}\right)$

Strategy for B = $\left(\frac{14}{45}, \frac{11}{45}, \frac{4}{9}\right)$

Value of the game = $\frac{-29}{45}$.

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Department of Mathematics (2022-2023 EVEN)

UNIT TEST - II Answer key

SUB:- ELEMENTS OF OPERATIONS RESEARCH CLASS:- II B.Com.ISM

CODE:- CZ34A DATE:-

SECTION - A

1. A basic feasible solution is said to be basic, if the number of positive allocations are m+n-1. (m-origin & n-destinal) If the number of allocations are less than (m+n-1) it is called degenerate basic feasible solution.

2. If the number of non-negative independent allocations in a mxn T.P is less than m+n-1, then there exists degeneracy in the solution of the T.P.

3. The purpose of MODI method is to determine whether the current basic feasible solution of the T.P is optimal (or) not.

4. A set of non-negative decision value X_{ij} (i=1 to m, j=1 to n) satisfies the constrain equation is called feasible solution. A basic feasible solution is said to be basic. If the no of +ve allocation are m+n-1, if the no of allocation are less then (m+n-1), then it is called degenerate basic feasible solution.

5. In a game if the maximum value is equal to the minmax value, then the game is said to have a saddle point. If the game has a saddle point, then each

player has a pure strategy.

6. Each combination of the alternatives of players A and B is associated with an outcome, a_{ij}. If a_{ij} is positive, it means gain to player A and a loses of player B. If a_{ij} is negative, it represents a loss to player A and a gain to player B.

7. In a game with 2 players, if the gain of one player is equal to the loss of another player, then it is called two person zero sum game.

SECTION-B

8.

1	6 / 2	3	4	6
4	3	2 / 2	0 / 6	8 2
0 / 4	2	2 / 6	1	6 10
4	4	8 6	6	24

Mini cost $Z = 2\times6 + 2\times2 + 0\times6 + 0\times4 + 2\times6$

$= 12 + 4 + 0 + 0 + 12$

$= 28/-$

UNIT TEST – II

CODE : CZ34-A

SUB : EOR

CLASS : II B.Com ISM

9. $\begin{bmatrix} 8 & -3 \\ -3 & 1 \end{bmatrix}$

$P_1 = \frac{4}{15}$, $q_1 = \frac{4}{15}$

$P_2 = \frac{11}{15}$, $q_2 = \frac{11}{15}$

The value of the game $= \frac{a_{22}a_{11} - a_{12}a_{21}}{(a_{11}+a_{22}) - (a_{12}+a_{21})}$

$= \frac{8-9}{15} = \frac{-1}{15}$.

$S_A = \begin{bmatrix} A_1 & A_2 \\ \frac{4}{15} & \frac{11}{15} \end{bmatrix}$, $S_B = \begin{bmatrix} B_1 & B_2 \\ \frac{4}{15} & \frac{11}{15} \end{bmatrix}$.

10. SECTION – C

$\begin{bmatrix} 5 & 7 & 11 & 6 \\ 8 & 5 & 9 & 6 \\ 4 & 7 & 10 & 7 \\ 10 & 14 & 8 & 8 \end{bmatrix}$

$J_1 \to M_4$, $J_2 \to M_2$, $J_3 \to M_1$,

$J_4 \to M_3$.

Mini Cost = 23 /_ .

11. $\begin{bmatrix} 3 & 2 & 4 & 0 \\ 3 & 4 & 2 & 4 \\ 4 & 2 & 4 & 0 \\ 0 & 4 & 0 & 8 \end{bmatrix}$

$$\begin{bmatrix} 4 & 0 \\ 0 & 8 \end{bmatrix}$$

$p_1 = \frac{2}{3}$, $p_2 = \frac{1}{3}$

$q_1 = \frac{2}{3}$, $q_2 = \frac{1}{3}$

The Value of the game is $8/3$.

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UNIT TEST - II (EVEN SEMESTER) (2022-2023)

DEPARTMENT OF MATHEMATICS

ANSWER KEY

Class: II B.com (A&F)

Sub: Elements of operation Research.

Part - A

1) Transportation problem:

The transportation problem is a special type of linear programming problem where the objective consists in minimizing transportation cost of a given commodity from a number of sources, or origins.

2. Unbalanced Transportation problem.

$\sum a_i \neq \sum b_i$

supply $\neq$ demand.

3. Mixed strategy:

When the player does not choose one definite action, but rather, chooses according to a probability distribution over a his actions

4. Zero sum Game:

One person's gain is equivalent to another's loss, so the net change in wealth or benefit is zero.

5. **Basic Feasible solution:**

A Basic feasible solution x is called basic solution of the system $X_B = B^{-1}b$

$X_N = 0$, $X_B \geq 0$.

6. **Value of the Game:**

We can adequately represent the game by a numerical "characteristic function".

7. Types of Game

Co-operative, Non-co-operative, constant-sum, zero sum, Non-zero sum, simultaneous move, sequential move, Symmetric, Asymmetric, Normal-form, Extensive form.

Part-B

8.

				Supply						
3 (45)	3	4 (30) / (25)		100	2	2	0	1	4	4
4	2 (80)	4 (20)	2	125	0	0	2	0	4	-
1 (75)	5	3	2	75	1	-	-	-	-	-
Demand	120	80	75	25						
	2	1	1	1						
	1	1	0	1						
	1	1	0	-						
	1	0	0	-						
	-	-	0	-						
	-	-	4	1						

Minimum total transportation cost

$= (3 \times 45) + 4(30) + 1(25) + 2(80) + 4(45) + 1 \times 75$

$= 695$

9. pay-off matrix

player A

$$B \begin{bmatrix} -1 & 2 & -2 \\ 6 & 4 & -6 \end{bmatrix}$$

column 2 is dominated by column 3

$$\begin{array}{c} \\ A_1 \\ A_2 \end{array} \begin{array}{c} \begin{matrix} B_1 & B_2 \end{matrix} \\ \begin{bmatrix} -1 & -2 \\ 6 & -6 \end{bmatrix} \end{array}$$

column 1 is dominated by column 2

$$\begin{array}{c} \\ A_1 \\ A_2 \end{array} \begin{array}{c} \begin{matrix} B_3 \end{matrix} \\ \begin{bmatrix} -2 \\ -6 \end{bmatrix} \end{array}$$

row 2 is dominated by row 1

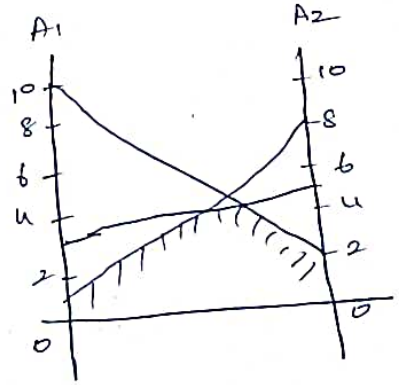
$$[-2]$$

∴ pay off matrix = −2 //

10.

player B

$$A \begin{bmatrix} 1 & 3 & 11 \\ 8 & 5 & 2 \end{bmatrix}$$



value of the game $= \frac{49}{11}$

$P_1 = \frac{3}{11}$, $P_2 = \frac{8}{11}$

11) AP.

$$\begin{bmatrix} 41 & 72 & 39 & 52 \\ 22 & 29 & 49 & 65 \\ 27 & 39 & 60 & 51 \\ 45 & 50 & 48 & 59 \end{bmatrix}$$

Solution:

$$\begin{bmatrix} 4 & 28 & [0] & 6 \\ 8 & [0] & 25 & 34 \\ [0] & 5 & 31 & 15 \\ 2 & 8 & 3 & [0] \end{bmatrix}$$

Optimal solution is

Work	Job	cost
A	3	39
B	2	29
C	1	27
D	4	52
Total.		147

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Department of Mathematics (2022-2023 EVEN)

UNIT TEST – II Answer key

SUB :- OPERATIONS RESEARCH

CODE :- BB34A

CLASS :- II BBA

DATE :- 13/04/2023

SECTION – A

1. The Transportation problem is a special type of linear programming problem where the objective consists in minimizing transportation cost of a given commodity from the number of sources (or) origins. (eg. factory manufacturing facility) to a number of destinations. (e.g. warehouse, store).

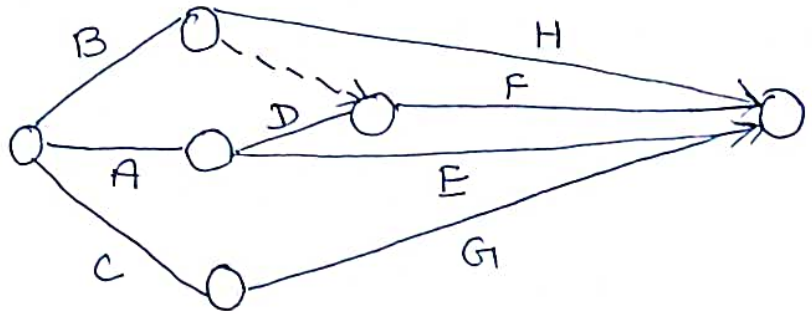
2. optimal solution is a feasible solution which optimizes the total transportation cost. If it minimises the total transportation cost.

3. Balanced Transportation problem when both supplies and demands are equal.
Unbalanced Transportation problem is defined as a situation where supply and demand are not equal.

4. (i) In assigning machines to factory orders.
(ii) In assigning sales / marketing people to sales territories.
(iii) In assigning contracts to bidders by systematic bid - evaluation.

5. It is a system of planning project outline by analyzing different activities associated with it.

6. A < D, E ; B, D < F ; C < G ; And B < H ;



7. (i) The critical path is the longest path (in time) from start to Finish.

(ii) Difference b/w Earliest starting time and Latest starting time.

SECTION - B

8.
$$\begin{pmatrix} 10 & 12 & 19 & 11 \\ 5 & 10 & 7 & 8 \\ 12 & 14 & 13 & 11 \\ 8 & 15 & 11 & 9 \end{pmatrix}$$

Row matrix
$$\begin{pmatrix} 0 & 2 & 9 & 1 \\ 0 & 5 & 2 & 3 \\ 1 & 3 & 2 & 0 \\ 0 & 7 & 3 & 1 \end{pmatrix}$$

Colaum matrix
$$\begin{pmatrix} 0 & 0 & 7 & 1 \\ 0 & 3 & 0 & 3 \\ 1 & 1 & 0 & 0 \\ 0 & 5 & 1 & 1 \end{pmatrix}$$

$$\begin{pmatrix} \cancel{0} & \boxed{0} & 7 & 1 \\ \cancel{0} & 3 & \boxed{0} & 3 \\ 1 & 1 & \cancel{0} & \boxed{0} \\ \boxed{0} & 5 & 1 & 1 \end{pmatrix}$$

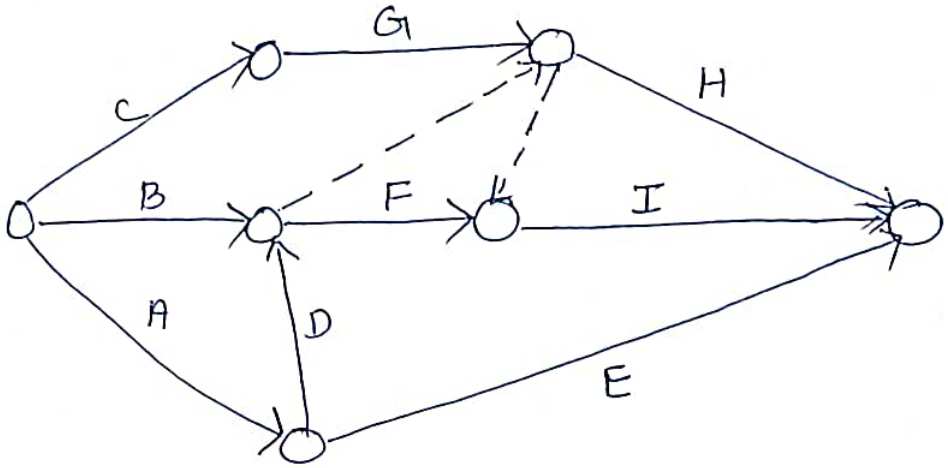
Min = 12 + 7 + 11 + 8.
= 38/—

A → 2, B → 3, C → 4, D → 1

UNIT TEST – II – (2022-2023 EVEN)

OPERATIONS RESEARCH — II BBA

9. $A < D, E$; $B, D < F$; $C < G$; $B < H$; $F, G < I$;



SECTION – C

10.

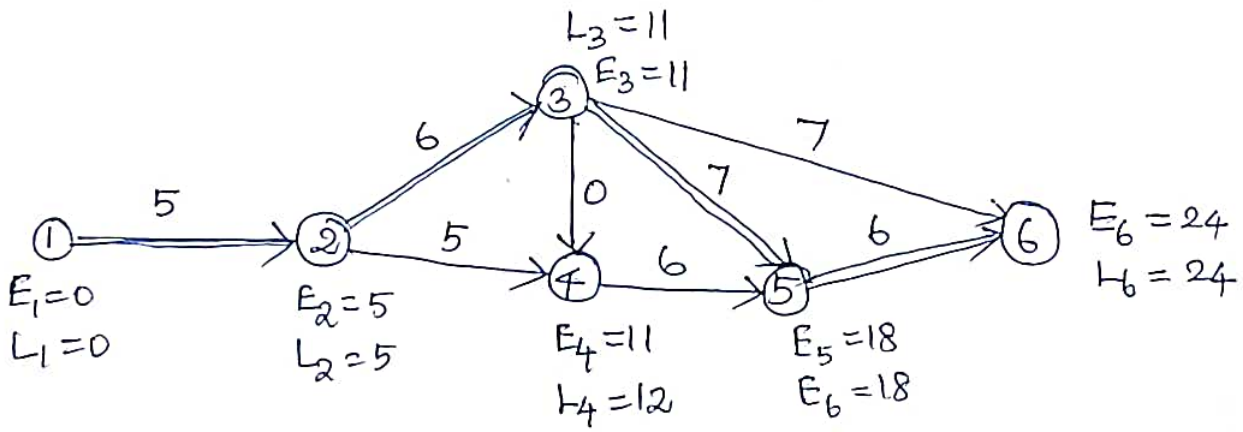
[3] 2	2	2	1	3
10	8	[3] 5	[4] 4	7
[1] 7	[3] 6	[1] 6	8	5
4	3	4	4	

Mini Z = $3\times2 + 3\times5 + 4\times4 + 1\times7 + 3\times6 + 1\times6$

$= 6+15+16+7+18+6$

$= 21+23+24 = 68$

11.



Activity	Days	EST	EFT	LST	LFT	TF
1-2	5	0	5	0	5	0
2-3	6	5	11	5	11	0
2-4	5	5	10	7	12	2
3-4	0	11	11	11	12	1
3-5	7	11	18	11	18	0
3-6	7	11	18	17	24	6
4-5	6	11	17	12	18	1
5-6	6	18	24	18	24	0

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UNIT TEST – II (2022–2023 Even Semester)

Subject: Quantitative Techniques for Business Decisions

CLASS : I M.Com

ANSWER KEY

Section A

1. Single point is called point estimation.
2. A t-test is a statistical test that compares the means of two samples.
3. It is defined as $\chi^2 = \sum \frac{(O_i - E_i)^2}{E_i}$; it follows chi-square distribution with (n-1) df.
4. A statistical technique known as analysis of variance is used when simultaneous comparisons are made of measurement from more than two samples.
5. $-1 \leq r \leq 1$
6. An average relationship between two of more variables is said to regression.
7. One source to one distribution.

06/04/2023

Dr. T. Lalitha 6/4/23

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Section B.

8. positive correlation.....
negative correlation.....
zero correlation... linear correlation, non-linear correlation.....
partial and multiple correlation.....

9. $\rho = 1 - \frac{6\Sigma d^2}{n(n^2-1)}$

$n = 7$

$\Sigma d^2 = 28$

$\rho = 0.322$

10. Discriminant analysis is a multivariate statistical technique used for classifying a set of observations into predefined groups. The purpose is to determine the predictor variables on the basis of groups can be determined.....

11. Job 1 to Machine 1 = 12
Job 2 to Machine 3 = 9
Job 3 to Machine 2 = 25
Job 4 to Machine 4 = 14
60 hrs

Section C

12. A classification according to two factor is called two way classification.

Anova table:

S.V	SS	df	MSS	F-ratio
B.C	SSC	C-1	$MSC = \frac{SSC}{C-1}$	$F_C = \frac{MSC}{MSE}$
B.R	SSR	r-1	$MSR = \frac{SSR}{r-1}$	$F_R = \frac{MSR}{MSE}$
Error	SSE	(C-1)(r-1)	$MSE = \frac{SSE}{(C-1)(r-1)}$	
Total	SST	N-1		

13. $\Sigma x = 42$, $\Sigma y = 36$, $\Sigma x^2 = 364$,

$\Sigma y^2 = 286$, $\Sigma xy = 322$, $n = 6$

$$r = \frac{N\Sigma xy - \Sigma x \Sigma y}{\sqrt{N\Sigma x^2 - (\Sigma x)^2}\sqrt{N\Sigma y^2 - (\Sigma y)^2}}$$

$r = 1$ //

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PG DEPARTMENT OF COMMERCE

I UNIT TEST, FEBRUARY – 2023

ADVANCED FINANCIAL ACCOUNTING (CZ22A)

CLASS: I B. COM - A & B **TIME:** 1 Hour

DATE : 01.03.2023 **Max:** 25 Marks

PART A – (5 X 2 = 10 Marks)
Answer any FIVE questions

CO2 BL1 1.What is a Department? Explain with example.

CO1 BL1 2.Define Branch Accounting?

CO2 BL3 3.From the following particulars, calculate closing branch debtors balance: Branch Debtors (1.1.2018) Rs. 6,800 Credit sales Rs. 45,000 Cash received from debtors Rs. 45,500.

CO2 BL2 4.State any four reasons for preparing departmental accounts.

CO1 BL15.What are the types of branches?

CO2 BL2 6.State any two differences between branch and department accounts.

CO2 BL17.How do you allocate lighting in departmental accounts?

PART B - (1 X 5 = 05 Marks)
Answer any ONE question

CO2 BL3 8. From the following details, prepare departmental trading accounts :

Particulars	Department A	Department B	
Opening stock		9,000	8,400
Total purchases		27,000	21,600
Total sales	42,000	36,000	
Closing stock	10,800	4,800	
Credit purchases		17,000	10,600
Credit sales		5,000	6,000

CO1 BL3 9.From the following particulars prepare a branch account showing the profit or loss at the branch.

	Rs.
Opening stock at the branch	15,000

Goods sent to the branch 45,000
Sales 60,000
Salaries5,000
Other expenses 2,000
Closing stock could not be ascertained but it is known that the branch usually sells at cost plus 20%. The branch manager is entitled to a commission of 5% on the profit of the branch before charging such commission.

PART C– (1 X 10 = 10 Marks)
Answer any ONE question

CO1 BL3 10.Taj Ltd. of Madras invoices goods to Arcot branch at selling price which is cost plus 33 3 1 %. From the following particulars, make out the Branch Stock A/c, Branch Debtors A/c and other necessary Accounts to show the gross profit and net profit/net loss made there :

		Rs.
Stock on 1.1.2017 (invoice price)		15,000
Debtors on 1.1.2017	11,400	
Goods invoiced to branch (invoice price)		67,000
Cash sales	31,000	
Credit sales	37,400	
Bad Debts written off		250
Discount allowed to customers		300
Expenses at the Branch	6,700	
Stock on 31.12.2017 (invoice price)	13,400	
Cash received from debtors		40,000

CO2 BL3 11. You are given the following particulars of a business having three departments :

	Purchases	Opening Stock	Closing Stock
Dept. A	1,500 units	200 units	100 units
Dept. B	1,000 units	300 units	160 units
Dept. C	2,000 units	150 units	200 units

Additional information :
(a) Purchases were made at a cost of Rs. 92,000
(b) The percentage of gross profit on turnover is the same in each case.
(c) Purchase and sale prices are contract for the last 2 years.
(d) Selling price per unit :
Dept. A — Rs. 20; Dept. B — Rs. 25; Dept. C — Rs. 30.
Prepare Departmental Trading Account.

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PG DEPARTMENT OF COMMERCE

I UNIT TEST, FEBRUARY – 2023

ADVANCED FINANCIAL ACCOUNTING (CZ22A)

ANSWER KEY

CLASS: I B. COM - A & B

TIME: 1 Hour

DATE : 01.03.2023

Max: 25 Marks

PART A – (5 X 2 = 10 Marks)
Answer any FIVE questions

CO2 BL1 1.What is a Department? Explain with example.

Answer: Department accounting or departmental accounting is a system of financial accounting which is used in the organizations whose all works are done through their different departments or departmental stores. Departmental accounts are prepared separately for each department and trial balance will also be prepared. Departmental P&L Account is prepared to ascertain the profit or loss of each department separately and at the end of the year it is transferred to General profit and loss account of the whole organisation.

CO1 BL1 2.Define Branch Accounting?

Answer: Branch accounting is a bookkeeping system in which separate accounts are maintained for each branch or operating location of an organization.

CO2 BL3 3.From the following particulars, calculate closing branch debtors balance: Branch

Debtors (1.1.2018) Rs. 6,800 Credit sales Rs. 45,000 Cash received from debtors

Rs. 45,500.

Answer: Closing debtors 6300

CO2 BL2 4.State any four reasons for preparing departmental accounts.

Answer:

- To know the financial position of each and every department separately, it is helpful to make a comparison.
- Calculate commission of the managers department wise.
- Evaluate performance, planning, and control.

CO1 BL1 5.What are the types of branches?

Answer: 1. Dependent Branch ·

2. Independent Branch.

CO2 BL2 6.State any two differences between branch and department accounts.

Answer:

BASIS OF DIFFERENCE	DEPARTMENTAL ACCOUNTING	BRANCH ACCOUNTING
LINKAGE	Departments are attached with the main organization under a single roof.	Branches are separate from the main organization.
RESULTS OF	Departments are the results of fast human life.	Branches are the outcomes of the tough competition and expansion of the business.
GEOGRAPGICAL LOCATION	Departments are not geographically separated.	Branches are geographically separated.
TYPES	There is no classification of departments.	The branches may be dependent or independent.

CO2 BL1 7.How do you allocate lighting in departmental accounts?

Answer: Lighting is allocated on the basis of no. of points of each department.

PART B - (1 X 5 = 05 Marks)

Answer any ONE question

CO2 BL3 8. From the following details, prepare departmental trading accounts :

Particulars	Department A	Department B
Opening stock	9,000	8,400
Total purchases	27,000	21,600
Total sales	42,000	36,000
Closing stock	10,800	4,800
Credit purchases	17,000	10,600
Credit sales	5,000	6,000

Answer: Gross profit X: 11,310; Y: 2,280 & Net profit X: 8,850; Y: 120

CO1 BL3 9.From the following particulars prepare a branch account showing the profit or loss at the branch.

	Rs.
Opening stock at the branch	15,000
Goods sent to the branch	45,000
Sales	60,000
Salaries	5,000
Other expenses	2,000

Closing stock could not be ascertained but it is known that the branch usually sells at cost plus 20%. The branch manager is entitled to a commission of 5% on the profit of the branch before charging such commission.

Answer: Net profit 2,850

PART C– (1 X 10 = 10 Marks)
Answer any ONE question

CO1 BL3 10.Taj Ltd. of Madras invoices goods to Arcot branch at selling price which is cost plus 33 3 1 %. From the following particulars, make out the Branch Stock A/c, Branch Debtors A/c and other necessary Accounts to show the gross profit and net profit/net loss made there :

	Rs.
Stock on 1.1.2017 (invoice price)	15,000
Debtors on 1.1.2017	11,400
Goods invoiced to branch (invoice price)	67,000
Cash sales	31,000
Credit sales	37,400
Bad Debts written off	250
Discount allowed to customers	300
Expenses at the Branch	6,700
Stock on 31.12.2017 (invoice price)	13,400
Cash received from debtors	40,000

Answer: General profit 9,700

CO2 B L3 11. You are given the following particulars of a business having three departments :

	Purchases	Opening Stock	Closing Stock
Dept. A	1,500 units	200 units	100 units
Dept. B	1,000 units	300 units	160 units

Dept. C	**2,000 units**	**150 units**	**200 units**

Additional information :

(a) Purchases were made at a cost of Rs. 92,000

(b) The percentage of gross profit on turnover is the same in each case.

(c) Purchase and sale prices are contract for the last 2 years.

(d) Selling price per unit :

Dept. A — Rs. 20; Dept. B — Rs. 25; Dept. C — Rs. 30.

Prepare Departmental Trading Account.

Answer: G.P – A: 6,400; B: 5700; C: 11,700

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I UNIT TEST, FEBRUARY 2023

PRINCIPLES OF MANAGEMENT – CZ22B

CLASS: I B.com – A & B TIME: 1 Hour

DATE : 02.03.2023 Max: 25 Marks

PART A – (5 X 2 = 10 Marks)
Answer any FIVE questions

1. CO2 BL 1 Define planning?
2. CO1 BL 1 List out the levels of management ?
3. CO1 BL 1 Define management?
4. CO1 BL 1 What is espirit de crops ?
5. CO1 BL 1 What do you mean by scalar chain ?
6. CO1 BL 1 What is scientific management ?

PART B – (1 X 5 = 5 Marks)
Answer any ONE questions

7. CO 1 BL 1 List out the importance of planning ?
8. CO 1 BL 2 Explain the importance of organization ?

PART C – (1 X 10 = 10 Marks)
Answer any ONE question

9. CO 1 BL 2 Explain the steps of planning ?
10. CO 1 BL 2 Explain the 14 principles of management?

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I UNIT TEST, FEBRUARY 2023

CLASS: I B.com TIME: 1 Hour

SUB: Principles of Management Max: 25 Marks

PART A – (5 X 2 = 10 Marks)

Answer any FIVE questions

1. CO2 B1 Define planning?

Planning is the fundamental management function, which involves **deciding beforehand**, what is to be done, when is it to be done, how it is to be done and who is going to do it. It is an **intellectual process** which **lays down** an **organisation's objectives and develops various courses of action**, by which the organisation can achieve those objectives. It chalks out exactly, how to attain a specific goal.

2.List out levels of management?

Top level

Intermediate level

Middle level

Lower level

3.CO1 B1 Define management?

MANAGEMENT IS THE ART OF KNOWING WHAT IS TO BE DONE,AND SEEING THAT IS DONE IN THE BEST POSSIBLE MANNER''

4.CO1 B1 What is espirit de crops ?

MANAGEMENT SHOULD NOT ADOPT THE SHORTSIGHTED POLICY OF DIVIDE AND RULE.IT SHOULD BE CONVINCED THAT UNION IS STRENGTH HE FAVOURS THE NEED FOR TEAM WORK AND STRESSED THE IMPORTANCE OF COMMUNICATION IN OBTAINING IT.

5.CO1 B1 what do you mean by scalar chain ?

The scalar principle, also known as the scalar chain, is a management principle predicated on establishing an unbroken line of authority from the highest levels of management on down. In this model, the person at each management level communicates with only those directly above and below them.

6.CO1 B1 what is scientific management ?

Scientific management theory is a method of improving efficiency in the workforce. As its name implies, this management theory uses scientific methods to assess work processes.

PART B – (1 X 5 = 5 Marks)

Answer any ONE questions

7.List out the importance of planning ?

Planning is definitely significant as it directs us where to go, it furnishes direction and decreases the danger of risk by making predictions. The significant advantages of planning are provided below:

- **Planning provides directions**: Planning assures that the objectives are certainly asserted so that they serve as a model for determining what action should be taken and in which direction. If objects are well established, employees are informed of what the company has to do and what they need do to accomplish those purposes.
- **Planning decreases the chances of risk**: Planning is an activity which permits a manager to look forward and predict changes. By determining in prior the tasks to be completed, planning notes the way to deal with changes and unpredictable effects.
- **Planning decreases overlapping and wasteful activities**: Planning works as the foundation of organising the activities and purposes of distinct branches, departments, and people. It assists in avoiding chaos and confusion. Since planning guarantees precision in understanding and action, work is conducted on easily without delays.
- **Planning encourages innovative ideas**: Since it is the primary function of management, new approaches can take the form of actual plans. It is the most challenging project for the management as it leads all planned actions pointing to growth and of the business.
- **Planning aids decision making**: It encourages the manager to look into the future and make a decision from amongst several alternative plans of action. The manager has to assess each option and pick the most viable plan.

8.Explain the importance of organization ?

GOAL ACCOMPLISHMENT

RESOURCE MOBILIZATION

SYSTEMATIC APPROACH TO WORK

DIVISION OF WORK

ENGAGEMENT OF RIGHT PERSON

HUMAN RESOURCE DEVELOPMENT

MOTIVATION OF EMPLOYEES

COMMUNICATION

LEADERSHIP

CONTROL FUNCTION

PART C – (1 X 10 = 10 Marks)

Answer any ONE questions

9.Explain the steps of planning ?

Skill and competence of planner

Quality plans

Flexible plans

Realistic plans

Communication of plans

Involvement of those concerned

Economy

Inter linkage

Questioning the assumption

Periodical review

10.Explain the 14 principles of management ?

1. Division of Work

The first Henry Fayol principle of management is based on the theory that if an employee is given a specific task to do, they will become more efficient and skilled in it. This is opposed to a multi-tasking culture where an employee is given so many tasks to do at once. In order to implement this principle effectively, look at the current skill sets of each employee and assign them a task that they can become proficient at. This will help them to become more productive, skilled, and efficient in the long run.

2. Authority

This henry fayol principle of management states that a manager needs to have the necessary authority in order to ensure that his instructions are carried out by the employees. If managers did not have any authority, then they would lack the ability to get any work done. However, this authority should come along with responsibility. According to Henri Fayol, there should be a balance between authority and responsibility. If there is more authority than responsibility, the employees will get frustrated. If there is more responsibility than authority, the manager will feel frustrated.

3. Discipline

This principle states that discipline is required for any organization to run effectively. In order to have disciplined employees, managers need to build a culture of mutual respect. There should be a set of organizational rules, philosophies, and structures in place that should be met by everyone. Bending rules or slacking should not be allowed in any organization. In order to achieve this, there is a need for good supervision and impartial judgment.

4. Unity of Command

This principle states that that should be a clear chain of command in the organization. The employees should be clear on whose instructions to follow. According to Fayol, an employee should receive orders from only one manager. If an employee works under two or more managers, then authority, discipline, and stability are threatened. Moreover, this will cause a breakdown in management structure and cause employees to burn out.

5. Unity of Direction

This henry fayol principle of management states that the work to be done should be organized in such a way that employees work in harmony towards the same objective, using one plan, under the direction of one manager. For example, if you have a range of marketing activities such as advertising, budgeting, sales promotion, etc., there should be one manager using one plan for all the marketing activities. The different activities can be broken down for different sub-managers, but they should all work towards a common goal under the direction of one main person in charge of the whole thing.

6. Collective Interest Over Individual Interest

This principle states that the overall interest of the team should take precedence over personal ones. The interest of the organization should not be sabotaged by the interest of an individual. If anyone goes rogue, the organization will collapse.

7. Remuneration

This henry fayol principle of management states that employees should be paid fair wages for the work that they carry out. Any organization that underpays its workers will struggle to motivate and keep quality workers. This remuneration should include both financial and non-financial incentives. Also, there should be a structure in place to reward good performance to motivate employees.

8. Centralization

Centralization refers to the concentration of power in the hands of the authority and following a top-bottom approach to management. In decentralization, this authority is distributed to all levels of management. In a modern context, no organization can be completely centralized or decentralized. Complete centralization means that people at the bottom have no authority over their responsibilities. Similarly, complete decentralization means that there will be no superior authority to control the organization. To use this effectively today, there should be a balance of centralization and decentralization. The degree to which this balance is achieved will differ from organization to organization.

9. Scalar Chain

A scalar chain refers to a clear chain of communication between employees and their superiors. Employees should know where they stand in the hierarchy of the organization and who to go to in a chain of command. To implement this in the workplace, Fayol suggests that there should be an organizational chart drawn out for employees to see this structure clearly.

10. Order

This principle states that there should be an orderly placement of resources (manpower, money, materials, etc.) In the right place at the right time. This ensures the proper use of resources in a structured fashion. Misplacement of any of these resources will lead to misuse and disorder in the organization.

11. Equity

Equity is a combination of kindness and justice. This principle states that managers should use kindliness and justice towards everyone they manage. This creates loyalty and devotion among the employees towards the organization they work for.

12. Stability of Tenure of Personnel

This principle states that an organization should work to minimize staff turnover and maximize efficiency. Any new employee cannot be expected to get used to the culture of an organization right away. They need to be given enough time to settle into their jobs to become efficient. Both old and new employees should also be ensured job security because instability can lead to inefficiency. There should also be a clear and effective method to handle vacancies when they arise because it takes time and expense to train new ones.

13. Initiative

This principle states that all employees should be encouraged to show initiative. When employees have a say as to how best they can do their job, they feel motivated and respected. Organizations should listen to the concerns of their employees and encourage them to develop and carry out plans for improvement.

14. Esprit de Corps

Esprit de Corps means "Team Spirit". This henry fayol principle of management states that the management should strive to create unity, morale, and co-operation among the employees. Team spirit is a great source of strength in the organization. Happy and motivated employees are more likely to be productive and efficient.

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I UNIT TEST - FEBRUARY 2023
PG Department of Commerce

CLASS: I- B.Com A & B (General) TIME: 1 Hour

SUB: Indian Economy Max: 25 Marks

DATE: 03.03.2023

SECTION-A **5X2=10**

Answer Any Five Questions

CO-1 BL-1 1.What is Meant by Economic Development

CO-1 BL-1 2.What is National Income?

CO-2 BL-1 3.What are the three concept of unemployment

CO-2 BL-2 4.Explain Poverty line.

CO-2 BL-6 5.Write a short note on GNP, NNP, PT?

CO-2 BL-1 6.Define the term Inequalities.

CO-2 BL-1 7.What is Disguised Unemployment?

SECTION-B **5X1=5**

Answer Any One Question

CO-1 BL-1 8.What are the difference between growth and Development.

CO-2 BL-6 9.Write a note of Nehru Rozgar Yojana.

SECTION-C **5X1=5**

Answer Any One Question

CO-1 BL-4 10.Analysis the different problems of Indian economy.

CO-2 BL-2 11.Discuss Bhagawathi Committee on Unemployment.

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I st question paper

PART-A

1. What do you meant by Economic Development?

Economic development is programs, policies or activities that seek to improve the economic well-being and quality of life for a community. "Economic development" means to you will depend on the community you live in. Each community has its own opportunities, challenges, and priorities.

2. What is National Income?

A variety of measures of national income and output are used in economics to estimate total economic activity in a country or region, including gross domestic product, gross national product, net national income, and adjusted national income.

3. What are the three concepts of unemployment?

The three concepts of unemployment are :-

* The condition of one who is capable of working.
* Actively seeking work
* But a unable to find any work.

4. What is Poverty line?

The Poverty line is an estimated, imaginary line developed by economists in order to define a poor person. Using certain standard measures, the poverty line is calculated such that all poor people lie below the poverty line and any one above the poverty line is not poor.

5. Write a short note on GNP, NNP and PI?

* GNP :- Gross National Product [GNP] refers to the total value of all the goods and services produced by the residents and businesses of a country, irrespective of the location of production.

* NNP :- Net national product [NNP] is gross national Product [GNP], the total value of finished goods and services produced by a country's citizens overseas and domestically, minus depreciation.

* PI :- Personal income is the amount of money collectively received by a inhabitants of a country. Sources of personal income include money earned from employment, dividends and distributions paid by investments, rents derived from property ownership, and profit sharing from businesses.

6. Define the term Inequalities?

Income inequality is the inequality in and disparity in the incomes commanded by the top percentile of the population in comparison to the bottom percentiles, while wealth inequality measures look to do the same but by calculating disparities in wealth instead of income.

7. What is Disguised Unemployment?

Disguised unemployment is unemployment that does not affect aggregate economic output. It occurs when productivity is low and too many workers are filling too few jobs. It can refer to any part of the population that is not employed at full capacity.

PART-B

1. What are the difference between growth and development.

GROWTH	DEVELOPMENT
Is a quantitative change	Is a qualitative change
Is value-neutral (can be positive or negative).	Is value positive (can only be positive).
change can be multi-directional (a decrease or an increase)	change can only unidirectional (can only be an increase in quality).

Is easier to express in terms of numbers.	Is not easier to express in terms of numbers, ranking in more effective.
Eg:- GDP, Population, etc,.	Eg:- Human Development Index, Happiness Index etc,..

2. Write a note of Nehru Rozgar Yojana?

* The Prime Minister Rozgar Yojana [PMRY] has been designed to provide employment to educated unemployed youth by setting up of micro enterprises by the educated unemployed poor. It relates to the setting up of the self-employment ventures for industries, services and business in Rural and Urban areas.

* The Scheme covers all educated youth with the minimum qualification of VIII standard (passed). Preference will be given to those who have been trained for any trade in Govt. recognized / approved institutions for a duration of at least 6 months.

PART-C :-

1. Analysis the different problems of Indian economy.

The different problems of Indian economy are :-

* Population density :- The population density of India is one of the highest in the world. This population density, coupled with Indian infrastructure which is not able to keep up with the population growth, is one of the main problems that the Indian economy faces.

* Poverty Problems :- Another challenge faced by the Indian economy is poverty. Nearly 22% of the population lives below the poverty line. this means that the large portion of the population is not able to participate in the economy and this leads to a vicious cycle of poverty.

* Unemployment :- Unemployment is another big challenge that the Indian economy faces. The unemployment rate in India is at a 45-year high.

This means that there are a lot of people who are not able to find jobs. This leads to a lot of social problems as well.

* Poor Education :- Another challenge that the Indian economy faces is poor education. The literacy rate in India is only around 74%. This means that a lot of people are not able to get good jobs and participate in the economy. This leads to a lot of social problems as well.

* Private Debt :- Another challenge faced by the Indian economy is private debt. The Private debt to GDP ratio in India is one of the highest in the world. This means that a lot of people have taken out loans and are not able to repay them. This leads to a lot of financial problems for the economy.

* Corruption :- Corruption is another big challenge faced by the Indian economy. Corruption leads to a lot of inefficiency and waste in the economy. It also leads to a lot of social problems as well.

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PG DEPARTMENT OF COMMERCE

I UNIT TEST, FEBRUARY – 2023

ADVANCED CORPORATE ACCOUNTING (CZ24A)

CLASS: II B. COM - A & B **TIME:** 1 Hour

DATE : 27.02.2023 **Max:** 25 Marks

PART A – (5 X 2 = 10 Marks)
Answer any FIVE questions

CO 4 BL 1 1. Who is Liquidator?

CO 4 BL 1 2. Define voluntary winding up.

CO 4 BL 1 3.write a short note on preferential creditors.

CO 1 BL 2 4. Explain the term external reconstruction.

CO 1 BL 3 5. Illustrate the word minority interest.

CO 4 BL 2 6.Discuss the different types of liquidation.

CO 4 BL 1 7.What is liquidation of a company?

PART B - (1 X 5 = 05 Marks)
Answer any ONE question

CO 4 BL 4 8. What do you mean by liquidation? Explain the order of payments.

CO 4 BL 3 9.Unlucky Ltd. went into voluntary liquidation. It's assets realised by ₹2,10,000 excluding the amount realised by the sale of securities held by the secured creditors.

From the following prepare liquidator final statement of account.

Secured creditors ₹ 17,500 (security realised ₹ 20,000)

Preferential creditors ₹ 3,000

Unsecured creditors ₹ 1,00,000

Debentures ₹ 1,25,000

Liquidation expenses ₹ 2,500

Liquidator remuneration is 3% on amount paid to unsecured creditors.

PART C– (1 X 10 = 10 Marks)
Answer any ONE questions

CO 4 BL 3 10. The following particulars relate to a Limited Company which went into Voluntary Liquidation.

Preferential Creditors 25,000

Unsecured Creditors 58,000

6% Debentures 30,000

The assets realised Rs. 80,000. The expenses of liquidation amounted to Rs. 1,500 and the liquidator's remuneration was agreed 2.5% on the amount realised and 2% on the amount paid to unsecured creditors including preferential creditors.

Show the Liquidator's final statement of account.

CO 1 BL 3 11. XYZ Ltd. Resolve to reduce its capital 50,000 fully paid ₹ 5 per share and to eliminate share premium account. The balance sheet were as follows:

Liabilities	₹	Assets	₹
Share capital of 50,000 shares of ₹ 10 each	5,00,000	Goodwill	1,00,000
		Land & Building	1,62,000
Security premiumSundry Creditors	50,000	Plant & Machinery	2,07,000
Bank overdraft	62,000	Stock	92,000
	73,000	Debtors	74,000
		Profit & loss A/c	50,000
	6,85,000		6,85,000

i. To written off goodwill account
ii. To written off debit balance in profit &loss account
iii. To reduce the book value of asset by the following amount-
Land & building ₹ 42,000
Plant & Machinery ₹ 67,000
Stock ₹ 33,600
iv. To provide bad debts reserve of 10% off the book value of debtors.
Pass the journal entries and prepare the balance sheet.

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I UNIT TEST, FEBRUARY – 2023

ADVANCED CORPORATE ACCOUNTING (CZ24A)

ANSWER KEY

CLASS: II B. COM - A & B

TIME: 1 Hour

DATE : 27.02.2023

Max: 25 Marks

PART A – (5 X 1 = 10 Marks)
Answer any FIVE questions

CO 4 BL 1 1. Who is Liquidator?

Answer: The person appointed for conducting the liquidation proceedings of the company is called 'Liquidator'.

CO 4 BL 1 2. Define voluntary winding up.

Answer: The company can be wound up voluntarily by the mutual agreement of members of the company, if:

(i) The company passes a Special Resolution stating about the winding up of the company.

(ii) The company in its general meeting passes a resolution for winding up as a result of expiry of the period of its duration as fixed by its Articles of Association or at the occurrence of any such event where the articles provide for dissolution of company.

CO 4 BL 1 3.write a short note on preferential creditors.

Answer: A preferential creditor is a person or company owed money entitled to be paid before other non-preferential creditors when a company is wound up.

CO 1 BL 2 4. Explain the term external reconstruction.

Answer: External reconstruction refers to forming of a new company to take over the assets and liabilities of old company.

CO 1 BL 3 5. Illustrate the word minority interest.

Answer: A minority interest is a partial ownership stake in a company where the majority of shares are controlled by a larger parent company.

CO 4 BL 2 6.Discuss the different types of liquidation.

Answer:

- Compulsory liquidation
- Creditors' voluntary liquidation
- Members voluntary liquidation

CO 4 BL 1 7.What is liquidation of a company?

Answer: A Company is an artificial person and it is created by law therefore the law alone can close it. Liquidation of company refers to a process in which a company's existence is brought to an end. On liquidation the affairs of a company are wound up and its name is struck off from the Register of the Registrar of Companies and this fact is published in the Official Gazette.

PART B - (1 X 5 = 05 Marks)
Answer any ONE question

CO 4 BL 4 8. What do you mean by liquidation? Explain the order of payments.
Answer: Liquidation of company refers to a process in which a company's existence is brought to an end.

- Secured creditors
- Cost of Liquidation
- Preferential creditor
- Debenture holders
- Unsecured creditors
- Preference shareholders
- Equity shareholders

CO 4 BL 3 9.Unlucky Ltd. went into voluntary liquidation. It's assets realised by ₹2,10,000 excluding the amount realised by the sale of securities held by the secured creditors.

From the following prepare liquidator final statement of account.

Secured creditors ₹ 17,500 (security realised ₹ 20,000)

Preferential creditors ₹ 3,000

Unsecured creditors ₹ 1,00,000

Debentures ₹ 1,25,000

Liquidation expenses ₹ 2,500

Liquidator remuneration is 3% on amount paid to unsecured creditors.

Answer: Liquidator remuneration 2388

PART C– (1 X 10 = 10 Marks)
Answer any ONE questions

CO 4 BL 3 10. The following particulars relate to a Limited Company which went into Voluntary Liquidation.

Preferential Creditors 25,000

Unsecured Creditors 58,000

6% Debentures 30,000

The assets realised Rs. 80,000. The expenses of liquidation amounted to Rs. 1,500 and the liquidator's remuneration was agreed 2.5% on the amount realised and 2% on the amount paid to unsecured creditors including preferential creditors.

Show the Liquidator's final statement of account.

Answer: Liquidator's remuneration 2000 +500 + 412 = 2912

CO 1 BL 3 11. XYZ Ltd. Resolve to reduce its capital 50,000 fully paid ₹ 5 per share and to eliminate share premium account. The balance sheet were as follows:

Liabilities	₹	Assets	₹
Share capital of 50,000 shares of ₹ 10 each	5,00,000	Goodwill	1,00,000
Security premium	50,000	Land & Building	1,62,000
Sundry Creditors	62,000	Plant & Machinery	2,07,000
Bank overdraft	73,000	Stock	92,000
		Debtors	74,000
		Profit & loss A/c	50,000
	6,85,000		6,85,000

i. To written off goodwill account
ii. To written off debit balance in profit &loss account
iii. To reduce the book value of asset by the following amount-
Land & building ₹ 42,000
Plant & Machinery ₹ 67,000
Stock ₹ 33,600
iv. To provide bad debts reserve of 10% off the book value of debtors.
Pass the journal entries and prepare the balance sheet.

Answer: Balance sheet 3,85,000

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I UNIT TEST – FEBRUARY 2023

COMPANY LAW – CZ24B

Date: 28.02.2023 **Max.Marks:25**

Class: II B. Com - A&B **Duration: 1 Hr**

PART – A (5*2=10)

Answer any FIVE of the following

1. CO1 PO1 Define company?
2. CO1 PO1 What is meant by perpetual succession?
3. CO1 PO1 What is subsidiary?
4. CO1 PO1 Define implied prospectus?
5. CO1 PO1 What are the contents of MOA?
6. CO1 PO1 Define producer company?
7. CO1 PO1 Who is a promoter?

PART – B (1*5=5)

Answer any ONE of the following

8. CO1 PO1 Explain in detail about content of prospectus and different types of prospectus?
9. CO1 PO1 Explain the legal effect of memorandum of association?

PART – C (1*10=10)

Answer any 1 of the following

10. CO1 PO1 Explain AOA and contents of AOA?
11. CO1 PO1 Describe the stages and steps of incorporation of company in detail?

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I UNIT TEST – FEBRUARY 2023

COMPANY LAW

Date: 28.2.23 Max.Marks:25

Class: II B.Com A & B Duration: 1 Hr

PART – A (5*2=10)

Answer any 5 of the following

1. Define company?CO1PO1

A company is a legal entity that is created by a group of individuals or organizations to conduct business. It is a separate legal entity from its owners and has the ability to own property, enter into contracts, sue or be sued, and pay taxes

2. What is meant by perpetual succession? CO1PO1

Perpetual succession means that a company has an unlimited lifespan and can continue to exist regardless of changes in ownership or management. This is because a company is a separate legal entity from its owners, and its existence is not dependent on the life or death of its members

3. What is subsidiary? CO1PO1

A subsidiary is a company that is controlled by another company, known as the parent company. The parent company holds a majority stake in the subsidiary and can influence its operations and management.

4. Define implied prospectus? CO1PO1

An implied prospectus is a type of prospectus that is not explicitly written or published but is assumed to exist based on the actions of the company. For example, if a company offers shares to the public without a formal prospectus, it is assumed that the company has provided an implied prospectus.

5. What are the contents of MOA? CO1PO1

The Memorandum of Association (MOA) is a legal document that defines the constitution of a company and outlines its objectives, powers, and scope of operations. The contents of an MOA typically include the company name, registered office, objectives, share capital, liability of members, and other important details related to the company's formation and operation.

6. Define producer company? CO1PO1

A producer company is a type of company that is formed by a group of farmers or agricultural producers to collectively engage in business activities related to agriculture. The main objective of a producer company is to improve the income and livelihoods of its members by promoting better farming practices, providing technical assistance, and facilitating marketing and distribution of their products.

7. Who is a promoter? CO1PO1

A promoter is an individual or group of individuals who initiate the formation of a company and take the necessary steps to incorporate it. Promoters are responsible for identifying the business opportunity, raising capital, and bringing together the necessary resources to start the company. They may also take an active role in the management of the company in its early stages.

PART-B

8. Explain in detail about content of prospectus and different types of prospectus? CO1PO1

A prospectus is a legal document that is issued by a company to the public to provide information about the company and its securities. It is a tool for investors to evaluate the investment opportunity and make informed decisions. The content of a prospectus typically includes the following:

Business description: This section provides an overview of the company's business operations, history, and future prospects.

Management and ownership: This section includes information about the company's management team, board of directors, and major shareholders.

Financial information: This section includes financial statements, such as income statements, balance sheets, and cash flow statements, as well as other financial data and projections

Risk factors: This section outlines the potential risks and uncertainties that could affect the company's business and financial performance.

Use of proceeds: This section explains how the company plans to use the funds raised through the sale of securities.Legal and regulatory information: This section includes information about the company's legal structure, regulatory compliance, and any pending legal proceedings.

9. Explain the legal effect of memorandum of association? CO1PO1

The Memorandum of Association (MOA) is a legal document that defines the constitution of a company and outlines its objectives, powers, and scope of operations. The legal effect of an MOA is that it serves as a contract between the company and its members, and between the company and the outside world. The MOA defines the relationship between the company and its members, and sets out the rights and obligations of each party.

The MOA establishes the company as a legal entity and specifies the activities that the company is authorized to undertake. It also outlines the share capital of the company, the liability of its

members, and the procedure for the transfer of shares. The MOA is a public document that can be viewed by anyone, and it is filed with the Registrar of Companies at the time of incorporation.

If a company engages in activities that are outside the scope of its MOA, it may be in breach of its legal obligations and may face legal consequences. Similarly, if a company violates the provisions of its MOA, its members may take legal action against the company. Therefore, the MOA is an important legal document that establishes the framework for the company's operation and sets out the legal rights and obligations of all parties involved.

Part-c

10. Explain AOA and contents of AOA? CO1PO1

The articles of association (AOA) are a legal document that sets out the rules and regulations governing the internal affairs of a company. In India, the AOA must be in compliance with the Companies Act, 2013. The following are the contents that must be included in the AOA:

Name Clause: This clause should contain the name of the company and the state in which its registered office is located.

Object Clause: This clause should specify the objects for which the company is formed and any ancillary or incidental objects.

Liability Clause: This clause should state the nature of the liability of the members of the company, whether it is limited or unlimited.

Capital Clause: This clause should specify the amount of authorized share capital of the company, the number of shares into which it is divided, and the nominal value of each share.

Association Clause: This clause should state that the subscribers to the memorandum of association agree to become members of the company and that they agree to the contents of the AOA.

Subscription Clause: This clause should contain the name, address, and occupation of each subscriber to the memorandum of association and the number of shares subscribed by each subscriber.

Shareholders' Rights and Restrictions: This clause should specify the rights, privileges, and restrictions attaching to each class of shares issued by the company.

Board of Directors: This clause should contain provisions relating to the appointment, retirement, remuneration, powers, and duties of the board of directors.

General Meetings: This clause should specify the rules and procedures for convening and conducting general meetings of the company.

Dividend and Reserve: This clause should specify the procedure for the declaration and payment of dividends, the transfer of profits to reserves, and the utilization of reserves.

Winding Up: This clause should specify the procedure for the winding up of the company.

It is important to note that the AOA of a company must be in compliance with the Companies Act, 2013 and any other applicable laws and regulations. Any amendment to the AOA must also be in compliance with the law and must be approved by the shareholders of the company.

11. Describe the stages and steps of incorporation of company in detail? CO1PO1

Incorporating a company involves several stages and steps that vary depending on the jurisdiction and type of business entity. However, the general process typically includes the following stages:

Choose a Business Entity: The first step in incorporating a company is to choose the type of business entity that best suits your needs. Common options include a corporation, limited liability company (LLC), partnership, sole proprietorship, or nonprofit organization.

Choose a Name: The next step is to choose a name for your company. The name must be unique and not already in use by another business entity in the same jurisdiction. You can check the availability of a name by searching the business name database of the Secretary of State office.

File Articles of Incorporation: The Articles of Incorporation is a legal document that establishes the existence of the company and includes details such as the name, address, purpose, and stock structure of the company. You must file the Articles of Incorporation with the Secretary of State office in the state where you plan to incorporate.

Draft Bylaws: The Bylaws are a set of rules and regulations that govern the internal operations of the company. Bylaws typically cover topics such as the rights and responsibilities of shareholders, the roles of officers and directors, and the procedures for holding meetings and making decisions.

Hold Initial Board of Directors Meeting: Once the Articles of Incorporation and Bylaws are filed, the initial board of directors meeting must be held to elect officers and adopt the Bylaws. This meeting must be recorded in the corporate minutes.

Obtain Business Licenses and Permits: Depending on the nature of the business and the jurisdiction, you may need to obtain various licenses and permits to operate legally. You can check the requirements with the local and state government offices.

Issue Stock Certificates: If the company is authorized to issue stock, stock certificates must be issued to shareholders, indicating their ownership in the company.

Obtain an EIN: An EIN (Employer Identification Number) is a unique identifier assigned by the IRS for tax purposes. You must obtain an EIN from the IRS if you plan to hire employees, open a bank account, or file tax returns.

Comply with Ongoing Legal and Regulatory Requirements: After the company is incorporated, ongoing legal and regulatory requirements must be met, such as filing annual reports, holding shareholder meetings, and maintaining accurate records.

In summary, incorporating a company involves several stages and steps, including choosing a business entity, choosing a name, filing Articles of Incorporation, drafting Bylaws, holding an initial board of directors meeting, obtaining licenses and permits, issuing stock certificates, obtaining an EIN, and complying with ongoing legal and regulatory requirements. It is advisable to seek professional guidance from an attorney or a business consultant to ensure compliance with all the legal requirements.

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DEPARTMENT OF COMMERCE

I UNIT TEST, FEBRUARY – 2023

INDIRECT TAXATION – CZ24D

CLASS: II B.com A & B

TIME: 1 Hour

DATE: 02.03.2023

Max: 25 Marks

PART A – (5 X 2 = 10 Marks)

Answer any FIVE questions

1. CO1 PO1 : What do you mean by tax?
2. CO1 PO1 : What is GST? Define it.
3. CO1 PO1 : What is Direct tax?
4. CO1 PO1 : Define the term person under GST?
5. CO1 PO1 : How do you classify the tax?
6. CO2 PO1 : Describe Why GST is introduced?
7. CO2 PO1: Expand the term CGST, SGST, IGST and UTGST.

PART B – (1 X 5 = 5 Marks)

Answer any ONE questions

8. CO2PO1: Distinguish between Direct tax and Indirect tax?
9. CO1 PO1 : What are all the Different Types of assessment under GST?

PART C – (1 X 10 = 10 Marks)

Answer any ONE questions

10. CO2PO1 : Explain The Following -
    i. History of Indirect tax
    ii. Objectives of GST
    iii. Pros And Cons Of Indirect Tax
    iv. Components of GST
    v. Rate Structure of GST

11. CO2PO1 : Briefly explain the Amendment Of Indian Constitution for GST?

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V. The rate structure of GST (Goods and Services Tax) in India is divided into four main tax rates: 5%, 12%, 18%, and 28%. In addition, there is a zero-rate tax and a special rate for certain goods and services. Here's a breakdown of the GST rate structure in India:

0% GST: Certain essential items such as food, books, and medical supplies are exempt from GST.

5% GST: Items like packaged foods, apparel below Rs. 1000, footwear below Rs. 500, and some goods used by the agriculture sector, are taxed at 5%.

12% GST: Items like processed foods, computers, and telecommunication services are taxed at 12%.

18% GST: Items like soaps, hair oil, toothpaste, and capital goods are taxed at 18%.

28% GST: Luxury items like automobiles, perfumes, high-end televisions, and cinema tickets are taxed at 28%.

Special rates: Certain goods and services such as gold, hotel rooms, and cinema tickets, attract a special rate of 3%, 5%, and 18%, respectively.

11. Briefly explain the Amendment Of Indian Constitution for GST? CO2PO1

The implementation of GST (Goods and Services Tax) in India required several amendments to be made to the Indian Constitution. The main amendments made to the Constitution are as follows:

Introduction of a new Article: Article 246A was inserted into the Constitution, which gives concurrent powers to the central government and the state governments to levy GST on goods and services.

Abolition of certain powers: The Constitution (One Hundred and First Amendment) Act, 2016 abolished the powers of the state governments to levy taxes such as VAT (Value Added Tax), Luxury Tax, and Entry Tax on goods.

Introduction of GST Council: The Constitution (One Hundred and First Amendment) Act, 2016 also introduced the GST Council, which is a constitutional body comprising the Union Finance Minister and the state finance ministers. The Council is responsible for making recommendations on issues related to GST, including tax rates, exemptions, and threshold limits.

PART C – (1 X 10 = 10 Marks)

Answer any ONE questions

10. Explain The Following - CO2PO1

i. History of Indirect tax
ii. Objectives of GST
iii. Pros And Cons Of Indirect Tax
iv. Components of GST
v. Rate Structure of GST

i. The history of indirect taxes can be traced back to ancient times when taxes were levied on the sale of goods and services. In India, the modern system of indirect taxes was introduced during the British colonial era with the introduction of the Excise Duty in 1944. After independence, several other indirect taxes such as customs duty, central sales tax, service tax, and others were introduced. However, the complex and fragmented indirect tax structure led to several issues such as tax evasion, cascading effect, and compliance burden.

ii. The main objectives of GST are to create a simplified and unified tax structure, to reduce the cascading effect of multiple taxes, to create a common market across India, to increase tax compliance, to reduce the cost of doing business, and to boost economic growth.

iii.Pros:

Broad-based: Indirect taxes can be applied broadly to a wide range of goods and services, which can help to generate a significant amount of revenue for the government.

Simplicity: Indirect taxes are generally easier to administer and collect than direct taxes, as they can be collected at the point of sale, without the need for individual taxpayers to file tax returns.

Incentivizes savings: Indirect taxes may incentivize savings and investment as it reduces consumer spending, therefore lowering demand and prices.

Cons:

Regressive: Indirect taxes can be regressive, meaning that they take a larger percentage of income from low-income individuals than from high-income individuals. This can lead to inequality in the tax burden.

Hidden: Indirect taxes are often hidden within the price of goods and services, making it difficult for consumers to understand how much tax they are paying.

Inflation: Indirect taxes can increase the prices of goods and services, leading to inflation, which can have negative effects on the economy.

iv. CGST,SGST,IGST,UTGST

7. Expand the term CGST, SGST, IGST and UTGST. CO2PO1

CGST stands for Central Goods and Services Tax, which is the tax levied by the central government on the intra-state supply of goods and services. SGST stands for State Goods and Services Tax, which is the tax levied by the state government on the intra-state supply of goods and services

PART B – (1 X 5 = 5 Marks)

Answer any ONE questions

8. Distinguish between Direct tax and Indirect tax?CO2PO1

The main difference between direct tax and indirect tax is in the way they are levied and collected. Direct tax is levied directly on the income or wealth of individuals or entities, while indirect tax is levied on the supply or consumption of goods and services. Direct taxes are progressive in nature, meaning the tax rate increases as the income or wealth of the individual or entity increases. Examples of direct taxes include income tax, corporate tax, and wealth tax. Indirect taxes, on the other hand, are regressive in nature, meaning they tend to have a greater impact on low-income earners than on high-income earners. Examples of indirect taxes include GST, excise duty, customs duty, and sales tax.

9. What are all the Different Types of assessment under GST? CO1 PO1

Self-assessment: The taxpayer is required to assess their own tax liability and pay the tax accordingly.

Provisional assessment: This is done when the taxpayer is unable to determine the tax liability due to various reasons such as incomplete records, pending investigations, or disputes.

Scrutiny assessment: The tax authorities scrutinize the taxpayer's returns and records to verify the accuracy of the tax paid.

Best judgement assessment: This is done when the taxpayer fails to comply with the tax authorities' notices or fails to file returns. The tax authorities assess the tax liability to the best of their judgement.

Summary assessment: This is done in cases where the taxpayer has excess input tax credit or has paid excess tax.

Re-assessment: This is done when the tax authorities discover any under-assessment or non-assessment of tax due to any reason such as misstatement or fraud.

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DEPARTMENT OF COMMERCE

I UNIT TEST, FEB 2023

CLASS: II B.com TIME: 1 Hour

SUB: **Indirect Taxation** Max: 25 Marks

PART A – (5 X 2 = 10 Marks)

Answer any FIVE questions

1. What do you mean by tax? CO1 PO1

   Tax refers to a mandatory financial charge imposed by the government on individuals and entities, usually based on their income, profits, or property.

2. What is GST? Define it. CO1 PO1

   GST stands for Goods and Services Tax, which is a comprehensive indirect tax levied on the supply of goods and services across India. GST has replaced various indirect taxes such as excise duty, service tax, VAT, and others. It is a value-added tax, meaning it is applied to the value added at each stage of the supply chain, from manufacturing to consumption.

3. What is Direct tax? CO1 PO1

   A direct tax is a tax that is levied directly on the income or wealth of individuals or entities.

4. Define the term person under GST? CO1 PO1

   Under GST, a person refers to any individual, company, partnership firm, association of persons, or any other entity that is liable to pay tax under the GST Act. It also includes individuals who are registered or required to be registered under the Act.

5. How do you classify the tax? CO1 PO1

   Taxes can be classified into various categories based on their nature, application, and incidence. Some of the common classifications of taxes include direct and indirect taxes, progressive and regressive taxes, specific and ad valorem taxes, and federal and state taxes.

6. Describe Why GST is introduced?CO2PO1

   GST was introduced in India to streamline the complex and fragmented indirect tax structure prevailing in the country. It aimed to create a common market across India by removing the cascading effect of multiple indirect taxes and creating a simplified tax structure that is easy to administer and comply with.

Amendment to Article 269A: Article 269A was amended to provide for the GST Council to decide on the apportionment of IGST (Integrated Goods and Services Tax) between the Centre and the states.

Amendment to Article 279A: Article 279A was inserted into the Constitution to provide for the establishment of the GST Council, and to define its powers and functions.

These amendments to the Constitution were necessary to enable the implementation of GST in India. The implementation of GST has simplified the indirect tax system in India by replacing multiple indirect taxes such as excise duty, service tax, VAT, and others, with a single tax. This has led to the harmonization of tax rates across the country and has helped to create a common market in India.

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I UNIT TEST, FEBRUARY - 2023
FINANCIAL SERVICES – CZ24C

CLASS: II B. Com A & B

TIME: 1 Hour

DATE: 01.03.2023

Max: 25 Marks

PART A – (5 X 2 = 10 Marks)
Answer any FIVE questions

1. CO 1 BL 1 What is Factoring?
2. CO 1 BL 1 Define merchant banking
3. CO 2 BL 1 What is issue management?
4. CO 1 BL 1 What is Leasing?
5. CO 2 BL 1 What is new issues market?
6. CO 1 BL 1 List out the players of financial services
7. CO 2 BL 1 What is private placement?

PART B – (1 X 5 = 5 Marks)
Answer any ONE question

8. CO 1 BL 2 Explain the various importance of financial services?
9. CO 2 BL 2 Difference between the new issue market and secondary market.

PART C – (1 X 10 = 10 Marks)
Answer any ONE questions

10. CO 1 BL 2 Describe the various functions of financial service
11. CO 2 BL 4 Explain the various functions of merchant banking.

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I UNIT TEST, FEBRUARY - 2023
FINANCIAL SERVICES – CZ24C

CLASS: II B. Com A & B TIME: 1 Hour

PART A – (5 X 2 = 10 Marks)
Answer any FIVE questions

1. CO 1 BL 1 What is Factoring?
   Factoring is a type of finance in which a business would sell its accounts receivable (invoices) to a third party to meet its short-term liquidity needs. Under the transaction between both parties, the factor would pay the amount due on the invoices minus its commission or fees.
2. CO 1 BL 1 Define merchant banking
   Merchant banking is a professional service provided by the merchant banks to their customers considering their financial needs, for adequate consideration in the form of fee.
3. CO 2 BL 1 What is issue management?
   Management of issues refers to effective marketing of corporate securities viz., equity shares, preference shares and debentures or bonds by offering them to public.
4. CO 1 BL 1 What is Leasing?
   A finance lease or capital lease is a financial product, in which a leasing company gives operating control of an asset to a business for an agreed period.
5. CO 2 BL 1 What is new issues market?
   The primary market, also known as the new issue market, is that segment of the capital market where securities are issued to investors for the first time.
6. CO 1 BL 1 List out the players of financial services
   The financial services sector provides financial services to people and corporations. This segment of the economy is made up of a variety of financial firms including banks, investment houses, lenders, finance companies, real estate brokers, and insurance companies.
7. CO 2 BL 1 What is private placement?
   A private placement is a sale of stock shares or bonds to pre-selected investors and institutions rather than publicly on the open market.

PART B – (1 X 5 = 5 Marks)
Answer any ONE question

8. CO 1 BL 2 Explain the various importance of financial services?

Importance of Financial Services

- Vibrant Capital Market.
- Expands activities of financial markets.
- Benefits of Government.
- Economic Development.
- Economic Growth.
- Ensures Greater Yield.
- Maximizes Returns.
- Minimizes Risks.

- Promotes Savings.
- Promotes Investments.
- Balanced Regional Development.
- Promotion of Domestic & Foreign Trade.

9. CO 2 BL 2 Difference between the new issue market and secondary market.

Basis	Primary Market	Secondary Market
Meaning	A market in which securities are sold for the first time is known as a Primary Market.	A market in which the sale and purchase of newly issued securities and second-hand securities are made is known as a Secondary Market.
Types of Securities	In the primary market, the sale of new securities takes place.	In the secondary market, the sale and purchase of existing or second-hand securities take place.
Issued by	In the primary market, the securities are directly issued by companies.	In the secondary market, the securities are transferred between the investors only.
Capital Formation	A primary market directly contributes to the capital of a company as it involves the transfer of funds from surplus units to deficit units.	A secondary market indirectly contributes to the capital of a company as it involves an exchange of funds between surplus units only.
Entry	The companies enter a primary market for raising capital for their operations.	The securities of listed companies only are bought and sold in this market.
Geographical Location	There is no fixed geographical location of a primary market. Every bank, institution, foreign investor, etc., contribute to this market.	There is a fixed geographical location of a secondary market and it also has fixed working hours.
Price	The price of securities in a primary market is fixed by the management of the company issuing them.	The price of securities in a secondary market is fixed by the demand and supply of the stock exchange market.

PART C – (1 X 10 = 10 Marks)
Answer any ONE questions

10. CO 1 BL 2 Describe the various functions of financial service
Promoting investment

Financial services create more demand for products and the producer to meet the demand from the consumer goes for more investment. Then the financial services come to the rescue of the investor like the merchant banker through new issued marketing by enabling the producer to raise capital. The stock market helps to mobilize more funds by the investor

Promoting savings

Financial services like mutual funds provide ample opportunity for different types of savings. Different types of investment options are available for the convenience of the pensioners as well as the aged people so that they can be ensured of a reasonable return on the investment without a lot of risks.

Minimizing the risks

Risk factors of both the financial services as well as producers are minimized by the presence of insurance companies. Different types of risks are covered here. It not only offers protection from the fluctuating business conditions but also the risks caused by natural calamities.

Maximizing the Returns

Financial services enable businessmen to maximize their returns. This is possible because of the availability of credit at a reasonable rate. Producers can avail of different types of credit facilities to acquire the assets.

Ensures greater Yield

There is a difference between return and yield. Yield attracts more producers to enter the market and increase their production so that they can meet the demands of the consumer.

Economic growth

The development of the sectors is essential to develop the economy. The financial services ensure equal distribution of the funds to all the three sectors named primary, secondary, and tertiary. Because of this, the activities are spread over in a balanced manner in all the three sectors.

Economic development

Financial services enable consumers to obtain various kinds of products and services by which they can improve their living standards. Purchasing a car or house or other essentials and also the luxurious items is made possible through the hire purchase, leasing, and housing finance companies.

The benefit to the Government

Financial services enable the government to raise short-term and long-term funds to meet both revenue and capital expenditures. The government raises short term funds through the money market and by issuing the Treasury Bills. These are purchased by the commercial banks from out of their depositors' money.

Expands activities of Financial Institutions

The financial services enable financial institutions to raise finance and get an opportunity to disburse their funds most profitably.

Capital Market

One of the barometers of a country's economy is the presence of a vibrant capital market. If there are hectic activities in the capital market, then it is an indication of the presence of any positive economic condition.

Promotion of Domestic and Foreign Trade

The financial services ensure the promotion of domestic and foreign trade. The factoring and for-failing companies promote the sale of goods in the domestic market and the export of goods in the foreign market. Banking and insurance services further help to step up these kinds of promotional activities.

Balanced Regional development

The government observes the growth of the economy and regions that remain economically backward are given fiscal and monetary benefits through taxation and cheaper credit promoting more investment.

11. CO 2 BL 4 Explain the various functions of merchant banking.

1)Portfolio Management:

Merchant banks provide consultancy service to institutional investors on investment decisions. They trade in exchange/securities on behalf of their clients and also manage their portfolio.

2)Raising funds for clients:

Merchant bank help their client/ business firm to raise capital from domestic and international market by issuing securities the capital raised merchant banks helps business firm in expansion of their business activities.

3)Broker in Stock Exchange:

Merchant banks act as broker for their client in stock exchange. They conduct research on equity shares for their client and also purchase and sell the share on behalf of them. They also play the role of advisor for, example, they advice their client their clients about which shares to buy, when to buy, how much to buy and when to sell.

4)Managing Public Issue of Companies:

Merchant bank manage the public issue of companies. They provide following services:

- Merchant bank advice companies at the time of public issue
- Merchant banks advice the size and price of public issue
- Merchant bank helps companies in managing the process of application and allotment of securities
- Merchant banks helps companies at the time of filing ipo in stock exchange
- Merchant banks help in appointing underwriters and brokers at time of issue.
- Acting the capacity of the manager to the issue

5)Services to Public Sector Units:

Merchant banks offer different services to public sector units. They provide the facilities to raise long-term capital, marketing of securities and arranging long-term finance from term lending institutions.

6)Money Market Operation:

Merchant bankers deal with underwriters and also deal with short-term financial/stock market instruments, such as:

1. Government Bonds.
2. Commercial paper issued by large corporate firms.
3. Treasury bills issued by the Government.

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I UNIT TEST, FEBRUARY 2023
ENTREPRENEURIAL DEVELOPMENT

Date: 01.03.2023 **Max.Marks:25**
Class: III B.COM "A"& "B" **Duration: 1 Hr**

Part – A

Answer any **FIVE** questions. **(5x1=5)**

1. CO1 BL1: 1. Who is an Entrepreneur?
2. CO1 BL1: 2. Define the term Entrepreneurship?
3. CO1 BL1: 3. Who is a Social Entrepreneur?.
4. CO2 BL2: 4. Explain the term Idea generation?
5. CO1 BL1: 5. Who is a Woman Entrepreneur?
6. CO2 BL1: 6. What is Focus groups?
7. CO2 BL1: 7. What is Brain storming?

Part – B

Answer any **TWO** questions. **(2x5=10)**

CO1 BL2: 1. Discuss the characteristics of Entrepreneur?
CO3 BL1: 2.Explain the steps in selection of New Business Opportunities?

Part – C

Answer any **ONE** question. **(1x10=10)**

CO1 BL6: 1. Discuss the factors influencing Entrepreneurship?
CO2 BL5: 2.Elucidate the Techniques of Business Idea Generation?

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I UNIT TEST, FEBRUARY 2023
ENTREPRENEURIAL DEVELOPMENT
ANSWER KEY

Part – A

Answer any **FIVE** questions.**(5x1=5)**

1. **Who is an Entrepreneur?**

An entrepreneur is someone who starts and operates a new business venture, typically taking on financial risks in the hopes of earning a profit or fulfilling a need in the marketplace. Entrepreneurs are characterized by their innovative thinking, creative problem-solving skills, and their willingness to take calculated risks in pursuit of their goals.

2. **Define the term Entrepreneurship?**

Entrepreneurship is the process of creating, developing, and managing a new business venture in order to achieve a specific goal or set of goals, such as financial success or social impact. This process typically involves identifying a need or opportunity in the marketplace, developing a plan to address that need or opportunity, securing the necessary resources (such as funding, talent, and materials), and launching and growing the business.

3. **Who is a Social Entrepreneur?**

A social entrepreneur is an individual who starts and runs a business venture with the primary goal of addressing a social problem or need. Unlike traditional entrepreneurs, who may focus primarily on generating profit, social entrepreneurs aim to create positive social or environmental impact through their business activities.

4. **Explain the term Idea generation?**

Idea generation is the process of coming up with new and innovative ideas for a specific purpose or goal. In the context of entrepreneurship, idea generation is often focused on identifying new business opportunities, developing innovative products or services, or finding better ways to solve problems.

5. **Who is a Woman Entrepreneur?**

A woman entrepreneur is a female individual who starts and operates her own business venture, often with the goal of achieving financial and personal independence. Women entrepreneurs are characterized by their innovative thinking, creative problem-solving skills, and their willingness to take calculated risks in pursuit of their goals.

6. **What is Focus groups?**

A focus group is a type of research method used to gather qualitative data and insights from a small group of individuals who share common characteristics or experiences. Focus groups typically involve a trained facilitator who leads a group discussion among a carefully selected group of participants, with the goal of exploring their attitudes, beliefs, opinions, and experiences related to a particular topic or product.

7. **What is Brain storming?**

Brainstorming is a creative problem-solving technique that involves generating a large number of ideas in a short period of time, without evaluating or judging them. It is a popular technique used in a variety of contexts, including business, education, and creative fields.

The goal of brainstorming is to encourage free thinking and open communication, in order to generate a wide range of potential solutions or ideas. During a brainstorming session, participants are encouraged to share their ideas without criticism or judgment from others, and to build on each other's ideas to create new and innovative solutions.

Part – B

Answer any **TWO** questions.

1. Discuss the characteristics of Entrepreneur?

Entrepreneurs are individuals who start and operate their own businesses, taking on financial and personal risks in order to pursue their goals and create value in the world. While there is no one-size-fits-all definition of what it means to be an entrepreneur, there are several common characteristics that many successful entrepreneurs share:

Visionary thinking: Entrepreneurs have a strong vision for the future, and are able to see opportunities where others might see challenges or obstacles. They are able to identify unmet needs or underserved markets, and develop innovative solutions to address them.

Risk-taking: Entrepreneurs are willing to take calculated risks in order to achieve their goals. They understand that starting a new business involves financial and personal risks, but are willing to take these risks in pursuit of their vision.

Resilience: Entrepreneurs face many challenges and setbacks along the way, but are able to bounce back from these setbacks and keep moving forward. They are able to adapt to changing circumstances, and are not deterred by failure.

Passion: Entrepreneurs are driven by a deep passion for what they do, and are motivated by a desire to make a positive impact in the world. They are willing to work long hours and make sacrifices in order to pursue their goals.

Creativity: Entrepreneurs are creative problem-solvers, able to think outside the box and come up with new and innovative solutions to complex problems.

Persistence: Entrepreneurs are persistent and tenacious, able to overcome obstacles and push through challenges in order to achieve their goals.

Strong work ethic: Entrepreneurs are highly motivated and hard-working, willing to put in the time and effort necessary to succeed.

Overall, successful entrepreneurs possess a unique combination of vision, risk-taking, resilience, passion, creativity, persistence, and strong work ethic. While these characteristics are not always innate, they can be developed and cultivated over time through education, training, and practical experience.

2.Explain the steps in selection of New Business Opportunities?

Selecting new business opportunities is a critical step in the entrepreneurial process. There are several steps involved in the selection of new business opportunities, which are outlined below:

Idea generation: The first step in the process is to generate a range of potential business ideas. This can be done through brainstorming sessions, market research, or by identifying unmet needs in the marketplace.

Screening: Once a range of potential ideas has been generated, the next step is to screen them based on a set of criteria. This may include factors such as market size, competition, feasibility, and potential profitability.

Feasibility analysis: For the most promising ideas, a feasibility analysis should be conducted to determine whether the idea is technically and economically feasible. This analysis should take into account factors such as market demand, product design, production costs, and distribution channels.

Market analysis: A detailed analysis of the market should be conducted to determine the size of the market, the level of competition, and the potential demand for the product or service.

Competitive analysis: An analysis of the competition should be conducted to identify potential competitors, their strengths and weaknesses, and how the new business will differentiate itself in the marketplace.

Financial analysis: A financial analysis should be conducted to determine the potential costs and revenue streams associated with the new business opportunity. This analysis should take into account factors such as startup costs, ongoing expenses, pricing, and projected revenue.

Risk assessment: A risk assessment should be conducted to identify potential risks and challenges associated with the new business opportunity. This may include risks such as legal, regulatory, and operational risks, as well as potential threats from competitors or changing market conditions.

Decision-making: Based on the above analysis, a decision should be made whether to pursue the new business opportunity or not. This decision should take into account all of the factors outlined above, as well as the entrepreneur's personal goals, skills, and resources.

Overall, selecting a new business opportunity is a complex process that requires careful analysis and evaluation of a range of factors. By following these steps, entrepreneurs can increase their chances of success and identify opportunities that align with their skills, resources, and goals.

Part – C

Answer any **ONE** question **(1x10=10)**

1. **Discuss the factors influencing Entrepreneurship?**

Entrepreneurship is influenced by a wide range of factors that can impact an individual's ability and willingness to start and run a successful business. Some of the key factors that influence entrepreneurship include:

Economic conditions: The overall state of the economy can have a significant impact on entrepreneurship. In a strong economy with low unemployment and high consumer confidence, there may be more opportunities for entrepreneurs to start and grow successful businesses. Conversely, in a weak economy with high unemployment and low consumer confidence, entrepreneurship may be more challenging due to reduced access to capital and decreased demand for products and services.

Technology: Advances in technology can create new opportunities for entrepreneurs by enabling the development of new products and services, and by making it easier to reach customers and operate a business. The rise of the internet, social media, and mobile devices, for example, has created new business models and opportunities for entrepreneurs in fields such as e-commerce, social media marketing, and app development.

Social and cultural factors: Social and cultural factors such as attitudes toward risk-taking, the availability of role models and mentors, and the level of support for entrepreneurship within a community can all impact an individual's decision to pursue entrepreneurship. In some cultures, entrepreneurship may be highly valued and celebrated, while in others it may be viewed with skepticism or even disapproval.

Education and training: Education and training can play an important role in fostering entrepreneurship by providing individuals with the skills and knowledge needed to start and run a successful business. Entrepreneurial education programs, such as business incubators and accelerators, can provide training and mentorship to help entrepreneurs develop their ideas and bring them to market.

Government policies: Government policies and regulations can have a significant impact on entrepreneurship. Policies that support entrepreneurship, such as tax incentives, access to capital, and streamlined regulatory processes, can help to create a favourable environment for entrepreneurs to start and grow businesses.

Personal factors: Finally, personal factors such as an individual's skills, experience, and personal motivation can all play a role in their decision to pursue entrepreneurship. Successful entrepreneurs often possess a combination of skills and traits, including creativity, risk-taking, perseverance, and a passion for their work.

Overall, entrepreneurship is influenced by a complex set of factors that can impact an individual's decision to start and grow a business. By understanding these factors, entrepreneurs can better navigate the challenges and opportunities of entrepreneurship and increase their chances of success.

2.Elucidate the Techniques of Business Idea Generation?

Generating new business ideas is a critical step in the entrepreneurial process. There are several techniques that entrepreneurs can use to generate new business ideas, including:

Brainstorming: Brainstorming is a technique that involves generating a large number of ideas in a short period of time. This can be done individually or in a group setting, and can involve free-associating ideas based on a particular theme or problem.

Observation: Observing the world around you can be a powerful source of inspiration for new business ideas. By observing consumer behavior, market trends, and emerging technologies, entrepreneurs can identify unmet needs and gaps in the marketplace that can be addressed with a new product or service.

Problem-solving: Identifying problems or pain points in the marketplace can be a starting point for generating new business ideas. By identifying a problem or unmet need, entrepreneurs can develop solutions that meet the needs of consumers and create value in the marketplace.

Idea mapping: Idea mapping is a visual technique that involves mapping out different ideas and concepts on a piece of paper or whiteboard. This technique can help to identify connections between different ideas and generate new ideas based on those connections.

Customer feedback: Engaging with customers and gathering feedback can be a powerful source of inspiration for new business ideas. By listening to customer needs and feedback, entrepreneurs can identify opportunities to develop new products or services that meet those needs.

Competitor analysis: Studying competitors can provide insights into gaps in the marketplace and opportunities for new business ideas. By analyzing the strengths and weaknesses of competitors, entrepreneurs can identify opportunities to differentiate themselves in the marketplace and develop new products or services that meet unmet needs.

Overall, there are many techniques that entrepreneurs can use to generate new business ideas. By using a combination of these techniques and staying open to new opportunities and ideas, entrepreneurs can identify and pursue opportunities that align with their skills, resources, and goals.

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I UNIT TEST, FEBRUARY - 2023

MANAGEMENT ACCOUNTING

CLASS: III B.Com (A&B) TIME: 1 Hour

DATE : 28.02.2023 Max: 25 Marks

PART A (5 X 2 = 10 Marks)
Answer any FIVE questions

CO1 BL1 1. State the meaning of Management Accounting.

CO1 BL1 2. List any two limitations of Management Accounting.

CO2 BL1 3. What is Financial Statement Analysis?

CO2 BL1 4. What is meant by comparative statement?

CO2 BL1 5. Define Trend Analysis.

CO5 BL1 6. What is budgetary control?

CO5 BL3 7. Prepare a production budget for three months ending March 31,2009 for the factory producing four products on the basis of the following information:

Type of Products	Estimated stock on 1st January 2009 (units)	Estimated Sales on Jan. – March 2009 (Units)	Desired closing stock March 31, 2009
A	2,000	10,000	5,000
B	3,000	15,000	4,000
C	4,000	13,000	3,000
D	5,000	12,000	2,000

PART B – (1 X 5 = 5 Marks)
Answer any ONE questions

CO1 BL2 8. Explain the importance of Management Accounting.

CO2 BL3 9. Calculate the Trend Percentage from the following data:

	2015	2016	2017	2018
	Rs	Rs	Rs	Rs
Cash	100	120	80	140
Debtors	200	250	325	400

Stock	300	400	350	500
Other Current Assets	50	75	125	150
Land	400	500	500	500
Building	800	1,000	1,200	1,500
Plant	1,000	1,000	1,200	1,500
	2,850	3,345	3,780	4,690

PART C – (1 X 10 = 10 Marks)

Answer any ONE questions

CO1 BL2 10. Differentiate between Cost Accounting and Management Accounting.

CO2 BL3 11. From the following balance sheets of X Ltd, you are required to prepare a comparative balance sheet.

Balance sheet as on 31st December (Rs. in lakhs)

Liabilities	2016	2017	Assets	2016	2017
	Rs.	Rs.		Rs.	Rs.
Equity capital	400	400	Land and building	400	370
6% Pref. capital	300	300	Plant and machinery	400	410
Reserves	200	245	Stock	200	300
8% Debentures	100	150	Debtors	200	300
Bills payable	50	75	Cash	100	140
Sundry creditors	250	350			
	1 ,300	1,520		1 ,300	1,520

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I UNIT TEST, FEBRUARY 2023

MANAGEMENT ACCOUNTING

ANSWER KEY

Section – A

I. Answer Any FIVE Questions: **(5*2=10)**

CO1 BL1 **Ans:** 1. The term Management Accounting refers to adoption and analysis of accounting information for diagnosis and explanation in such a way to assist management in the decision – making function. In other words, it is a form of accounting which uses financial and cost data for the purpose of policy formulation, planning, control and decision – making by the management.

CO1 BL1 **Ans:** 2. Limitations of Management Accounting:

- **Evolutionary Stage**: Management accounting is comparatively a new concept in accounting. It is still in a developing stage.
- **High cost**: The management accounting is supposed to be very sophisticated technique, resulting in high cost to the business.
- **Lack of objectivity**: Management accounting gives more importance to relevance than to objectivity.
-

CO2 BL1 **Ans:** 3. The process of critical evaluation of the financial information contained in the financial statements in. order to understand and make decisions regarding the operations of the firm is called 'Financial Statement Analysis'.

CO2 BL1 **Ans:** 4. Comparative statement refer to those statements which summaries and present accounting data for a number of years incorporating therein changes in individual items of financial statements. These statements mainly include comparative balance sheet and comparative income statement.

CO2 BL1 **Ans:** 5. Trend analysis is a technique used to examine and predict movements of an item based on current and historical data. You can use trend analysis to improve your business using trend data to inform your decision-making.

CO5 BL1 **Ans:** 6. Budgetary control refers to the financial and /or quantitative statement prepared and approved prior to a defined period of time of the policy to be pursued during that period for the purpose of attaining a given objective.

CO5 BL3 **Ans:** 7. Production budget:

Particular	Production
Product – A	13,000
Product – B	16,000
Product – C	12,000
Product – D	9,000
Total	50,000

Section – B

II.Answer Any ONE Question: **(1*5=5)**

CO1 BL2 **Ans:** 8. Importance of Management Accounting are as follows:

Helps in Making Plans
Management accounting assists organization in making better plans for future activities. It supplies all financial and non-financial data to management on a regular basis. Managers through the availability of all these information are able to perform better analysis and forecasting which enables them in framing proper plans.

Assist In Decision Making
Efficient decision making is a major role played by management accounting. It collects and analyses all financial information available within organization and present them in simplified charts, tables or graphs. Management gets better understanding regarding organization affairs and is able to take correct decisions at right time.

Measures the Performance
Management accounting monitors and measures the overall performance of organization. It uses various tools like variance analysis which measures the company performance with pre-established standards for finding out the deviations. Managers by identifying all variations in performance of company are able to take corrective measures accordingly for removing them.

Increases the Efficiency
This accounting branch aims at raising the overall efficiency of business organizations. Management accounting sets target for each division in advance and checks whether they fulfill all targets. It ensures that all resources are fully utilized which helps in improving the efficiency.

Better Service to Customers
Management accounting focuses on better service to customers by providing them quality goods at fair prices. It helps in controlling the prices of products by employing cost control devices. In addition to that, it sets various quality standards to be met by organization for producing their goods.

Raises the Profitability
It has an efficient role in enhancing the profitability of organizations. It makes companies cost conscious and assist in avoiding all extra expenditures. Management accounting uses techniques such as budgetary control and capital budgeting for reducing the expenses which helps in earning better profits.

Provides Reliability
Management accounting adds reliability to management decisions by providing them genuine information. It uses proper scientific tools and techniques for analysis purposes which helps managers in the proper management of business operations.

CO2 BL3 **Ans:** 9. Trend Percentage :

Trend Percentage: 2015-100%

2016-117.37%

2017- 132.63%

2018- 164.56 %

Section – C

III. Answer Any ONE Question: **(1*10=10)**

CO1 BL2 **Ans:** 10. The difference between management and cost accounting are as follows:

S.No.	Cost Accounting	Management Accounting
1	The main objective of cost accounting is to assist the management in cost control and decision-making.	The primary objective of management accounting is to provide necessary information to the management in the process of its planning, controlling, and performance evaluation, and decision-making.
2	Cost accounting system uses quantitative cost data that can be measured in monitory terms.	Management accounting uses both quantitative and qualitative data. It also uses those data that cannot be measured in terms of money.
3	Determination of cost and cost control are the primary roles of cost accounting.	Efficient and effective performance of a concern is the primary role of management accounting.

4	Success of cost accounting does not depend upon management accounting system.	Success of management accounting depends on sound financial accounting system and cost accounting systems of a concern.
5	Cost-related data as obtained from financial accounting is the base of cost accounting.	Management accounting is based on the data as received from financial accounting and cost accounting.
6	Provides future cost-related decisions based on the historical cost information.	Provides historical and predictive information for future decision-making.
7	Cost accounting reports are useful to the management as well as the shareholders and creditors of a concern.	Management accounting prepares reports exclusively meant for the management.
8	Only cost accounting principles are used in it.	Principals of cost accounting and financial accounting are used in management accounting.
9	Statutory audit of cost accounting reports are necessary in some cases, especially big business houses.	No statutory requirement of audit for reports.
10	Cost accounting is restricted to cost-related data.	Management accounting uses financial accounting data as well as cost accounting data.

CO2 BL3 **Ans:** 11: Comparative balance sheet:

Total assets and total liabilities = +16.92%; Current assets = + 48%; Current liabilities = +41.67%; Fixed assets = -2.5; Shareholders funds= +5%

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I UNIT TEST, FEBRUARY - 2023

INCOME TAX LAW AND PRACTICE-II

Date: 03.03.2023 **Max.Marks:25**

Class:III B.Com "A" &" B" **Duration: 1 Hr**

Section – A

I. Answer Any FIVE Questions: **(5*2=10)**

CO1 BL1-1. State the meaning of short-term capital asset?

CO1 BL1-2. Explain the kinds of Capital gains?

CO1 BL1-3. What do you mean by cost of improvement?

CO1 BL1-4. What is grossing up?

CO1 BL1-5. State the Provisions for Interest on securities?

CO1 BL1-6. State the provisions for family pension?

CO1 BL1-7 State the provisions for gift?

Section – B

II.Answer Any ONE Question: **(1*5=5)**

CO1 BL1-**8:** From the following particulars, compute Income from other Sources for the year 2021-22.

(i) Dividend Rs.12,000

(ii) Rent from Machineries Rs. 26,000 (bank collection charges Rs.380; Insurance Premium Rs.1,060; Depreciation Rs. 1,400; Repair Expenses Rs.250)

(iii) Casual Income (Net) Rs. 24,500

(iv) Interest on bank deposits Rs.6,000

(v) Royalty income Rs. 18,000(Expenses Rs. 2,000)

CO1 BL1-**9:** Mrs. X gives you the following particulars in respect of her income for the financial year 2021-2022. Compute her income under the hand income from other sources.

Interim Dividend	4,000
Dividend from a company on equity shares	3,000
Dividend on preference shares	4,000
Director's fees	1,800
Ground Rent	3,000
Income from sub – letting	6,000
Dividend from foreign company (net)	5,000
Interest on National Defence Gold Bonds, 1980	3,000

Section – C

III. Answer Any ONE Question: **(1*10=10)**

CO1 BL1: **10**. Mr. Sharma owns a residential house at Thoothukudi. From the following information, Compute the capital gain

Cost of construction (during 2004-05)	6, 00,000
Cost of additions and improvement (during 2007-08)	2, 40,000
Sale Consideration (Sale made on 10.10.2021)	29, 00,000
Expenses on transfer	20,000
Cost of new house purchase in Chennai (15.01.2021) (House is half finished)	5, 00,000
Amount deposited in Capital gain deposit scheme in SBI on 25.02.2022	3, 00,000

An amount of Rs.2, 00,000 withdraw from capital gain deposit scheme on 12th May 2024 and utilized for the completion of the house.

C.I.I 2004-05- 113, 2007-08 – 129 and for 2021-22-317.

CO1 BL1: **11:** Mr. A owns an Industrial Undertaking, which is situated in the urban area of Chennai. Mr. A shifted this industrial undertaking to a rural area near Chennai. For shifting purpose, he had to sell the following assets of the undertaking:

Acquired	**Plant & Machinery 1996**	**Furniture 1997**
Net sale consideration (Rs.)	30,00,000	1,00,000
Date of sale	15.9.2021	22.11.2021
Cost of acquisition U/S 50(2) Rs. (WDV)	10,00,000	60,000
Cost of New assets Purchased (Rs.)	16,00,000	30,000
Date of Purchase	31.12.2012	28.02.2010

If the industrial undertaking is shifted to the rural area on 15.3.2023. Calculate capital gains chargeable to tax for the A.Y:2022-2023

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I UNIT TEST, FEBRUARY - 2023
INCOME TAX LAW AND PRACTICE-II
ANSWER KEY

Section – A

I. Answer Any FIVE Questions: **(5*2=10)**

CO1 BL1-**1**. State the meaning of short-term capital asset?

A short-term capital asset is an asset that is held for a short period, typically for less than 36 months in India. In other words, it is an asset that is held for the purpose of investment or for personal use, and is sold within a short period of time to make a profit or to meet a financial obligation.

Examples of short-term capital assets include stocks, mutual fund units, debt securities, and land or buildings held for less than three years. Gains or losses on the sale of short-term capital assets are treated as short-term capital gains or losses, and are taxed at different rates than long-term capital gains or losses.

CO1 BL1-**2**. Explain the kinds of Capital gains?
Capital Gains are of two types:
Short term capital gain: arising on sale of short term capital assets such as shares, house property.
Long term capital gains: arising on sale of long term capital assets such as securities, jewellery and land and house property.

CO1 BL1-**3**. What do you mean by cost of improvement?
Cost of improvement includes all expenses capital in nature incurred in making additions/ alterations to the capital asset is cost of improvement. It also includes any expenditure to protect or complete the title to the capital assets or to cure such title.

CO1 BL1-**4**. What is grossing up?
Total income: in the case of net income after tax is given it is to be grossed up to find before tax being deducted.

Grossing up procedure:

$$\text{Gross Income} = \frac{\text{Net amount} \times 100}{100 - \text{tax rate}}$$

CO1 BL1-**5.** State the Provisions for Interest on securities?

Interest on securities on other government securities is income from other sources and notified securities is exempted.

CO1 BL1-**6**. State the provisions for family pension?
Family pension received is income from other source, SD is @1/3 of family pension of Rs.15,000 WEL is deducted from family pension.

CO1 BL1-**7** State the provisions for gift?
Gifts received from relatives is exempted and from unrelated persons are taxable.

Section – B

II.Answer Any ONE Question: **(1*5=5)**

8.INCOME FROM OTHER SOURCES = Rs.91,910

9. INCOME FROM OTHER SOURCES = Rs.26,800

Section – C

III. Answer Any ONE Question: **(1*10=1)**

10. Long term capital gain = Rs.6,07,046

11. STCG- P&L- 20,00,000

EXEMPTION – 16,00,000

TAXABLE STCG- P&L- 4,00,000

EXEMPTION – 10,000

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I UNIT TEST, FEBRUARY – 2023

HUMAN RESOURCES MANAGEMENT

Date: 02.03.2023 **Duration: 1 Hr**

Class: III B.Com A & B **Marks: 25**

Section-A

I. ANSWER ANY FIVE QUESTIONS:- **(5x2=10)**

1. CO1 PO1 Define Human Resource Management.
2. CO1 PO1 What are the features of Human resource Management?
3. CO6 PO1 Discuss the professional significance of HRM.
4. CO1 PO1 List any four differences between personal management and Human Resource Management.
5. CO1 PO1 List the role of Human Resource Manager.
6. CO1 PO2 Define Training.
7. CO1 PO2 What do you mean by on- the job training?

Section-B

II. ANSWER ANY ONE QUESTION:- **(1X5=5)**

8. CO1 PO1 What do you think would be the qualities of HR Managers of tomorrow?
9. CO1 PO1 What are the factors that affecting Human Resources Planning?

Section-C

III. ANSWER ANY ONE QUESTION:- **(1X10=10)**

10. CO1 PO1 Explain the steps involved in Human Resources planning.
11. CO1 PO1 Explain the Internal and External sources of Recruitment.

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DEPARTMENT OF COMMERCE I INTERNAL EXAMINATION, FEB – 2023
HUMAN RESOURCES MANAGEMENT

Date:02-03-2023 **Duration: 1 Hr**
Class: III B.Com A & B **Marks: 25**

Section-A

I. ANSWER ANY FIVE QUESTIONS:- (5x2=10)

1. Define Human Resource Management.CO1PO1
   Human resource management (HRM) is the practice of recruiting, hiring, deploying and managing an organization's employees
2. What are the features of Human resource Management? CO1PO1
   Gives Opportunities. ...
   Decision Oriented. ...
   Development Oriented. ...
   Individual Focus.
3. Discuss the professional significance of HRM.CO6PO1
   Due to proper Human Resource policies employees are trained well and this makes them ready for future promotions. Their talent can be utilized not only in the company in which they are currently working but also in other companies which the employees may join in the future.
4. List any four differences between personal management and Human Resource Management. CO1PO1
   Hiring, Employee Orientation, Managing Employees, Compensation & Benefits
5. List the role of Human Resource Manager. CO1PO1
   Planning, coordinating, and supervising the employment of new employees are the responsibilities of HR managers
6. Define Training. CO1PO2
   Training means the process of increasing the knowledge and skills of an employee for doing a particular job. It seeks to improve the job performance and work behaviour of those trained
7. What do you mean by on- the job training? CO1PO2
   on-the-job training is pretty much exactly what it sounds like — learning how to do the job (or do the job better) while in the role

Section-B

II. ANSWER ANY ONE QUESTION:- (1X5=5)

8. What do you think would be the qualities of HR Managers of tomorrow? CO1PO1

Top 5 qualities of an excellent HR manager

- Employee recruitment to keep the company staffed.
- Training and development to have productive and effective employees.
- Compensation and employee benefits to retain employees.
- Employment laws to keep the company in compliance.

- Employee wellness to keep employees healthy and engaged.

9.What are the factors that affecting Human Resources Planning? CO1PO1

- Recruitment needs
- Budget
- Training needs
- Work Environment
- Retrenchment

Section-C

III. ANSWER ANY ONE QUESTION:- (1X10=10)

10. Explain the steps involved in Human Resources planning. CO1PO1

There are four general, broad steps involved in the human resource planning process. Each step needs to be taken in sequence in order to arrive at the end goal, which is to develop a strategy that enables the company to successfully find and retain enough qualified employees to meet the company's needs.

Analyzing labor supply

The first step of human resource planning is to identify the company's current human resources supply. In this step, the HR department studies the strength of the organization based on the number of employees, their skills, qualifications, positions, benefits, and performance levels.

Forecasting labor demand

The second step requires the company to outline the future of its workforce. Here, the HR department can consider certain issues like promotions, retirements, layoffs, and transfers—anything that factors into the future needs of a company. The HR department can also look at external conditions impacting labor demand, such as new technology that might increase or decrease the need for workers.

Balancing labor demand with supply

The third step in the HRP process is forecasting the employment demand. HR creates a gap analysis that lays out specific needs to narrow the supply of the company's labor versus future demand. This analysis will often generate a series of questions, such as:

Should employees learn new skills?

Does the company need more managers?

Do all employees play to their strengths in their current roles?

Developing and implementing a plan

The answers to questions from the gap analysis help HR determine how to proceed, which is the final phase of the HRP process. HR must now take practical steps to integrate its plan with the rest of the company. The department needs a budget, the ability to implement the plan, and a collaborative effort with all departments to execute that plan.

11. Explain the Internal and External sources of Recruitment. CO1PO1

There are many sources of recruiting potential employees but all of them can be grouped into two categories, namely.

Internal Sources of Recruitment

Internal sources of recruitment consist of employees who are already on the payroll of a firm. It also includes former employees who have returned to work for the organization. Recruitment from internal

sources is done to fill up vacancies through promotion, re-hiring and transferring employees within the company.

Characteristics of Internal Sources of Recruitment

- Quick process.
- Cheaper than the external recruitment process.
- Works as a tool of motivation for the staff.
- The company's choice is limited to existing employees of the company.
- Hiring fresh employees is a lost prospect

External Sources of Recruitment

External sources of recruitment refer to the sources that lie outside or exist external to the organization.

Sources of external recruitment include:

1. People joining an organization, specifically through recommendations.
2. Employment agencies(e.g. naukri.com) or employment exchanges.
3. Advertising
4. Institutes like colleges and vocational schools (e.g. campus selection)
5. Contractors
6. Hiring unskilled labor
7. List of applications
8. Temporary workers.

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PG DEPARTMENT OF COMMERCE

I UNIT TEST – FEBRUARY 2023

ADVANCED COST ACCOUNTING

Date: 27.02.2023 Max.Marks:25

Class: III B. Com - A&B Duration: 1 Hr

PART – A (5*2=10)

Answer any FIVE of the following

CO 2 BL 1 1. Define Process Costing.

CO 2 BL 1 2.State any two advantages of Process Costing.

CO 2 BL 1 3.What do you mean by Normal Loss?

CO 2 BL 1 4. What do you understand by abnormal loss?

CO 2 BL 1 5. What is equivalent Production?

CO 4 BL 1 6. What is contribution?

CO 4 BL 1 7. Find out P/V ratio:

Fixed expenses Rs.15000

Break even sales Rs. 50,000

PART – B (1*5=5)

Answer any ONE of the following

CO 2 BL 3 **8.** The following figures show the cost of two processes of manufacture. The production from process II is passed to finished stock account.

	Process I	Process II
Direct material	2000	3020
Direct wages	3500	4226
Production overheads	1500	2000
Normal loss	10% of Input	5 % of input
Actual output	920 units	870 units

1000 units are introduced at a cost of Rs.5 per unit. The wastage realises Rs.3 per unit in Process I and Rs.5 per unit in process II. Prepare process accounts.

CO 2 BL 1 **9.** In Process B, 75 units were transferred from process A at a cost of Rs.1310. The additional expenses incurred in the process were Rs.190. 20% of the units are normal loss. Output from process B 70 units. Find the value of abnormal gain.

PART – C (1*10=10)

Answer any 1 of the following

CO 2 BL 3 **10.** Bharat Chemicals Ltd. Produced three chemicals during the month by three processes. In each process 2% of the total weight put in is lost and 10% is scrap which from process I and II realises Rs.100 per ton and from process III Rs. 20 per ton.

	Process I	Process II	Process III
Passed on to next process	75%	50%	
Sent to warehouse	25%	50%	100%
Raw materials (in tons)	1000	140	1348
Value (in Rs.)	120000	28000	107840
Manufacturing wages (Rs.)	20500	18520	15000
General expenses (Rs.)	10300	7240	3100

Prepare process accounts showing cost per ton of each product

CO 4 BL 3 **11.** From the following information you are required to find out (i) Contribution

(ii) BEP

(iii) Margin of safety (iv) Profit

	Rs.
Total Fixed cost	4500
Total variable cost	7500
Total sales	15000
Units sold	5000 units

Also calculate the volume of sales to earn a profit of Rs.6000.

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I UNIT TEST – FEBRUARY 2023

ADVANCED COST ACCOUNTING

Date: 27.2.23 Max.Marks:25

Class: IIIB.Com A & B Duration: 1 Hr

PART – A (5*2=10)

Answer any 5 of the following

1. **Define Process Costing.**
   Process costing is one of the important methods of costing where the manufacturing of products involves distinct stages of production. Ascertainment of cost at each stage of production is called Process costing.
2. **State any two advantages of Process Costing.**
   - The cost incurred in each process can be ascertained
   - Value of Normal loss, Abnormal loss or abnormal gain can be ascertained
3. **What do you mean by Normal Loss?**
   It represents loss of units which is an inherent part of production process caused by natural or unavoidable causes such as milling, dying, evaporating, loading, unloading, etc.
4. **What do you understand by Abnormal loss?**
   The loss that are in excess of normal limits and that cannot be avoided are called abnormal loss. They are caused by unexpected conditions and not due to the nature of production process.
5. **What is equivalent Production?**
   In process industries, it is most likely that there is a problem of work-in-progress in respect of each process. The degree of completion in respect of each element of cost varies. In such situation, it is necessary to convert the incomplete product into equivalent finished product.
6. **What is contribution?**
   The excess of selling price over and above the variable cost is contribution.
7. **Find out P/V ratio:**
   Fixed expenses Rs.15000
   Break even sales Rs. 50,000
   Ans: 30% [(15000/50000) *100]

PART – B (1*5=5)

Answer any 1 of the following

8. The following figures show the cost of two processes of manufacture. The production from process II is passed to finished stock account.

	Process I	Process II
Direct material	2000	3020
Direct wages	3500	4226
Production overheads	1500	2000

Normal loss	10% of Input	5 % of input
Actual output	920 units	870 units

1000 units are introduced at a cost of Rs.5 per unit. The wastage realises Rs.3 per unit in Process I and Rs.5 per unit in process II. Prepare process accounts.

Ans: Process I: Abnormal gain units –20 units, Value of abnormal gain – Rs.260, Process II: Abnormal loss - 4 units, value- Rs.96

9. In Process B, 75 units were transferred from process A at a cost of Rs.1310. the additional expenses incurred in the process were Rs.190. 20% of the units are normal loss. Output from process B 70 units. Find the value of abnormal gain.
Ans: Rs.250 [(1500/60) *10]

PART – C (1*10=10)

Answer any 1 of the following

10. Bharat Chemicals Ltd. Produced three chemicals during the month by three processes. In each process 2% of the total weight put in is lost and 10% is scrap which from process I and II realises Rs.100 per ton and from process III Rs. 20 per ton.

	Process I	Process II	Process III
Passed on to next process	75%	50%	
Sent to warehouse	25%	50%	100%
Raw materials (in tons)	1000	140	1348
Value (in Rs.)	120000	28000	107840
Manufacturing wages (Rs.)	20500	18520	15000
General expenses (Rs.)	10300	7240	3100

Prepare process accounts showing cost per ton of each product

Ans:

	Process I		**Process II**		**Process III**	
Transfer to warehouse	**220**	**35200**	**352**	**75680**	**1496**	**198220**
Transfer to next process	**660**	**105600**	**352**	**75680**	**-**	**-**
Cost per Ton	**-**	**160**	**-**	**215**	**-**	**132.5**

11. From the following information you are required to find out (i) Contribution (ii) BEP (iii) Margin of safety (iv) Profit

	Rs.
Total Fixed cost	4500
Total variable cost	7500
Total sales	15000
Units sold	5000 units

Also calculate the volume of sales to earn a profit of Rs.6000.

Ans: (i) Contribution per unit – Rs.1.50, value – Rs.7500 (ii) BEP – 3000 units, Value Rs. 9000 (iii) Margin of safety – Rs. 6000 (iv) Profit- Rs.3000, (v)Required Sales volume - 21000

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I UNIT EXAMINATION, FEBRUARY- 2023

CORPORATE LAWS

Date: 01.03.2023 **Max.Marks:25**

Class: I M.com **Duration: 1 Hr**

Part – A

Answer any **FIVE** questions. **(5x1=5)**

1. CO 1 BL 1 : What is SEBI?
2. CO 1 BL 1 : Define Foreign Exchange.
3. CO 1 BL 1 : What is FEMA?
4. CO 2 BL 1 : Define Competition.
5. CO 2 BL 1 : What is Copy right?
6. CO 2 BL 1 : What is Environmental Pollution ?
7. CO 2 BL 1 : What is unfair Trade practice?

Part – B

Answer any **TWO** questions. **(2x5=10)**

8. CO 1 BL 1: What are the Functions of SEBI?
9. CO 1 BL 6: Write a short note "Management of the Board under SEBI".
10. CO 2 BL 1: What are the conditions under which a trade mark should not be registered?
11. CO 2 BL 1: Define a person resident in India under FEMA.

Part – C

Answer any **ONE** question. **(1x10=10)**

12. CO 1 BL 2: Discuss the provisions in respect of the management of the SEBI .
13. CO 2 BL 1: State the rules in respect of restriction on dealing in and duties of persons entitled to receive foreign exchange.

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I UNIT EXAMINATION, FEBRUARY- 2023
CORPORATE LAWS

Date: 01.03.2023 **Max.Marks:25**

Class: I M.com **Duration: 1 Hr**

Part – A

Answer any **FIVE** questions. **(5x1=5)**

1. CO 1 BL 1:What is SEBI?

The Securities and Exchange Board of India is the regulatory body for securities and commodity market in India under the ownership of Ministry of Finance within the Government of India.

2. CO 1 BL 1:Define Foreign Exchange.

Foreign exchange refers to exchanging the currency of one country for another at prevailing exchange rates. Let us take a close look at the meaning of foreign exchange. Different countries have different currencies. Foreign exchange converts the currency of one country into another.

3. CO 1 BL 1:What is FEMA?

The Foreign Exchange Management Act, 1999, is an Act of the Parliament of India "to consolidate and amend the law relating to foreign exchange with the objective of facilitating external trade and payments and for promoting the orderly development and maintenance of foreign exchange market in India".

4. CO 2 BL 1:Define Competition.

The act or process of trying to get or win something (such as a prize or a higher level of success) that someone else is also trying to get or win: the act or process of competing.

5. CO 2 BL 1:What is Copy right?

Copyright is a type of intellectual property that protects original works of authorship as soon as an author fixes the work in a tangible form of expression.

6. CO 2 BL 1:What is Environmental Pollution?

Environmental pollution is defined as "the contamination of the physical and biological components of the earth/atmosphere system to such an extent that normal environmental processes are adversely affected.

7. CO 2 BL 1:What is unfair Trade practice?

The Competition Act, 2002, contains 66 sections which are divided into IX Chapters. The main purpose of the enactment of the Competition Act was to restrict unfair means of trade practices and anti-competitive practices while at the same time encouraging healthy competition to help in the growth of the market.

Part – B

Answer any **TWO** questions. **(2x5=10)**

8. CO 1 BL 1: What are the Functions of SEBI?

SEBI has the following functions

1. Protective Function
2. Regulatory Function
3. Development Function

The following functions will be discussed in detail

Protective Function: The protective function implies the role that SEBI plays in protecting the investor interest and also that of other financial participants. The protective function includes the following activities.

a. Prohibits insider trading: Insider trading is the act of buying or selling of the securities by the insiders of a company, which includes the directors, employees and promoters. To prevent such trading SEBI has barred the companies to purchase their own shares from the secondary market.

b. Check price rigging: Price rigging is the act of causing unnatural fluctuations in the price of securities by either increasing or decreasing the market price of the stocks that leads to unexpected losses for the investors. SEBI maintains strict watch in order to prevent such malpractices.

c. Promoting fair practices: SEBI promotes fair trade practice and works towards prohibiting fraudulent activities related to trading of securities.

d. financial education provider: SEBI educates the investors by conducting online and offline sessions that provide information related to market insights and also on money management.

Regulatory Function: Regulatory functions involve establishment of rules and regulations for the financial intermediaries along with corporates that helps in efficient management of the market.

The following are some of the regulatory functions.

a. SEBI has defined the rules and regulations and formed guidelines and code of conduct that should be followed by the corporates as well as the financial intermediaries.

b. Regulating the process of taking over of a company.

c. Conducting inquiries and audit of stock exchanges.

d. Regulates the working of stock brokers, merchant brokers.

Developmental Function: Developmental function refers to the steps taken by SEBI in order to provide the investors with a knowledge of the trading and market function. The following activities are included as part of developmental function.

1. Training of intermediaries who are a part of the security market.

2. Introduction of trading through electronic means or through the internet by the help of registered stock brokers.

3. By making the underwriting an optional system in order to reduce cost of issue.

9. CO 1 BL 6: Writea short note "Management of the Board under SEBI".

SEBI stands for Securities and Exchange Board of India. It is a statutory regulatory body that was established by the Government of India in 1992 for protecting the interests of investors investing in securities along with regulating the securities market. SEBI also regulates how the stock market and mutual fund's function.

Following are some of the objectives of the SEBI:

1. Investor Protection: This is one of the most important objectives of setting up SEBI. It involves protecting the interests of investors by providing guidance and ensuring that the investment done is safe.

2. Preventing the fraudulent practices and malpractices which are related to trading and regulation of the activities of the stock exchange

3. To develop a code of conduct for the financial intermediaries such as underwriters, brokers, etc.

4. To maintain a balance between statutory regulations and self-regulation.

The purpose for which SEBI was setup was to provide an environment that paves the way for mobilsation and allocation of resources. It provides practices, framework and infrastructure to meet the growing demand.

It meets the needs of the following groups:

1. Issuer: For issuers, SEBI provides a marketplace that can utilized for raising funds.

2. Investors: It provides protection and supply of accurate information that is maintained on a regular basis.

3. Intermediaries: It provides a competitive market for the intermediaries by arranging for proper infrastructure.

10. CO 2 BL 1: What are the conditions under which a trade mark should not be registered?

(1) A registered trade mark is infringed by a person who, not being a registered proprietor or a person using by way of permitted use, uses in the course of trade, a mark which is identical with, or deceptively similar to, the trade mark in relation to goods or services in respect of which the trade mark is registered and, in such manner, as to render the use of the mark likely to be taken as being used as a trade mark.

(2) A registered trade mark is infringed by a person who, not being a registered proprietor or a person using by way of permitted use, uses in the course of trade, a mark which because of—

(a) its identity with the registered trade mark and the similarity of the goods or services covered by such registered trade mark; or

(b) its similarity to the registered trade mark and the identity or similarity of the goods or services covered by such registered trade mark; or

(c) its identity with the registered trade mark and the identity of the goods or services covered by such registered trade mark, is likely to cause confusion on the part of the public, or which is likely to have an association with the registered trade mark.

(3) In any case falling under clause (c) of sub-section (2), the court shall presume that it is likely to cause confusion on the part of the public.

(4) A registered trade mark is infringed by a person who, not being a registered proprietor or a person using by way of permitted use, uses in the course of trade, a mark which—

(a) is identical with or similar to the registered trade mark; and

(b) is used in relation to goods or services which are not similar to those for which the trade mark is registered; and

(c) the registered trade mark has a reputation in India and the use of the mark without due cause takes unfair advantage of or is detrimental to, the distinctive character or repute of the registered trade mark.

(5) A registered trade mark is infringed by a person if he uses such registered trade mark, as his trade name or part of his trade name, or name of his business concern or part of the name, of his business concern dealing in goods or services in respect of which the trade mark is registered.

11. CO 2 BL 1: Define a person resident in India under FEMA.

FEMA makes clear distinction between resident and non-resident. 'Person' includes an individual, HUF, company, firm, an association of persons and any agency, office or branch owned or controlled by such person. - section 2(u) of FEMA.

A person resident in India:

A person resident in India means the following [section 2(v) of Foreign Exchange Management Act – FEMA:

A person residing in India for more than 182 days during the course of preceding financial year. However, it does not include a person who has gone out of India or who stays outside India for employment outside India or carrying on business or vocation outside India or for any other purpose, in such circumstances as would indicate his intention to stay outside India for an uncertain period.

A person residing in India for more than 182 days during the course of preceding financial year. However, it does not include a person who has come to or stays in India, in either case, otherwise than. He has come for or taking employment in India

For carrying on business or vocation in India. For any other purpose, in such circumstances, as would indicate his intention to stay in India for an uncertain period.

In other words, even in this case, residing in India in previous year for 182 days is essential. Any person or body corporate registered or incorporated in India.

An office, branch or agency outside India owned or controlled by a person resident outside India

An office, branch or agency outside India owned or controlled by a person resident in India.

Broadly, 'person resident of India' includes persons of India (except those staying abroad for work or business or other purpose) and foreign persons who come to India or stay in India for employment, carrying out business or other purpose. Even office, branch or agency can be 'person'.

Person residing for less or more than 182 days in the Previous year:

If a person stayed in India during 2001-2002 for less than 182 days, he will not be a 'resident' during 2002-03 even if he resides in India for more than 182 days in that year, as what is relevant is 'preceding year'. However, if he resides in India for over 182 days in 2002-03, he will be 'resident' in 2003-04.

Part – C

Answer any **ONE** question. **(1x10=10)**

12. CO 1 BL 2: Discuss the provisions in respect of the management of the SEBI.

SEBI is a statutory regulatory body established on the 12th of April, 1992. It monitors and regulates the Indian capital and securities market while ensuring to protect the interests of the investors, formulating regulations and guidelines. The head office of SEBI is at Bandra Kurla Complex, Mumbai.

The following are theprovisions in respect of the management of the SEBI: -

A sponsor of a mutual fund, an associate or a group company, which includes the asset management company of a fund, through the schemes of the mutual fund in any form cannot hold: (a)10% or more of the shareholding and voting rights in the asset management company or any other mutual fund. (b) An asset management company cannot have representation on a board of any other mutual fund. A shareholder cannot hold 10% or more of the shareholding directly or indirectly in the asset management company of a mutual fund.

No single stock can have more than 35% weight in the index for a sectoral or thematic index; the cap is 25% for other indices. The cumulative weight of the top three constituents of the index cannot exceed 65%. An individual constituent of the index should have a trading frequency of a minimum of 80%. AMCs must evaluate and ensure compliance to the norms

at the end of every calendar quarter. The constituents of the indices must be made public by publishing them on their website. New funds must submit their compliance status to SEBI before being launched. All liquid schemes must hold a minimum of 20% in liquid assets such as government securities (G-Secs), repo on G-Secs, cash, and treasury bills. A debt mutual fund can invest up to only 20% of its assets in one sector; previously the cap was 25%. The additional exposure to housing finance companies (HFCs) is updated to 15% from 10% and a 5% exposure on securitized debt based on retail housing loan and affordable housing loan portfolios. As per SEBI's recommendation, amortization is not the only method for evaluating debt and money market instruments. The mark-to-market methodology is also used. An exit penalty will be levied on investors of liquid schemes who exit the scheme within a period of seven days. Mutual funds schemes must invest only in the listed non-convertible debentures (NCD). Any fresh investment in commercial papers (CPs) and equity shares are allowed in listed securities as per the guidelines issued by the regulator. Liquid and overnight schemes are no longer allowed to invest in short-term deposits, debt, and money market instruments that have structured obligations or credit enhancements. When investing in debt securities having credit enhancements, a minimum of four times security cover is mandatory for investing in mutual funds schemes. A prudential limit of 10% is prescribed on total investment by such schemes in debt and money market instruments.

13. CO 2 BL 1: State the rules in respect of restriction on dealing in and duties of persons entitled to receive foreign exchange.

SEBI is a statutory regulatory body established on the 12th of April, 1992. It monitors and regulates the Indian capital and securities market while ensuring to protect the interests of the investors, formulating regulations and guidelines. The head office of SEBI is at Bandra Kurla Complex, Mumbai.

Restrictions on dealing in foreign exchange are mentioned under Section 3 of the Act, the Section reads as-

1. Other than authorized person no person can deal in or transfer any foreign exchange or foreign security to any person.
2. In any manner, a person should not make any payment to or for the credit of any person resident outside India.
3. Only an authorized person can receive any payment by order or on behalf of any person resident outside India.

Every exporter of goods-

4. Shall provide to the Reserve Bank or any other authority with a declaration or a statement in such a manner that is specified and should contain true and correct material particulars which should also include the amount representing the full export value. And if the amount is not ascertainable then the prevailing market value should be mentioned.
5. It should also provide such other information to the Reserve Bank for the purpose of ensuring the realisation of the export proceeds by such exporter.
6. The Reserve Bank may determine the full value of the export goods or reduced value of those goods to ensure that they comply with the prevailing market conditions and to check that it is received without any delay and if not that can direct any exporter to comply which such requirements as it deems fit.
7. With regards to the payment of services, every exporter of services shall provide to the Reserve Bank or to any other authority, a declaration in a form and it should be in such a manner which is already specified and also which contains the true and correct material particulars.

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I UNIT TEST, FEBRUARY – 2023

TOTAL QUALITY MANAGEMENT – KDAXA

Class: I M.Com

Date: 03.03.2023

Time: 1 Hour

Max: 25 Marks

PART A – (5 X 1 = 5 Marks)

Answer any FIVE questions

CO1:BL1 1.Define Quality Control.

CO1:BL1 2.Define cost of quality.

CO1:BL2 3.What do you mean by PDSA cycle?

CO1:BL2 4.What do you understand by quality circles?

CO2:BL6 5.Expand the term SQC.

CO2:BL6 6.Write a note on sampling inspection

CO2:BL4 7.State the objectives of control charts.

PART B– (2 X 5 = 10 Marks)

Answer any TWO questions

CO1:BL4 8. Explain the various types of quality costs.

CO1:BL2 9. What are the four pillars of TQM? Explain

CO2:BL3 10. Draft a note on acceptance sampling.

CO2:BL5 11. Narrate the uses of control charts.

PART C – (1 X 10 = 10 Marks)

Answer any ONE question

CO1:BL5 12. Discuss the dimensions of quality.

CO2:BL4 13. How do you construct a control chart?

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ANSWER KEY

PART A

1. Define Quality Control

Quality control (QC) is a procedure or set of procedures intended to ensure that a manufacture product or performed service adheres to a defined set of quality criteria or meets the requirement of the client or customer. QC is similar to, but not identical with, quality assurance (QA).

2. Define cost of quality

Cost of quality is defined as the cost of those activity which an organization as process as incurred over above minimum cost required to do the job well.

3. What do you mean by PDSA cycle?

PDSA, or Plan-Do-Study-Act, is an iterative, four-stage problem-solving model used for improving a process or carrying out change. When using the PDSA cycle, it's important to include internal and external customers; they can provide feedback about what works and what doesn't

4. What do you understand by quality circles?

A quality circle or quality control circle is a group of workers who do the same or similar work, who meet regularly to identify, analyze and solve work-related problems. It consists of minimum three and maximum twelve members in number.

5. Expand the term SQC.

Statistical quality control (SQC)

6. Write a note on sampling inspection

In sampling inspection, samples are taken from a target lot (inspection lot) for examination in order to determine the acceptability of the lot according to that lot's quality standards. Thanks to the small number of items to be inspected compared to 100% inspection, manufacturers can save on inspection costs and time.

7. State the objectives of control charts.

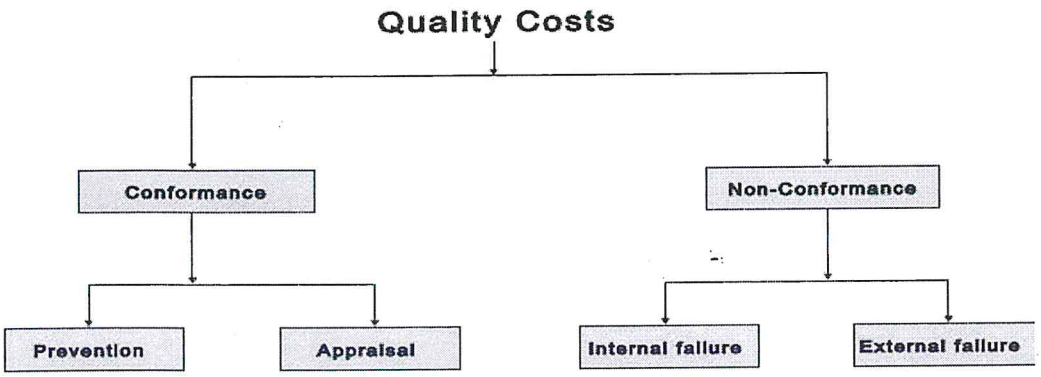
- To establish the core values and quality statement. Quality statement include vision statement, mission statement, and quality policy statement.
- To establish the strategic long – term plan with goals and annual quality improvement program with ibjectives

PART B

8. Explain the various types of quality costs.

Cost of quality

Cost of quality is defined as the cost of those activity which an organization as process as incurred over above minimum cost required to do the job well.



Conformance

Prevention cost:

Activities planned and designed before operations to guarantee good quality and prevent bad quality products or services.

Examples include new product review, quality planning, supplier surveys, process reviews, quality improvement teams, education and training.

Appraisal Costs:

Measurement and inspection activities during operations to determine conformance to quality requirements.

Examples include inspection, testing, process or service audits, calibration of measuring and test equipment.

Non-conformance

Internal failure cost:

Expenses incurred to remedy defects discovered before the delivery of a product or service.

Examples include scrap, rework, re-inspection, re-testing, material review, material downgrades.

External failure cost:

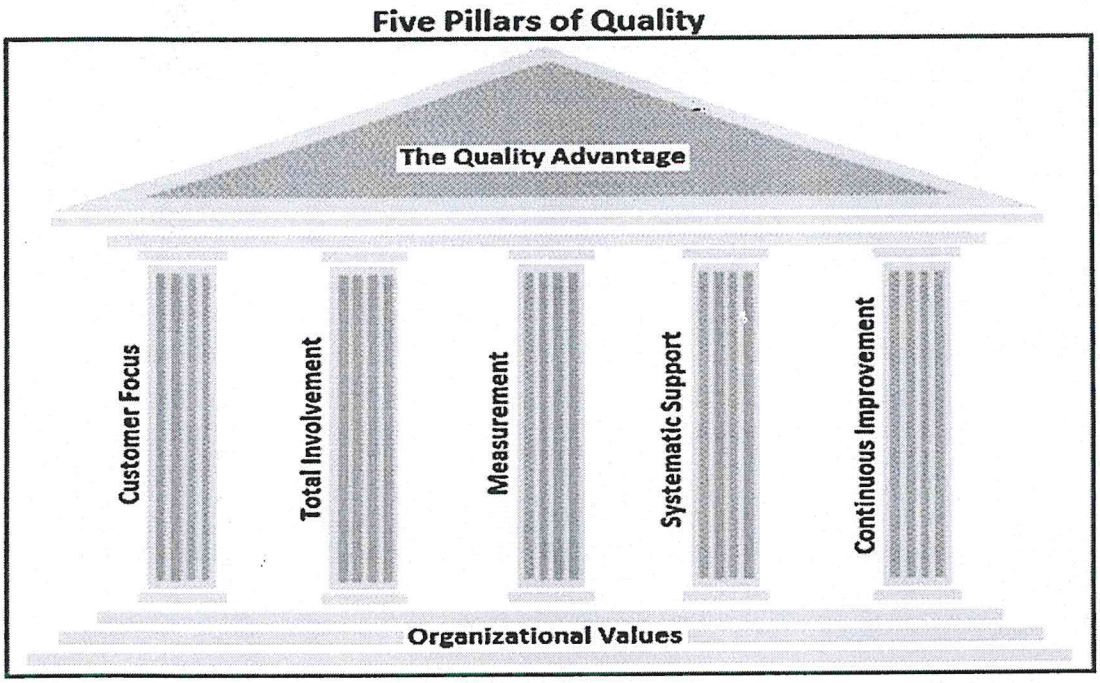
Expenses incurred to remedy defects discovered by customers after the customer receives the product or service.

Examples include processing customer complaints, customer returns, warranty claims, product recalls.

9. What are the four pillars of TQM? Explain

TQM:

Total quality management (TQM) is an integrated effort design to improve quality performance at the every level of the organization.



Customer focus:

Customer focus is the first pillar of the quality. The organization must understand the present and future needs of customer - be the first in the market to provide the product needed by the customers will be the market leader.

TOTAL INVOLVEMENT OF EMPLOYEE:

The full involvement of employee is necessary to enable the ability to introduce the achieving the quality improvement objectives of the organization.

MEASUREMENT:

In quality organization measurement are need to tract is progress for the right things.

The organization can meet its Quality goals it established base line and charts progress against them.

SYSTAMETIC SUPPORT:

Quality improvement begins well every in the organization support system process of the organization such as strategic planning, budgeting, scheduling on the performance management in the organization reinforce the Quality improvement efforts. Quality is be recognised and awarded.

CONTINUES IMPROVEMENT:

Fifth pillar of the TQM. There is always root for improvement this are possible improvement and all the time.

10. Draft a note on acceptance sampling.

Acceptance Sampling:

Acceptance sampling is an important filed of Statistical Quality Control(SQC) that was popularized by Dodge and Roming and originally applied by U.S for testing bullets.

The Dicisitions may be mode to accepts and reject a lot or consignment of items depending upon sample drawn the number of effecting items found in the sample drawn from the lot. This process of using sampling the incoming and outgoing is called acceptance sampling.

ACCEPTANCE SAMPLING EMPLOYEED IN THE FOLLOWING CASE:

1. Testing is destructive, all the product will be determined by testing.
2. The cost of 100% Inspection is very high.
3. 100% Inspection taken to long time.
4. When information concerning producers quality x and r or p charts, are not available.
5. When automated inspection is not used.

TYPES OF ACCEPTANCE SAMPLING:

- Acceptance sampling by attributes
- Acceptance sampling by variables

Acceptance sampling by attributes

Attribute sampling is a statistical process used in audit procedures that aims to analyze the characteristics of a given population. This practice is often used to test whether or not a company's internal controls are being correctly followed.

Acceptance sampling by variables

A variable is an essential component of any statistical data. It is a feature of a member of a given sample or population, which is unique, and can differ in quantity or quantity from another member of the same sample or population.

11. Narrate the uses of con**trol charts**.

The control chart is a graph used to study how a process changes over time. Data are plotted in time order. A control chart always has a central line for the average, an upper line for the upper control limit, and a lower line for the lower control limit. These lines are determined from historical data.

USES OF CONTROL CHARTS:

- Determining if a process currently functions efficiently or as expected
- Noticing deviations or outliers in your data that may show part of your process could benefit from a change
- Analyzing potential causes for data deviation
- Figuring out strategies for optimizing a process
- Evaluating if you've effectively changed a process

PART C

12. Discuss the dimensions of quality.

Dimensions of quality:

Quality has many dimensions. The dimensions of quality are nothing but the various features/ aspect of the product or service by using which the customers may evaluate the quality of the product or services.

Dimensions of product

- Dimensions of Service quality

Dimensions of product quality:

Performance:

The product is the primary operating characteristics.

Features:

The special characteristics that appeal to customers.

Reliability:

The likelihood of breakdown, malfunction or the need for repairs.

Serviceability:

The speed, cost and convenience of repair and maintained.

Durability:

The length of time or amount of use before repair or replacement.

Dimensions of service quality:

Reliability:

Ability to perform promise to service with dependable and accurate result.

Assurance:

Knowledge and courtesy of the employees and ability inspire trust and confidence.

Tangibles:

Physical evidence of structure (feasibility, tools and equipment)

Empathy:

Individual attention given to customer.

13. How do you construct a control chart?

The control chart is a graph used to study how a process changes over time. Data are plotted in time order. A control chart always has a central line for the average, an upper line for the upper control limit, and a lower line for the lower control limit. These lines are determined from historical data.

CONSTRUCT OF CONTROL CHART:

Gather the data:

a. Select the subgroup size. The subgroup size is the area where defects have the opportunity to occur. It must be constant from subgroup to subgroup. The opportunity for defects to occur must be large. The number of defects that actually occur must be small.

b. Select the frequency with which the data will be collected. Data should be collected in the order in which they are generated.

c. Select the number of subgroups (k) to be collected before control limits will be calculated (at least twenty).

Plot the data:

a. Select the scales for the control chart.

b. Plot the values of c for each subgroup on the control chart. c. Connect consecutive points with straight lines.

Calculate the process average.

a. Calculate the process average number of defects (c):

b. Draw the process average number of defects on the control chart as a solid line and label.

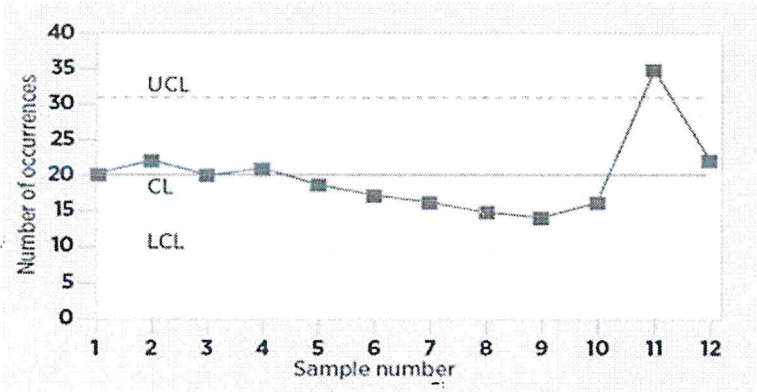
Calculate the control limits.

a. Calculate the control limits for the c chart. The upper control limit is given by UCLc. The lower control limit is given by LCLc.

b. Draw the control limits on the control chart as dashed lines and label.

Interpret the chart for statistical control.

a. The following tests for statistical control as a minimum should be used (see April 2004 publication available on the website). If any of these conditions are present, the process is out of statistical control due to the presence of a special cause of variation.



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I UNIT TEST, FEBRUARY - 2023
ADVANCED COST AND MANAGEMENT ACCOUNTING

Date: 27.02.2023 **Max.Marks:25**

Class: I M.com **Duration: 1 Hr**

Part – A

Answer any **FIVE** questions. **(5x1=5)**

CO1 BL1: 1. Define costing.

CO1 BL1: 2. What is cost reduction?

CO1 BL1: 3. What is process costing?

CO2 BL2: 4. Name the four important aspects of process costing?

CO2 BL1: 5. Give the main objects of inter-process profit?

CO2 BL1: 6. What do you mean by equivalent production?

CO2 BL1: 7. What is normal loss?

Part – B

Answer any **TWO** questions. **(2x5=10)**

CO1 BL2: 8. From the following information prepare process account and normal loss account.

Input of Raw material 1000 units @ Rs.6 per unit.

Direct material Rs.5,200

Direct wages Rs.4,000

Production overhead Rs.4,000

Actual output transferred to process II - 950 units

Normal loss-5% Value of scrap per unit Rs. 4 per unit.

CO1 BL1: 9. Distinguish between job costing and process costing .

CO2 BL5: 10. From the following profit and loss a/c of eveready co.ltd., for the year ending on 31st mar 1998 and 1999,you are required to prepare a comparative income statement and comment on the performance:

Particulars	**year ended 31.3.1999**	**year ended 31.3.1998**
Sales	12,80,000	9,60,000
Less: cost of goods sold	7,12,000	4,96,000
Gross profit	5,68,000	4,64,000
Less: administrative exp	2,56,000	1,76,000
Selling exp	1,44,000	1,68,000

Interest charges	6,400	9,600
	4,06,400	3,53,600
Net profit before income tax	1,61,600	1,10,400
Less: income tax@50%	80,800	55,200
	80,800	55,200

CO1 BL4: 11.State the objectives of preparing financial statement analysis.

Part – C

Answer any ONE question. **(1x10=10)**

CO1 BL6: 12. Bengal chemical co.lts produced three chemicals during the month of july 1998, by three consecutive process. In each process 2% of the total weight put in is lost and 10% is scrap which from processes (1) and (2) relises Rs. 100 a ton and from process (3) Rs.20 a ton. The Products of three process are dealt with as follows:

	Process 1	**Process 2**	**Process 3**
Passed on to the next process	75%	50%	---
Sent to warehouse for sale	25%	50%	100%

	Process 1		**Process 2**		**Process 3**	
	Rs.	**Tons**	**Rs**	**Tons**	**Rs.**	**Tons**
Raw materials	1,20,000	1,000	28,000	140	1,07,840	1,348
Manufacturing Exp	20,500	----	18,520	---	15,000	---
General exp	10,300	----	7,240	---	3,100	---

Prepare process cost accounts showing the cost per ton of each product.

CO2 BL5: 13. Explain the steps to be taken for the installation of a costing system.

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I UNIT TEST, FEBRUARY - 2023

ADVANCED COST AND MANAGEMENT ACCOUNTING

Answer Key

Part – A

Answer any **FIVE** questions. **(5x1=5)**

CO1 BL1: 1. Define costing.

Cost accounting is a process of assigning costs to cost objects that typically include a company's products, services, and any other activities that involve the company. Cost accounting is helpful because it can identify where a company is spending its money, how much it earns, and where money is being lost.

CO1 BL1: 2. What is cost reduction?

Cost reduction is the process of decreasing a company's expenses to maximize profits. It involves identifying and removing expenditures that do not provide added value to customers while also optimizing processes to improve efficiency.

CO1 BL1: 3. What is process costing?

Process costing is an accounting method typically used by companies that mass produce very similar or identical products or units of output. It's common in manufacturing industries where the costs of producing each unit of output are very similar, and it doesn't make sense to try to track costs for each individual unit throughout the production process.

CO2 BL2: 4. Name the four important aspects of process costing?

Basic steps in accounting for Process cost:

Summarize the flow of physical units of output.
Compute output in terms of equivalent units.
Summarize total costs to account for and Compute equivalent unit costs.
Assign total costs to units completed and to units in ending work in process inventory.

CO2 BL1: 5. Give the main objects of inter-process profit?

(a)Inter process profits enable to measure the efficiency of each process.

(b) Comparison of costs with market price at each stage assist management to take 'make or buy' decisions.

(c) The efficiency of or inefficiency of one process. In other words, each process can be assessed separately on that account.

CO2 BL1: 6. What do you mean by equivalent production?

An equivalent unit of production is an expression of the amount of work done by a manufacturer on units of output that are partially completed at the end of an accounting period.

CO2 BL1: 7. What is normal loss?

The normal loss means a loss which is inherited and can not be avoided. It should also be considered while valuing the closing stock.

Part – B

Answer any **TWO** questions. **(2x5=10)**

CO1 BL2: 8. Solution:

Process II- 900 Units.

Abnormal loss: 50 units

CO1 BL1: 9. Distinguish between job costing and process costing .

No	Job costing	Process costing
1	Cost is calculated based on work performed as per customer requirement/instructions.	Costs are charged to different processes and operations are ascertained.
2	Nature in customised production.	Nature in standardised production.
3	Cost is calculated for each job.	Cost is determined for the overall process and then is spread over the production units.
4	Job is at the cost centre.	Process is at cost centre.
5	No transfer of cost.	Can transfer cost from one process to another process.
6	Each job is identified differently.	No identity because products are manufactured consecutively.
7	Cost ascertainment at completion of job.	Cost ascertainment at the end of cost period.
8	Suitable for products manufactured as per customer requirement.	Useful for companies/industries where mass production is done.
9	Losses are not usually segregated.	Losses are bifurcated.
10	Work-in-progress may or may not exist.	Work-in-progress is always there.
11	Value of work is less.	More value to work.

CO2 BL5: 10. Solution:

Net Profit after tax :

31.3.98 = 55,200

31.3.99 = 80,800

Percentage change = 46.38

CO1 BL4: 11.State the objectives of preparing financial statement analysis.

Objectives of Financial Statement Analysis are as follows –

To know the current position of the company
Eliminating Discrepancies if any
Future Decision Making
Minimize the Chances of Fraud

Part – C

Answer any **ONE** question. **(1x10=10)**

CO1 BL6: 12. Solution:

Process 1- 660 tons, 105600

Process 2 – 352 tons, Rs.75,680

Process 3 – 1496 tons., 1,98,220

CO2 BL5: 13. Explain the steps to be taken for the installation of a costing system.

To overcome the above difficulties, following steps are suggested:

Support from the Top Management: ...
Utility of System to Existing Staff: ...
Workers' Confidence for Cooperation: ...
Training of Existing Accounting Staff: ...
Cost System According to Specific Requirements of the Concern: ...
Proper Supervision:

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I UNIT EXAMINATION, FEBRUARY- 2023

INTERNATIONAL MARKETING - KDACE

Date: 02.03.2023 **Max.Marks:25**

Class: II M.com **Duration: 1 Hr**

Part – A

Answer any **FIVE** questions. **(5x1=5)**

1. CO 1 BL 1 : What is International marketing?
2. CO 2 BL 1 : What is meant by market targeting?
3. CO 2 BL 1 : What is mean by MNC?
4. CO 2 BL 1 : What is product adaptation?
5. CO 1 BL 1 : What do you mean by globalization?
6. CO 1 BL 1 : Define WTO.
7. CO 2 BL 1 : What is meant by product Positioning?

Part – B

Answer any **TWO** questions. **(2x5=10)**

8. CO 2 BL 2: Explain the factors involved in product standardization.
9. CO 2 BL 6: Write short notes on International product marketing strategies?
10. CO 1 BL 6: Explain the objectives of International marketing.
11. CO 1 BL 6: Explain the challenges of global marketing.

Part – C

Answer any **ONE** question. **(1x10=10)**

12. CO 1 BL 4: Differentiate the International Marketing from Domestic Marketing.
13. CO 2 BL 1: What do you understand by overseas market research? Explain its impact in globalization ?
14. CO 2 BL 1 :What are the important determinants of International Marketing policies?

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I UNIT, MARCH- 2021
INTERNATIONAL MARKETING KDACE

DATE: 30.03.2021 **MAX.MARKS:25**
CLASS: II M.COM **DURATION: 1 HR**

PART – A

Answer any five questions. **(5x1=5)**

1. What is international marketing?
   International marketing is the marketing of products or services outside of your brand's domestic audience. Think of it as a type of international trade. By expanding into foreign territories, brands are able to increase their brand awareness, develop a global audience, and of course, grow their business.

2. What is meant by market targeting?
   Target marketing is a marketing strategy that breaks a market into segments and then concentrates your marketing efforts on one or a few key segments consisting of the customers whose needs and desires most closely match your product or service offerings.

3. What is mean by MNC?
   Multinational Corporation (MNC) also called transnational corporation, any corporation that is registered and operates in more than one country at a time. Generally the corporation has its headquarters in one country and operates wholly or partially owned subsidiaries in other countries.

4. What is product adaptation?
   Product adaptation is the process of changing a product to meet the needs of customers in a market other than the one in which it is made. This can be an important part of a company's strategy for selling in a foreign country.

5. What do you mean by globalization?
   Globalization is a term used to describe how trade and technology have made the world into a more connected and interdependent place. Globalization also captures in its scope the economic and social changes that have come about as a result.

6. Define WTO?
   The world trade organization is an intergovernmental organization that regulates and facilitates international trade. With effective cooperation in the united nations system, governments use the organization to establish, revise, and enforce the rules that govern international trade.

7. What is meant by product positioning?

Product positioning is a form of marketing that presents the benefits of your product to a particular target audience. Through market research and focus groups, marketers can determine which audience to target based on favorable responses to the product.

PART – B

Answer any two questions. **(2x5=10)**

8. Explain the factors involved in product standardization?

Even though product adaptation becomes inevitable in the case of certain products, it should be realized that there is sound economic logic behind a product policy which suggests uniformity in all markets. Six factors have been identified which may favor international product standardization:-

1. Economies of scale in production: when only one standard version is marketed in all the areas, it will be possible to have larger production runs, which will result in lower manufacturing costs.
2. Economies in product research and development: similarly, product standardization will allow recovery of the costs incurred in product research and development from the entire sales. This will reduce the recovery period as also lower the break-even point. Moreover, additional expenditure on adapting product to each individual market can be avoided.
3. Economies in marketing: when the same product is to be launched in different markets, economies can be achieved in terms of sales literature, sales force training, inventory management, and advertising and after-sales service requirements. The above three factors which are economic might motivate a company to go for international product standardization. There are also three marketing factors which may reinforce the standardization level:

1. Consumer mobility: consumers are becoming increasingly more mobile and trans-continental travel is now fairly common. A consumer who is loyal to a particular brand in his home market is more likely to remain loyal in a foreign country as well when the product in question is the same. Gillette razors and kodak films are good examples.
2. Made-in image: when the name of a country is associated with a high standard of quality in the minds of the consumers, a product manufactured in that country may enjoy a psychological premium in the foreign markets. French perfumes and japanese cameras are good examples.
3. Impact of technology: industrial products are generally tend to have standard specifications and do not require much adaptation for foreign markets, unless climatic and similar considerations call for it. Even when industrial goods are modified, changes are likely to be minor, e.g. Changes in voltage or conversion to metric measures. Products in which technical specification are critical tend to be uniform. However, operating instructions have to be in the local language.

9. Write short notes on international product marketing strategies?

1. People - understanding customer behavior in a different world

The people you are marketing to and the product that you are marketing goes hand in hand. However, we're leading off with the people because if you don't first and foremost understand

who you are marketing to, you may end up trying to sell them a product they don't want and probably will never buy. For example, best buy has not found much international success, especially in Europe. While their products were something that their target market wanted overseas, the way in which it was distributed was not well executed based on the way consumers shop in Europe. Instead of tailoring their stores to fit the preferred mold of Europeans — which is smaller shops as opposed to large box stores — best buy opened up brick and mortars that were much bigger than what Europeans were used to. We'll get more into how important the 'place' is in which you sell your product internationally in a bit. In this example, had best buy done more research to understand their intended target audience, they would have seen that their product offering — tech gadgets in an extremely large one-stop-shop — would not have fared well. Instead, they could have opened up smaller stores to accommodate cultural preference. So, when it comes to taking a product or service abroad, you first have to see if there is even a market for your offering.

2. Product - altering to fit the needs of your new market

If you notice that the current offering of your product now won't play in the new market you want to enter then you can do one of two things:

A.) Decide not to sell in that market

B.) Change your offering to meet the local demand

The classic example of this is McDonald's.

The fast-food empire has an astounding 34,480 restaurants in 119 countries. In order to be successful, they had to alter their menu for just about every one of those countries — which led to some pretty interesting entrees. McDonald's put in the work to understand the people they were about to serve and altered their offering to fit their palate. Overall, this decision is an excellent one to learn from for those looking to branch out to foreign markets.

3. Prices - choosing a premium or economy pricing strategy

For the most part, if you already have a product or service that is successful in one area of the world, the price point you use won't vary much in comparison to the competition in that area. If you have a premium product, it's likely premium elsewhere. If you have a more affordable, economically-friendly product, it'll be the same in your new market.

This is for the sake of consistency. It's difficult to pull off being associated as a more expensive, premium product in one country, and the complete opposite in another. You may even risk bringing down your brand image as a result. Imagine if omega was entering the Swiss market for the first time and because they knew Rolex already had a definitive hold on the premium watch market,

they decided to pivot to a more economy pricing strategy. While a move like this might help them sell more watches in the short term, the long term effects could make people outside of Switzerland associate them with cheaper products, which is not could negatively impact sales in other regions. But what if they created an entirely new, separate brand to sell in a different country? This tends to be a strategy that is often used in international product marketing. For example, Procter & gamble has many, many brands. Some are premium products while others are more economically-friendly. They own both dawn and joy, which are dishwashing liquid brands. In the 1990s, Procter & gamble introduced joy, the more affordable option, to the Japanese market and found success — quickly becoming one of the market leaders. Obviously, this is an extreme example due to Procter & gamble's diverse selection of brands. Therefore, they have the flexibility and size to own brands with a wide range of pricing options as opposed to exclusively premium or exclusively affordable offerings. Going back to the omega and rolex example, it is not inconceivable to think omega could enter the swiss market with an affordable watch under a different name if they truly wanted to target that segment of the watch market. It wouldn't be so different than Birkenstock, which offers their premium sandals in addition to their economic option, which is made from eva foam. The key is to articulate that the economic option is for those who want the look, but don't want to pay the price.No harm, no foul.

4. Promotion - choosing strategies that work in this new environment

Figuring out the most effective methods for marketing your product or service abroad is not that much different than doing it domestically. Even if you live where you're promoting your product, you still have to do some additional research to find out where your target audience is and which mediums they frequent. Take brazil, china, japan, russia, poland, south korea, and vietnam for example. In these countries — at least as of 2011 — facebook is not the most popular social media site. Instead, twitter or orkut and other regional platforms reign supreme. Obviously, this doesn't mean you shouldn't be advertising on facebook, but this information does suggest that perhaps focusing more effort on the leading site in those geographical locations — like twitter, may be more effective. Especially if that's where your demographic is hanging out. Just like cities across the u.s. that vary in terms of which mediums are most effective, cities across the world tend to have their own unique preferences on channels and messaging.

5. Place - finding the sales avenue that your consumers use

Defining where you'll be advertising and marketing your product or service is one thing. But finding the right place to actually sell your offering is another. One of the bigger questions you should look to answer is whether or not you'll be able to sell your product online. Did you know that there are many european countries where their people prefer to shop in person as opposed to online? Depending on the country, the reason varies. Some people prefer to shop in person and see and touch a product. Or, they just have loyalty to that shop. Fifty-two percent of montenegrins prefer to shop in person, the most of any european country.

10. Explain the objectives of international marketing?

International marketing simply means the sale and purchase of products and services in a market that acts as a platform for several other markets. Companies from different countries attempt to draw customers by advertising their products and services on the same platform.

The major objectives of international marketing are outlined as follows –

- To enhance free trade at global level and attempt to bring all the countries together for the purpose of trading.
- To increase globalization by integrating the economies of different countries.
- To achieve world peace by building trade relations among different nations.
- To promote social and cultural exchange among the nations.
- To assist developing countries in their economic and industrial growth by inviting them to the international market thus eliminating the gap between the developed and the developing countries.
- To assure sustainable management of resources globally.
- To propel export and import of goods globally and distribute the profit among all participating countries.
- To maintain free and fair trade.

11. Explain the challenges of global marketing?

Globalization and the rapid growth experienced in emerging markets in asia, africa and latin america fuelled the growth in international business in the last decade. The western markets are now growing slower and even the growth rate in the emerging markets has sharply fallen in the last two years. These factors along with the brexit (uk's decision to leave the european union) and the america first policy being propagated by the new president of the united states of america pose grave challenges for international marketing and business.

1. Slow growth in the developed markets

The foremost challenge facing us is slow growth in the developed markets. It is a fact that the growth rate in developed markets has slowed down. An international marketer however, remains to remember that despite the slow growth rate these markets remain large markets and that all marketers would need to continue to target these markets.

2. Falling growth rates in emerging markets

The second big challenge facing the world is falling growth rates in emerging markets. Despite the fall in growth rates of a lot of emerging markets a marketer needs to remember

that the emerging markets will continue to grow at a faster pace than the developed markets. This is because of their large population and rising income levels which gives a boost to demand in these markets. Thus all international marketing organizations' need to look beyond the developed markets and focus their efforts on all emerging markets too.

3. Demographics

The third key factor to remember is demographics. The population in developed western markets is aged whereas the emerging economies have a younger population. The emerging markets will, therefore remain important and international marketing organizations therefore will need to continue their focus on emerging markets.

4. Increased competition and innovation

The fourth important factor is that of increased competition and innovation. Companies in the developed world will be challenged by more and more companies from emerging markets. Organizations which focus on innovation to reduce costs or increase the perceived benefit to their customers will thrive.

5. The increased role of communication

The last important consideration would be the increased role of communication. The role of communication will further go up as companies from one part of the world acquire customers from very different parts of the world. A successful international marketing organization will therefore, need to focus more and more on its efforts to communicate effectively with its customers.

PART – C

Answer any one question. **(1x10=10)**

12. Differentiate the international marketing from domestic marketing?

1. Domestic marketing:

Domestic marketing refers to carrying out marketing activities within the national boundaries means it refers to doing marketing in local market and its scope is limited. It requires less investment as compared to international marketing. There is one nation, same language and one culture. In domestic marketing only one currency is used. In domestic marketing companies can have the same policies and strategies.

2. International marketing:

International marketing refers to carrying out marketing activities outside the national boundaries also and it refers to doing marketing in global market and its scope is wide. It requires more investment as compared to domestic marketing. There are many nations, many languages, and cultures. In international marketing different currencies are used. In international marketing companies needs different types of policies in the promotion of their product. Difference between domestic marketing and international marketing:

S. No.	Domestic marketing	International marketing
01.	Domestic marketing refers to carrying out marketing activities within the national	International marketing refers to carrying out marketing activities outside the national

	boundaries.	boundaries also.
02.	It refers to doing marketing in local market and its scope is limited.	It refers to doing marketing in global market and its scope is wide.
03.	There is one nation, same language and one culture.	There are many nations, many languages and culture.
04.	In domestic marketing only one currency is used.	In international marketing different currencies are used.
05.	Controlling domestic marketing activities is easy as compared to international marketing.	Controlling international marketing is difficult as compared to domestic marketing.
06.	Well familiarity with domestic or local market.	Lack of familiarity with global or foreign market.
07.	Low risk factors are associated with domestic marketing.	Whereas more risk factors are associated with international marketing.
08.	Domestic marketing requires less investment as compared to international marketing.	International marketing requires more investment as compared to domestic marketing.
09.	Mostly there is stable business environment.	Mostly there is unstable business environment.
10.	It relatively deals with homogeneous market.	It relatively deals with diverse market.
11.	In domestic marketing competitors behavior is easy to predict.	In international marketing competitors behavior is difficult to predict.
12.	It has less capital requirement.	It has huge capital requirement.
13.	Research is required, but not to a great extent.	High level of research is required because of the involved overseas markets.
14.	Limited opportunities for growth because of local scope.	Several opportunities are available because of vast scope.
15.	Less government intervention.	Government intervention is to a greater extent because of the laws and policies vary from country to country.
16.	The same policies and tactics can be opted by the company in domestic marketing.	The company requires different tactics and policies for advertising the products to their customers.
17.	Greater control over domestic marketing operations.	Less control over international marketing operations.

13. What do you understand by overseas market research? Explain its impact in globalization

International market research is a key piece of successful export planning. It is important to critically review and assess demand for your product, as well as factors related to a given export destination. The information will maximize your company's efforts while keeping the

export plan cost and time-efficient. Our resources can help you compare markets and target the right ones.

Product

1. Your international marketing of goods may be successful in western economies that have a similar economic structure to the United States, but it will fail in developing markets unless you make adjustments. You have to adapt your products to the local economies. A product you market as environmentally-friendly may not be relevant in a subsistence economy. A product that saves energy will not sell if energy is subsidized and inexpensive in the foreign market. You may offer the same products internationally as you do in the United States, but your global marketing has to change for your products to make economic sense in foreign economies.

2. Price

Whether an international market is accessible to your company depends on whether you can offer your products at a competitive local price. International economic factors such as currency exchange rates, tariffs and shipping impact your costs and the prices of your goods. If the cost of offering your products in international markets is higher than that of locally-produced products, you may have to target luxury goods market segments. Sometimes mass-produced goods cost less than locally-made custom products, and your marketing strategy can price your products to achieve wide acceptance.

3. Production

Carrying out production locally is one way to reduce costs and limit the influence of international economic factors on your operations. Instead of incurring costs through duties and transportation, you may be able to take advantage of lower production costs in the local economy with lower labor and facility expenses. Local production can impact your marketing by affecting both price and local acceptance. Marketing your products as locally-produced competitively-priced options can be an effective marketing strategy.

4. Channel

The international and local economic environments influence your channel marketing. If establishing a local presence is costly, you may opt for partnering with a local or international distributor who already has experience in the target market. For some markets, it makes economic sense to market your products via direct sales, either through local representatives or via online sales. Alternatively, a low-cost, open local economy may make it feasible to create your own local distribution network. The channel you choose for your marketing initiatives depends on the economics of delivering the goods to market and the local economic situation.

14. What are the important determinants of international marketing policies?

Definitions provided by eminent authors: Philip kotler, j.b. mckitterick, Hess and cateora

International marketing, though it has certain distinct characteristics, is similar to domestic marketing in terms of certain technical attributes. Marketing can be concerned as an internal part

of two processes, viz. Technical and social. International marketing and domestic marketing are identic.al, so far as technical process is concerned.

International marketing strategy is a set of quantitative and qualitative indicators of the company's activities in the foreign market and making decisions that direct specific marketing activities towards the implementation of the company's development strategy as a whole.

Export activities

Export activities involve the production of goods and services in a company's main domestic market (or in a third country or region) and the sale of these goods in the target foreign market. Suppose a company has chosen the export method of entering new markets. In that case, it should decide which functions in the promotion of goods it will retain and which functions it will delegate to intermediaries in foreign markets. The degree of delegation determines the level of responsibility and risks. There are 3 possible directions of export activity: direct export, indirect export, and joint export. The advantage of the choice of export activity is the minimum risks and costs that the company incurs in implementing this method of access to foreign markets. The main disadvantage of export activities is the low level of control of the selected trade intermediaries in the target country.

Licensing

Licensing in international operations is a type of cooperation whereby a company transfers the right to a company in another country to use its unique production processes, patents, trademarks, technological advances, and other valuable skills for a fee that is set out in an agreement. Licensing allows the company to set strict conditions for compliance with the processes and marketing policy of the company, which is a convenient way to organize local production in the target foreign market without high capital investments. The most crucial advantage of organizing such activities is the low cost of organizing, supporting, and controlling such activities.

Franchising

Franchising is a type of business license in which the company franchisor transfers to its intermediary (the franchisee company) a license to operate under its trademark. You can transfer either just the ability to use the company's trademark and products or an entire business process (as McDonald's or kfc do).

In fact, the franchise agreement differs from the licensing by more stringent requirements for the intermediary and a narrower scope of application. For example, the franchising agreement is created in order to make another branch out of your intermediary, to build it into your business processes by imposing its own rules of operation on it. The licensing agreement has more freedom to use the company's intangible property.

Joint venture

Joint ventures are separate companies formed by two or more businesses in which the responsibilities and risks are shared between the owners. A company may form a joint venture with one of the players in a target external market in order to gain access to resources, knowledge, contacts, or technology. In this case, the company shares the risks with its partner and shares the future income from activities in the industry. The main advantage of a joint venture is gaining access to certain knowledge and technologies of the market. This can be the partner's distribution network, its understanding of the specifics of the market, its production base, patents, and technologies. The disadvantages of this strategy of entering foreign markets are a high cost (compared with the above methods) and the risk of management conflicts due to different priorities of your company and the partner company.

******** All the best*********

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I UNIT TEST – FEBRUARY 2023

MERCHANT BANKING AND FINANCIAL SERVICES – (KDA4C)

Date: 01.03.2023
Class: II M. Com

Max.Marks:25
Duration: 1 Hr

PART – A (5*1=5)
Answer any 5 of the following

1. **Co 1** Define Merchant Banking according to SEBI.
2. **Co 1** State any two activities connected with corporate counselling.
3. **Co 1** What do you mean by Credit syndication?
4. **Co 1** What do you understand by capital restructuring?
5. **Co 1** What is the capital adequacy requirement for Merchant bankers prescribed by SEBI?
6. **Co 4** Define the term Underwriting.
7. **Co 4** Who is an underwriter?

PART – B (2*5=10)
Answer any 2 of the following

8. **Co 1** Briefly describe the following functions of merchant bankers:
   a. Issue management
   b. Working capital finance
9. **Co 1** What is due-diligence certificate? Why is it issued?
10. **Co 1** State the responsibilities of a lead manager.
11. **Co 1** Identify the specialized services rendered by merchant bankers as regards Merger & Acquisitions.

PART – B (1*10=10)
Answer any 1 of the following

12. **Co 1** What are the essential considerations of SEBI before the grant of certificate of Registration?
13. **Co 4** Explain the functions of an underwriter.

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UNIT TEST I- FEBURARY 2023

MERCHANT BANKING AND FINANCIAL SERVICES-(KDA4C)

ANSWER THE FOLLOWING

1.Define merchant banking according to SEBI

According to SEBI, a merchant banker may be defined as any entity "who is engaged in the business of issue management either by making arrangement regarding selling, buying or subscribing to securities as manager, consultant, advisor or rendering corporate advisory services in relation to such issue management."

2. State any two activities connected with corporate counselling.

- Problem solving at workplace. Issues related to Conflict management with seniors, juniors and colleagues.
- Issues related to team pressures and team building. Issues related to Managing and leading teams.

3. What do you mean by credit syndication?

Loan syndication occurs when two or more lenders come together to fund one loan for a single borrower. Syndicates are created when a loan is too large for one bank or falls outside the risk tolerance of a bank. The banks in a loan syndicate share the risk and are only exposed to their portion of the loan.

4. What do you understand by capital restructuring?

A Capital restructuring, thus, is a corporate operation that involves changing the mixture of debt and equity in a company's capital structure. It is done in order to optimize profitability, undertake a growth operation or in response to a crisis like bankruptcy or changing market conditions.

5. What is the capital adequacy requirement for merchant bankers prescribed by SEBI?

A Merchant Banker requires having a minimum net worth of not less than Rs. 5 Crore for category 1, Rs 50 Lakhs for Category 2, and Rs 20 Lakhs for Category 3.

6.Define the term underwriting.

Underwriting is the process through which an individual or institution takes on financial risk for a fee. This risk most typically involves loans, insurance, or investments.

7. Who is an underwriter?

An underwriter is any party, usually a member of a financial organization, that evaluates and assumes another party's risk in mortgages, insurance, loans, or investments for a fee in the form of a commission, premium, spread, or interest.

PART B

ANSWER THE FOLLOWINNG

8. Briefly describe the following functions of merchant bankers:

A) ISSUE MANAGEMENT

A merchant bank is a company that deals mostly in international finance, business loans for companies and underwriting. These banks are experts in international trade, which makes them specialists in dealing with multinational corporations. A merchant bank may perform some of the same services as an investment bank, but it does not provide regular banking services to the general public. One role of a merchant bank is to provide financing to large corporations that do business overseas. Assume, for example, that XYZ Company is based in the United States and decides to purchase a supplier that is based in Germany. Merchant banker is any person who is engaged in the business of issue management either by making arrangements regarding selling, buying or subscribing to securities as manager -consultant, advisor or rendering corporate advisory services in relation to such issue management in merchant banking.

Pre & Post issue management:

Pre issue management is time bound programmed and concerned with following:

1) Issue of shares

2) Marketing, Coordination and underwriting of the issue.

3) Pricing of issues

Post issue management is concerned with following:

1) Collection of application forms and amount received

2) Scrutinizing application

3) Deciding allotment procedure

4) Mailing of share certificates/refund or allotment orders

B) WORKING CAPITAL FINANCE: -

Businesses that traditionally have seasonality in their working capital requirements can (and should) plan ahead to anticipate those needs. In addition to your accounts receivable, there are several sources of capital to finance your working capital needs:

Trade Credit: If you are on good credit terms and have a good relationship with your vendors and suppliers, it's possible to negotiate payment terms to accommodate the seasonality of your business. Suppliers are often amenable to working with their best customers when they need to fund a large order to ramp up a new contract or bridge a short-term need for additional working capital by extending payment terms. Of course, you'll likely have greater success negotiating with a supplier if you're currently on good payment terms with them.

Factoring: This is a popular way to free up funds within the textile business because the manufacturing process can be long and the payment cycle might not be very quick. Basically, you're selling your accounts receivable at a discount to have access to working capital now, rather than waiting for the manufacturing and payment process. If you offer your regular customers payment terms and invoice for your goods or services, factoring could be a financing option for you.

A Line of Credit: Lines of credit can be more difficult to qualify for than a short-term small business loan, but for those that qualify, they offer the ability to access a credit line when you need it, pay interest on the amount of credit you use, pay off the balance and use it again. Lines of credit are available from both traditional lenders like a bank or credit union, as well as online lenders like OnDeck.

A Short-Term Small Business Loan: Getting a small business loan with term lengths of three to 12 months could be a good option for financing a small business's working capital needs. Depending on your credit profile, the industry you're in and the overall health of your business, you could have more than one option available to your business — including a short-term small business loan.

9. What is due – diligence certificate? Why is it issued?

Due diligence is a process of:

- Analysing various aspects to estimate an entities commercial potential
- Assessing the financial viability of the entity in terms of its assets and liabilities at a comprehensive level
- Examining the operations and verifying the material facts related to the entity in reference to a proposed transaction

Transactions covered for Due Diligence

Mergers and Acquisitions:

Due diligence is done from the viewpoint of the seller as well as the buyer. While the buyer looks into the financials, litigation, patents and an entire range of relevant information, the seller focuses on the background of the buyer, the financial capabilities to complete the transaction and the ability to fulfil commitments taken.

Partnership:

Due diligence is done for strategic alliances, strategic partnerships, business coalitions and such other partnerships.

Joint Venture and Collaborations:

When one company joins hands with another the reputation of the company is a matter of concern. Understanding the other company's stand and measuring the adequacy of resources at their end assumes importance.

Public Offer:

Aspects included during making a public offer are decisions on public issues, disclosures in a prospectus, post issue compliance and such other matters. These would usually require due diligence.

Need for a Due Diligence report

Finding skeletons in the closet before the deal is better than finding them later" is a relatable aspect when it comes to due diligence. The information collected during this process is crucial for decision making and hence needs to be reported. The Due Diligence report helps one understand how the company plans to generate additional earnings (monetary as well as non-monetary). It serves as a ready reckoner for understanding the state of affairs at the time of purchase/sale, etc. The ultimate purpose is to get a clear picture of how the business will perform in the future.

10.State the responsibilities of a lead manager: -

Responsibilities from real lead manager resumes representing typical tasks they are likely to perform in their roles.

- Lead a team of in-home geek squad agents that have the highest productivity in the company.
- Define processes and procedures for manual and automate testing and implement tools to achieve the overall QA objectives.
- Manage social media networks for increase public visibility through Facebook.
- Manage employee payroll activities and effectively evaluate employee performance for promotion opportunities.
- Manage several customer service incidents and tend to emergencies including the administration lifesaving CPR to a gym patron.
- Require to be certify in CPR, a and first aid.
- Submit work orders to the manger on duty.
- Perform a variety of tasks ranging from dishwasher to manger on duty.
- Establish internal audit procedures to ensure proper accounting to government agencies including FAA, TSA and OSHA.
- Evaluate and confirm that sign in/sign out sheets are accurate each week and send them to payroll for processing.
- Used reservation software, run various computer reports, take payments and post charges with credit cards and cash.

- ❖ Plan and execute daily operational briefings and monthly safety meetings in accordance with OSHA, FAA, and company guidelines.
- ❖ Act as manager-in-charge if managers are absent; delegate tasks to ensure all processes run smoothly, order and inventory items.
- ❖ Mentore and coach managers dealing with change, development, time management, productivity, resource allocation and disciplinary activities.
- ❖ Identify opportunities for improving the quality-of-service delivery methods and procedures; review with appropriate management staff; implement improvements.

11. Identify the specialized services rendered by merchant bankers as regards merger & acquisitions:

A merger is the voluntary fusion of two companies on broadly equal terms into one new legal entity. The firms that agree to merge are roughly equal in terms of size, customers, and scale of operations. For this reason, the term "merger of equals" is sometimes used. Acquisitions, unlike mergers, or generally not voluntary and involve one company actively purchasing another. Mergers are most commonly done to gain market share, reduce costs of operations, expand to new territories, unite common products, grow revenues, and increase profits—all of which should benefit the firms' shareholders. After a merger, shares of the new company are distributed to existing shareholders of both original businesses. Due to a large number of mergers, a mutual fund was created, giving investors a chance to profit from merger deals—called The Merger Fund from Virtus Investment Partners. The fund captures the spread or amount left between the offer price and trading price. It invests in companies that have publicly announced a merger or takeover.

Examples of Mergers: -

Anheuser-Busch InBev (BUD) is an example of how mergers work and unite companies together. The company is the result of multiple mergers, consolidation, and market extensions in the beer market. The newly named company, Anheuser-Busch InBev, is the result of the mergers of three large international beverage companies—Interbrew (Belgium), Ambev (Brazil), and Anheuser-Busch (United States).

PART C

ANSWER THE FOLLOWINNG

12. What are the essential consideration of SEBI before the grant of certificate of registration?

Consideration of application for grant of certificate of registration

The Board shall not consider an application under regulation 3, unless the sponsor belongs to one of the following categories, namely: -

(i) a public financial institution as defined in section 4A of the Companies Act, 1956 (1 of 1956);

(ii) a bank included for the time being in the Second Schedule to the Reserve Bank of India Act, 1934 (2 of 1934);

(iii) a foreign bank operating in India with the approval of the Reserve Bank of India;

(iv) a recognised stock exchange within the meaning of clause (j) of section 2 of the Securities Contracts (Regulation) Act, 1956 (42 of 1956);

(v) a body corporate engaged in providing financial services where not less than seventy five percent of the equity capital is held by any of the institutions mentioned in sub-clause (i), (ii), (iii) or (iv) jointly or severally;

(vi) a body corporate constituted or recognised under any law for the time being in force in a foreign country for providing custodial, clearing or settlement services in the securities market and approved by the Central Government; or

(vii) an institution engaged in providing financial services established outside India and approved by the Central Government.

(viii) the applicant is a fit and proper person.]

Grant of certificate of registration

After considering the application under regulation 3, with reference to the qualifications specified in regulation 6, if the Board is satisfied that the company established by the sponsor is eligible to act as depository, it may grant a certificate of registration in Form B to the depository subject to the following, namely: -

(a) the depository shall pay the registration fee specified in Part A of the Second Schedule in the manner specified in Part B thereof, within fifteen days of receipt of intimation from the Board;

(b) the depository shall comply with the provisions of the 6*[Act], the Depositories Ordinance, the bye-laws, agreements and these regulations;

(c) the depository shall not carry on any activity other than that of a depository unless the activity is incidental to the activity of the depository;

(d) the sponsor shall, at all times, hold at least fifty-one per cent of the equity capital of the depository and the balance of the equity capital of the depository shall be held by its participants;

(e) no participant shall at any time, hold more than five per cent of the equity capital of the depository; Provided that for the purposes of clause (d) and Clause (e) no foreign entity individually or collectively either as a sponsor or as a participant or as a sponsor and participant together shall hold more than 20% of the equity capital of a depository.

Explanation: For the purpose of this regulation, a foreign entity shall mean a body corporate or an entity where more than 51% of its equity is held by persons who are not citizens of India.

(f) if any information previously submitted by the depository or the sponsor to the Board is found to be false or misleading in any material particular, or if there is any change in such information, the depository shall forthwith inform the Board in writing;

(g) the depository shall redress the grievances of the participants and the beneficial owners within thirty days of the date of receipt of any complaint from a participant or a beneficial owner and keep the Board informed about the number and the nature of redressals;

(h) the depository shall make an application for commencement of business under regulation 14 within one year from the date of grant of certificate of registration under this regulation; and

(i) the depository shall amend its bye-laws from time to time as may be directed by the Board.

13.Explain the functions of an underwriters

Underwriting is the process through which an individual or institution takes on financial risk for a fee. This risk most typically involves loans, insurance, or investments. The term underwriter originated from the practice of having each risk-taker write their name under the total amount of risk they were willing to accept for a specified premium. Although the mechanics have changed over time, underwriting continues today as a key function in the financial world.

Underwriting is the process through which an individual or institution takes on financial risk for a fee. Underwriters assess the degree of risk of insurers' business. Underwriting helps to set fair borrowing rates for loans, establish appropriate premiums, and create a market for securities by accurately pricing investment risk. Underwriting ensures that a company filing for an IPO will raise the capital needed and provide the underwriters with a premium or profit for their services. Investors benefit from the vetting process of underwriting grants by helping them make informed investment decisions.

UNDER WRITING'S FOUR BASIC

FUNCTIONS

The process of underwriting involves four basic functions: 1) selection of risks, 2) classification and rating, 3) policy forms, and 4) retention and reinsurance. By performing these four functions the underwriter increases the possibility of securing a safe and profitable distribution of risks.

RISK SELECTION.

In this step the underwriter decides whether or not to accept a particular risk. It involves securing factual information from the applicant, evaluating that information, and deciding on a course of action. The underwriter is typically aided by a list of acceptable and prohibited risks.

CLASSIFICATION AND RATING.

Once the risk has been accepted, the underwriter then classifies and rates the policy. Several tentative classifications are usually assigned before a final decision on classifying the risk is reached. The purpose of using classifications is to separate risks into homogeneous groups to which rates can be assigned. Insurers may have their own classification and rating system, or they may obtain a system from a rating bureau.

POLICY FORMS.

After determining the acceptability of an applicant and assigning the proper classification and rating, the underwriter is ready to issue an insurance policy. The underwriter must be familiar with the different types of policies available as well as be able to modify the form to fit the needs of the applicant. The first three underwriting functions—risk selection, classification and rating, and policy selection—are interdependent. That is, the underwriter determines that a certain risk is acceptable when specified rates and forms are used. The underwriter also performs a fourth separate function on every risk before the underwriting is complete: reinsurance.

RETENTION AND REINSURANCE.

Reinsurance involves protecting the insurance company against a certain portion of potential losses. Every risk presents the possibility of loss that will equal or exceed the policy limits. It is up to the underwriter to protect his or her company from undue financial strain. The underwriter does this by retaining only a certain portion of the risk and securing reinsurance for the remainder of the risk.

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I UNIT TEST, FEBRUARY - 2023
MANAGEMENT INFORMATION SYSTEM

Date: 27.02.2023 **Max.Marks:25**

Class: II M.com **Duration: 1 Hr**

Part – A

Answer any **FIVE** questions. **(5x1=5)**

CO1 BL1: 1. Define Management Information System?

CO1 BL1: 2. What is Data Capturing?

CO1 BL1: 3. What is the need for MIS?

CO2 BL2: 4. Explain DBMS

CO2 BL1: 5. What are the functions of DBMS?

CO2 BL1: 6. What is Database Design?

CO2 BL1: 7. What are the 5 phases of Database Design?

Part – B

Answer any **TWO** questions. **(2x5=10)**

CO1 BL2: 1. Explain the Process of MIS?

CO1 BL1: 2. How MIS facilities to take decision making?

CO2 BL5: 3. Explain the Advantages of DBMS?

CO1 BL4: 4. Distinguish between computers and MIS?

Part – C

Answer any **ONE** question. **(1x10=10)**

CO1 BL6: 1. Elaborate the Role and functions of MIS?

CO2 BL5: 2. Explain about Recent trends in Database?

******** ALL THE BEST*********

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I UNIT TEST, FEBRUARY 2023
MANAGEMENT INFORMATION SYSTEM
ANSWER KEY

Part – A

Answer any **FIVE** questions.**(5x1=5)**

1. Define Management Information System?

A management information system (MIS) is a computer-based system that provides managers with the tools to organize, evaluate and efficiently manage departments within an organization. An MIS typically includes hardware and software that enables the collection, storage, and retrieval of data, as well as the communication of this information to managers in a format that is useful for decision-making. The system may include a variety of functions such as data analysis, planning, and control, and provide managers with a comprehensive view of the organization's operations and performance

2. What is Data Capturing?

Data capturing refers to the process of collecting, capturing and inputting data into a computer system or database. This can be done through various means such as manual entry, scanning, or electronic transfer from another system. The data captured can be in the form of text, images, or other digital information. The purpose of data capturing is to make the data available for storage, processing, and analysis so that it can be used for various business operations like decision making, forecasting, and trend analysis. Data capturing is an essential step in the management of information systems, as it enables the organization to store, access and use large amounts of data in an efficient and accurate way.

3. What is the need for MIS?

- Decision-making
- Planning and control
- Efficiency
- Competitive advantage
- Cost savings
- Compliance

4. Explain DBMS?

A database management system (or DBMS) is essentially nothing more than **a computerized data-keeping system**. Users of the system are given facilities to perform several kinds of operations on such a system for either manipulation of the data in the database or the management of the database structure itself.

5. What are the functions of DBMS?

The functions of a DBMS include **concurrency, security, backup and recovery, integrity and data descriptions**. Database management systems provide a number of key benefits but can be costly and time-consuming to implement

6. What is Database Design?

Database design is **the organization of data according to a database model**. The designer determines what data must be stored and how the data elements interrelate.

7. What are the 5 phases of Database Design?

- Analysis.
- Conceptual Design.
- Logical and Physical Design.
- Implementation.
- Testing.
- Operation.

Part – B

Answer any **TWO** questions.

1. Explain the Process of MIS?
   - Problem Definition.
   - Feasibility Study.
   - Systems Analysis.
   - System Design.
   - Detailed System Design.
   - Implementation.
   - Maintenance.
2. How MIS facilities to take decision making?

Decision-Making Process



- Identification of the Purpose of the Decision
- Information Gathering
- Principles for Judging the Alternatives
- Brainstorm and Analyze the Choices
- Evaluation of Alternatives
- Select the Best Alternative
- Execute the decision

3. Explain the Advantages of DBMS?

- Minimum data redundancy.
- Improved data security.
- Increased consistency.
- Lower updating errors.
- Reduced costs of data entry, data storage, and data retrieval.
- Improved data access using host and query languages.
- Higher data integrity from application programs.

3. Distinguish between computers and MIS?

Computer Information System	Management Information System
It is technology-oriented field emphasis on managing needs of business.	It is people-oriented field with an emphasis on service through technology.
It focuses on solving practical problems and improving process with computing technology.	It focuses on tasks related to information processing and management.
It helps business and organization to solve problems related to anything from cyber security to project management.	It helps business and organization to operate more effectively and better serve their customers, staff and bottom line.

Part – C

Answer any **ONE** question **(1x10=10)**

1. Elaborate the Role and functions of MIS?
   - MIS, or Management Information System, is a system that provides information to support managerial decision-making in organizations. The role and functions of MIS are critical in ensuring that the organization has the necessary information to make informed decisions.

- The primary role of MIS is to gather, process, and disseminate information to decision-makers in an organization. The system collects data from various sources, including internal and external sources, and transforms it into useful information. The information is then disseminated to different levels of management in the organization, from operational managers to top-level executives, to facilitate their decision-making.
- The functions of MIS can be broadly classified into three categories: information processing, information storage, and information dissemination.
- **Information Processing:** MIS processes information through a set of procedures that include data collection, processing, and analysis. This function involves the use of various software applications that are used to collect, store, and analyze data, such as database management systems, data mining software, and business intelligence tools. MIS also involves the use of statistical analysis to identify trends, patterns, and relationships in the data that can help managers make informed decisions.
- **Information Storage:** MIS stores information in databases, data warehouses, and other data repositories. The data is organized in a way that is easy to access and use, and it is maintained and updated regularly to ensure that it is accurate and relevant.
- **Information Dissemination:** MIS disseminates information to the appropriate decision-makers in the organization. This function involves the use of reports, dashboards, and other tools that provide a summary of the relevant information. MIS also provides decision-makers with access to the underlying data, allowing them to dig deeper into the information and analyze it further.
- In summary, the role and functions of MIS are essential in providing decision-makers with the information they need to make informed decisions. By gathering, processing, storing, and disseminating information, MIS helps organizations achieve their goals and objectives more effectively and efficiently.

2. Explain about Recent trends in Database?

- Databases are a critical component of modern information systems, and there have been several recent trends that are shaping the future of databases. Some of the notable trends in database technology include:
- **Cloud databases:** Cloud computing has emerged as a significant trend in recent years, and databases have followed suit. Cloud databases allow organizations to store and manage their data in the cloud, providing them with the flexibility and scalability they need to handle their data needs. Cloud databases also offer a wide range of features and services, such as automatic backups, disaster recovery, and real-time analytics.
- **No SQL databases:** No SQL databases have gained popularity in recent years due to their ability to handle large volumes of unstructured data, such as social media data and machine-generated data. Unlike traditional relational databases, No SQL databases do not rely on a fixed schema and are more flexible and scalable.
- **Graph databases:** Graph databases have emerged as a popular solution for managing complex data relationships, such as social networks and supply chains. Graph databases are designed to store and manage data as nodes and edges, which represent entities and the relationships between them.
- **In-memory databases:** In-memory databases are designed to store data in the server's memory instead of on disk, providing faster access to data and faster processing times. In-memory databases are particularly useful for applications that require real-time processing, such as financial trading systems and real-time analytics.
- **Block chain databases:** Block chain technology has gained significant attention in recent years, and block chain databases have emerged as a new way to store and manage data. Block chain databases use distributed ledger technology to provide a secure and transparent way to store and manage data, making them particularly useful for applications that require a high degree of security and trust.
- In summary, the recent trends in database technology are driven by the need to handle increasing volumes of data, provide faster processing times, and ensure security and scalability. Cloud databases, No SQL databases, graph databases, in-memory databases, and block chain databases are all emerging as popular solutions to these challenges.

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I Unit Test , February – 2023

SECURITY ANALYSIS AND PORTFOLIO MANAGEMENT – KDA4G

Class: II M.Com | Time: 1 Hour

Date: 28.02.2023 | Max: 25 Marks

PART A – (5 X 1 = 5 Marks)

Answer any FIVE questions

CO1:BL1 1.Define Investment.

CO1:BL2 2.What is Sweat Equity?

CO1:BL2 3.What do you mean by Capital gain appreciation?

CO2:BL6 4.Write short notes on TVM.

CO2:BL6 5.Give short notes on risk and return.

CO3:BL6 6.Write a note on YTM of a bond.

CO3:BL4 7.State any two advantages of Company analysis.

PART B– (2 X 5 = 10 Marks)

Answer any TWO questions

CO1:BL4 8. Differentiate savings from investment.

CO2:BL2 9. State the dimensions of TVM.

CO3:BL3 10. A finance company advertises that it will pay a lumpsum of Rs.44,650 at the end of five years to investors who deposit annually Rs.6,000 for 5 years. What is the interest rate implicit in this offer?

CO3:BL5 11. Examine the obstacles in the way of fundamental analysis.

PART C – (1 X 10 = 10 Marks)

Answer any ONE question

CO1:BL5 12. Discuss the different types of financial instruments.

CO2:BL3 13. A Ltd, issues 8% bonds at the face value of Rs. 1000. Assuming that the bonds are redeemable after 5 years, calculate the price at which an investor shall be willing to buy the same now if the rate of return expected by the investor is 10%.

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SRM Nagar, Kattankulathur
Chengalpattu Dist - 603 203

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PG Department of Commerce
I Unit Test, February-2023

SECURITY ANALYSIS AND PORTFOLIO MANAGEMENT-KDA4G
ANSWER KEY

PART A-(5X1-5 Marks)

COI:BLI 1.Define Investment.

An investment is an asset or item accrued with the goal of generating income or recognition. In an economic outlook, an investment is the purchase of goods that are not consumed today but are used in the future to generate wealth

COI:BL2 2. What is Sweat Equity?

Sweat equity is a non-monetary benefit that a company's stakeholders give in labour and time, rather than a monetary contribution, that benefit the company. Sweat equity is rewarded in the form of sweat equity shares.

CO1:BL2 3. What do you mean by Capital gain appreciation?

Capital appreciation refers to the portion of an investment where the gains in the market price exceed the original investment's purchase price or cost basis.

CO2:BL6 4.Write short notes on TVM.

The time value of money (TVM) is the concept that a sum of money is worth more now than the same sum will be at a future date due to its earnings potential in the interim.

CO2:BL6 5.Give short notes on risk and return.

The term return refers to income from a security after a. defined period either in the form of interest, dividend, or market appreciation in security. value. On the other hand, risk refers to uncertainty over the future to get this return. In simple words, it is a probability of getting return on security

CO3:BL6 6. Write a note on YTM of a bond.

The YTM of a bond is essentially the internal rate of return (IRR) associated with buying that bond and holding it until its maturity date.

CO3:BL4 7.State any two advantages of Company analysis.

- Business analytics can assist you in measuring your progress
- It facilitates data-driven decision-making

PART B-(2X5 10 Marks)

COI:BL4 8. Differentiate savings from investment.

BASIS FOR COMPARISON	SAVINGS	INVESTMENT
Meaning	Savings represents that part of the person's income which is not used for consumption	Investment refers to the process of investing funds in capital assets, with a view to generate returns.
Purpose	Savings are made to fulfill short term or urgent requirements	Investment is made to provide returns and help in capital formation
Risk	Low or negligible	Very high
Returns	No or less	Comparatively high
Liquidity	Highly liquid	Less liquid

CO2-BL2 9. State the dimensions of TVM.

- Discounting technique
- Compounding technique

CO3:BL3 10. A finance company advertises that it will pay a lumpsum of Rs.44,650 at the end of five years to investors who deposit annually Rs.6,000 for 5 years. What is the interest rate implicit in this offer?

Implicit rate of interest:20%

CO3:BL5 11. Examine the obstacles in the way of fundamental analysis.

- Time-Consuming And Complex
- Based On Assumptions
- Reliance On Historical Data
- Chances Of Misinterpretation Are High

PART C-(1 X 10 = 10 Marks)

CO1:BLS 12. Discuss the different types of financial instruments.

- Cash Instruments.
- Derivative Instruments.
- Debt-Based Financial Instruments.
- Equity-Based Financial Instruments.
- Foreign Exchange Instruments.

CO2:BL3 13. A Ltd, issues 8% bonds at the face value of Rs. 1000. Assuming that the bonds are redeemable after 5 years, calculate the price at which an investor shall be willing to buy the same now if the rate of return expected by the investor is 10%.

Valuation of bond: Rs.924.164

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I UNIT EXAMINATION, FEBRUARY – 2023

INDUSTRIAL RELATIONS AND LABOUR WELFARE (KDABB)

Date: 02.03.2023 **Max.Marks:25**

Class: I M.Com **Duration: 1 Hr**

Part – A

Answer any 5 Questions: **(5*1=05)**

CO 2 1. What is meant by disputes?

CO 1 2. What do you know about codes of conduct?

CO 1 3. What is meant by Industrial safety?

CO 1 4. Define labour.

CO 1 5. Who are called disabled persons?

CO 2 6.What is meant by strike?

CO 2 7.What is meant by Adjudication?

Part – B

Answer any 2 Question: **(2*5=10)**

CO 2 8. Mention the causes of Industrial Accidents

CO 1 9. Narrate the uses of trade unions in industrial relations

CO 2 10.What is meant by industrial dispute? State its reasons? CO 2 11.What are the impacts of strikes?

Part – C

Answer any 1 Question: **(1*10=10)**

CO 2 12. Critically examine the various modes of settlement of disputes in the view of industrial relations.

CO 1 13. Examine the need for education and training schemes for workers.

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I UNIT EXAMINATION, FEBRUARY – 2023
INDUSTRIAL RELATIONS AND LABOUR WELFARE (KDABB)

Date: 02.03.2023 **Max.Marks:25**
Class: I M.Com

Part – A

Answer any 5 Questions: **(5*1=05)**

1. What is meant by disputes?
   An argument or disagreement, especially an official one between, for example, workers and employers or two countries with a common border
2. What do you know about codes of conduct?
   A code of conduct, also known as privacy and code of conduct, is a defined set of rules, principles, values, employee expectations, behaviours, and relationships that a business considers important and believes necessary for its success.
3. What is meant by Industrial safety?
   Industrial Safety is a multi-disciplinary approach to developing and ensuring compliance with regulatory agencies, safe working practices, and maintaining the health and well-being of those employed in a particular occupation or workplace.
4. Define labour.
   The term industrial relations comprises two words, i.e. 'industry' and 'relations'. The term 'industry' refers to any productive activity in the organisation in which the employees are engaged. On the other hand, the term 'relations' refers to the relationship, which exists within the industry between the management and the employees.
5. Who are called disabled persons?
   The term "disabled person" means any person unable to ensure by himself or herself, wholly or partly, the necessities of a normal individual and/or social life, as a result of deficiency, either congenital or not, in his or her physical or mental capabilities.
6. What is meant by strike?
   Strike, collective refusal by employees to work under the conditions required by employers. Strikes arise for a number of reasons, though principally in response to economic conditions (defined as an economic strike and meant to improve wages and benefits) or labour practices (intended to improve work conditions).
7. What is meant by Adjudication?
   It means a legal authority appointed by government who intervenes in order to make a settlement which is binding on both the parties. In other words, a settlement of an Industrial dispute by a labour court or a tribunal is mandatory.

Part – B

Answer any 2 Question: **(2*5=10)**

8. Mention the causes of Industrial Accidents

   1. Unsafe Conditions 2. Unsafe Acts 3. Machine Factors 4. Non-Machine Factors 5. Inherent Hazards or Nature of Job 6. Slipping, Tripping or Falling on the Floor 7. Collision and Obstruction 8. Equipments and Machines 9. Fire Hazards

10. Physical Causation Factors 11. Underlying Causation Factors 12. Poor Physical Conditions 13. Psychological Climate at the Workplace 14. Work Schedules 15. Technical Causes 16. Human Causes 17. Environmental Causes 18. Miscellaneous Causes.

9. Narrate the uses of trade unions in industrial relations

Employee unions play an important role in an organisation by doing the following -

- through aiding in the hiring and choosing of employees.
- through encouraging workplace discipline, allowing for the amicable resolution of labour conflicts, and assisting with societal adaptations. The new working environment and the new norms and procedures must be adopted by the workforce. Diverse backgrounds in the workforce may cause disarray, discontentment, and frustration. Unions assist them in making such adjustments.
- lowering the incidence of labour disputes and instilling in workers a feeling of corporate social responsibility will promote and maintain national cohesion.
- establishing industrial harmony

10. What is meant by industrial dispute? State its reasons?

Industrial Dispute means any dispute or differences between employers and employers or between employers and workmen or between workmen and workmen which is connected with the employment or non-employment or the terms of employment or with the conditions of labour of any person.

Causes of industrial disputes can be broadly classified into two categories: economic and non-economic causes. The economic causes will include issues relating to compensation like wages, bonus, allowances, and conditions for work, working hours, leave and holidays without pay, unjust layoffs and retrenchments. The non economic factors will include victimization of workers, ill treatment by staff members, sympathetic strikes, political factors, indiscipline etc. (The Industrial Disputes Act, 1947 governs rules for the settlement of disputes between the management of industrial establishments and workmen.)

Wages and allowances

Personnel and retrenchment

Indiscipline and violence:

11. What are the impacts of strikes?

▪Effect on Workers: (i) Loss of wages, (ii) Physical injury or death on account of violence during labour unrest, (iii) Excesses by employers, (iv) Economic losses, (v) Bitterness in relations, (vi) Adverse affect on career.

▪Effect on Employers / Industrialists: (i) Less production, (ii) Less Profit, (iii) Bad affect on organisation, (iv) Bad effect on human relations, (v) Damage to machines and equipments, (vi) Adverse effect on development of companies, (vii) Burden of fixed expenses.

▪Effect on Government: (i) Loss of revenue (less recovery of income tax. sales tax, etc.) (ii) Lack of order in society, (iii) Blame by different parties.

▪Effect on Consumers: (i) Rise in prices, (ii) Scarcity of goods, (iii) Bad affect on quality of goods.

▪Other Effects: (i) Adverse affect on International Trade (Fall in exports and rise in imports), (ii) Hindrance in Economic Development of the country, (iii) Uncertainty in economy.

Part – C

Answer any 1 Question: **(1*10=10)**

12. Critically examine the various modes of settlement of disputes in the view of industrial relations.

The three methods for settlement of industrial disputes are as follows: 1. Conciliation 2. Arbitration 3. Adjudication.

Failure of the employees and the employers to sort out their differences bilaterally leads to the emergence of industrial disputes. The Industrial Disputes Act, 1947 provides legalistic machinery for settlement of such disputes by involving the interference of a third party

1. Conciliation:

In simple sense, conciliation means reconciliation of differences between persons. Conciliation refers to the process by which representatives of workers and employers are brought together before a third party with a view to persuading them to arrive at an agreement by mutual discussion between them. The alternative name which is used for conciliation is mediation. The third party may be one individual or a group of people.

2. Arbitration:

Arbitration is a process in which the conflicting parties agree to refer their dispute to a neutral third party known as 'Arbitrator'. Arbitration differs from conciliation in the sense that in arbitration the arbitrator gives his judgment on a dispute while in conciliation, the conciliator disputing parties to reach at a decision.

3. Adjudication:

The ultimate legal remedy for the settlement of an unresolved dispute is its reference to adjudication by the government. The government can refer the dispute to adjudication with or without the consent of the disputing parties. When the dispute is referred to adjudication with the consent of the disputing parties, it is called 'voluntary adjudication.' When the government herself refers the dispute to adjudication without consulting the concerned parties, it is known as 'compulsory adjudication.

13. Examine the need for education and training schemes for workers.

In the word of William Flayed, —Worker Education‖ is an attempt on the part of organized labour to educate its own members under an educational system in which the workers prescribe the courses of instructions, select the teachers and in a considerable measure, furnish the finance

- It is important for Industrial peace and Harmony, healthy Management-labour relations.
- Develop Effective trade unions through better trained officials and more enlightened members.
- Enhance the leadership skills which enables the worker in his development.
- Increase the total labour mass literacy.
- Better understanding of the problem, with effective solutions
- To fulfill the Organisations requirements through proper responsibility handling.
- The pre-condition of workers education literacy.
- Important consideration at the present stage of developing country.
- To understand the workers privileges, rights and obligations.
- Time-to-time training programs to upgrade the workers knowledge.
- Minimize the Industrial Accidents and other mishaps on the shop floor.
- National Commission on Labour, has said that the labour's/ workers education should have the following key areas to be studied:-
- This should employee independent, intelligent and innovative.
- He should be responsible, alert, and self-disciplined.
- Also Guided the National trade union centers to arrange for the quality programs with the Collaboration with some of the universities and Institutions.

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DEPARTMENT OF COMMERCE

II UNIT TEST, APRIL 2023

ADVANCED FINANCIAL ACCOUNTING - CZ22A

CLASS: I B.com 'A & B' **MARKS:25**

DATE: 12-04-2023 **TIME: 1 Hour**

PART A – (5 X 2 = 10 Marks)

Answer any FIVE questions

1. **CO3 BL1** What is sacrificing ratio?
2. **CO3 BL1** What do you understand by 'admission of a partner '?
3. **CO3 BL2** How do you calculate sacrificing ratio?
4. **CO4 BL2** Explain 'Hidden Goodwill'?
5. **CO3 BL1** What is ' Revaluation of assets and Liabilities'?
6. **CO4 BL1** What is Memorandum revaluation account?
7. **CO3 BL1** What are factors affecting the value of goodwill?

PART B – (1 X 5 = 5 Marks)

Answer any ONE questions

8. **CO3 BL3** A and B are partners in a business sharing profits in the ratio of 5:3 . They decide to admit C into the firm giving him 1/6 th share . Calculate the new profit sharing ratio and sacrificing ratio of the partners?
9. **CO3 BL2** Difference between Gaining Ratio and Sacrificing Ratio?

PART C – (1 X 10 = 10 Marks)

Answer any ONE question

10. **CO3 BL4** Calculate the amount of goodwill at three years purchase of last five years Average profits. The profits were: I year- Rs. 9,600, II year- Rs. 14,400, III year- Rs. 20,000, IV year- Rs. 6,000, V year- Rs.10,000
11. **CO3 BL3** The following were the profits carmed by Bertha & Lam for the past four years.

2007	Rs. 60,00
2008	Rs. 80,000
2009	Rs. 1,00,000
2010	Rs. 1,40,000

You are required to value the goodwill on the basis of 3 years purchase of weighted average profit, assigning weights of 1,2,3 & 4 respectively for the four years.

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DEPARTMENT OF COMMERCE

II UNIT TEST, APRIL 2023

ADVANCED FINANCIAL ACCOUNTING - CZ22A

Answer key

CLASS: I B.com 'A & B' **MARKS:25**

DATE: 12-04-2023 **TIME: 1 Hour**

PART A – (5 X 2 = 10 Marks)

Answer any FIVE questions

1. **CO3 BL1 What is sacrificing ratio?**

   Answer: The sacrificing ratio is expressed as a proportion in which the existing partners agree to sacrifice their share of profits in favor of the new or outgoing partner. The purpose of determining the sacrificing ratio is to establish a fair and agreed-upon distribution of profits or losses among the partners based on the changes in the partnership structure.

2. **CO3 BL1 What do you understand by 'admission of a partner '?**

   Answer: The "admission of a partner" in the context of business partnerships refers to the process of including a new person as a partner in an existing partnership firm.

3. **CO3 BL2 How do you calculate sacrificing ratio?**

   Answer: Sacrificing Ratio= Old Ratio–New Ratio

4. **CO4 BL2 Explain 'Hidden Goodwill'?**

   Answer: Hidden goodwill refers to the goodwill of a partnership firm that is not explicitly recorded in the books of accounts but is implicitly present due to changes in the profit-sharing ratio during the admission or retirement of a partner.

5. **CO3 BL1 What is ' Revaluation of assets and Liabilities'?**

   Answer: The "revaluation of assets and liabilities" is a process in accounting where a business reviews and adjusts the recorded values of its assets and liabilities. This is typically done to reflect their current fair market values more accurately.

6. **CO4 BL1 What is Memorandum revaluation account?**

   Answer: A Memorandum Revaluation Account is a temporary account used in partnership accounting during the process of revaluing assets and liabilities when there is a change in the partnership structure, such as the admission or retirement of a partner.

7. **CO3 BL1 What are factors affecting the value of goodwill?**

   Answer: Earnings and Profitability, Brand Recognition and Reputation, Location and Market Presence

PART B – (1 X 5 = 5 Marks)

Answer any ONE questions

8. **CO3 BL3 A and B are partners in a business sharing profits in the ratio of 5:3 . They decide to admit C into the firm giving him 1/6 th share . Calculate the new profit sharing ratio and sacrificing ratio of the partners?**

Answer: New profit sharing ratio is 25:15:8 & sacrificing ratio is 5:3

9 . **CO3 BL2 Difference between Gaining Ratio and Sacrificing Ratio?**

Answer: Gaining Ratio: The Gaining Ratio is the ratio in which the continuing partners share the profits among themselves after the admission of a new partner or any change in the profit-sharing structure. It represents the adjusted share of profits for existing partners when a new partner is admitted.

Formula: New Ratio –Old RRati

Sacrificing Ratio: The Sacrificing Ratio is the ratio in which the existing partners agree to reduce their share of profits in favor of the outgoing partner when there is a retirement of a partner. It represents the adjusted share of profits for existing partners when a partner is retiring.

Formula: Old Ratio –New Ratio

PART C – (1 X 10 = 10 Marks)

Answer any ONE question

9. **CO3 BL4 Calculate the amount of goodwill at three years purchase of last five years Average profits. The profits were: I year- Rs. 9,600, II year- Rs. 14,400, III year- Rs. 20,000, IV year- Rs. 6,000, V year- Rs.10,000**

Answer: Average profits ₹12,000 & goodwill is 36,000

11. **CO3 BL3 The following were the profits carmed by Bertha & Lam for the past four years.**

2007	**Rs. 60,00**
2008	**Rs. 80,000**
2009	**Rs. 1,00,000**
2010	**Rs. 1,40,000**

You are required to value the goodwill on the basis of 3 years purchase of weighted average profit, assigning weights of 1,2,3 & 4 respectively for the four years.

Answer: Goodwill is ₹ 3,24,000

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II UNIT TEST, APRIL 2023

PRINCIPLES OF MANAGEMENT (CZ22B)

Date: 13.04.2023 **Max.Marks:25**

Class: I B.COM A & B **Duration: 1 Hr**

Part – A

Answer any **FIVE** questions. **(5x1=5)**

1. CO4 BL1: 1 What is Policy?
2. CO3 BL1: 2. What is an Informal Organization?
3. CO3 BL2: 3 Define Authority.
4. CO3 BL1: 4. What is Decentralization?
5. CO4 BL1: 5 What is Responsibility Accounting.
6. CO5 BL1: 6 What is Span of Control.
7. CO5 BL1: 7. what is mean by direction?

Part – B

Answer any **TWO** questions. **(2x5=10)**

CO4 BL1: 1. Distinguish Between Authority and Responsibility

CO5 BL1: 2. Describe The Importance Of Centralization?

Part – C

Answer any **ONE** question. **(1x10=10)**

CO5 BL6: 1. Explain Briefly The Various Kind of Policy ?

CO4 BL4: 2. Explain the importance of control process?

******** ALL THE BEST*********

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II UNIT TEST, APRIL 2023
PRINCIPLES OF MANAGEMENT

Date: 13.04.2023 Max.Marks:25
Class: I B.COM A & B Duration: 1 Hr

Part – A

Answer any FIVE questions. (5x1=5)

1. CO4 BL1: 1 What Is Policy?
   Policy is a deliberate system of guidelines to guide decisions and achieve rational outcomes. A policy is a statement of intent and is implemented as a procedure or protocol. Policies are generally adopted by a governance body within an organization.

2. CO3 BL1: 2. What Is an Informal Organization?
   An informal organization is a group of people who share a common identity and are committed to achieving a common purpose. Informal organizations are created by the will and shared identity of their members. The operation of an organization, in reality, is known as an informal organization as opposed to a formal organization, which is based on roles and responsibilities.

3. CO3 BL2: 3 Define Authority.

   the power or right to give orders or make decisions

   "he has the authority to issue warrants"

4. CO3 BL1: 4. What Is Decentralization?
   Decentralisation is referred to as a form of an organisational structure where there is the delegation of authority by the top management to the middle and lower levels of management in an organisation.

5. CO4 BL1: 5 What Is Responsibility Accounting.
   Responsibility accounting is a kind of management accounting that is accountable for all the management, budgeting, and internal accounting of a company. The primary objective of this accounting is to support all the Planning, costing, and responsibility centres of a company.

6. CO5 BL1: 6 What Is Span of Control.
   This is a crucial information for managers since they need to understand which are the resources available from a human resources standpoint. A hierarchical organizational structure normally has well defined boundaries that allow the manager to fully understand who are part of his team.

7. CO5 BL1: 7. what is mean by direction?
   Directing is a function of management, which is guiding and leading people to work efficiently and effectively for the attainment of organizational objectives. Directing is the managerial function, which initiates organized action.

Part – B

Answer any TWO questions. (2x5=10)

CO4 BL1: 1. Distinguish Between Authority and Responsibility

	Authority	Responsibility
Web definitions	Authority is the power or right to give orders, make decisions, and enforce obedience.	Responsibility is the state or fact of having a duty to deal with something, or of having control over someone.
Basically	It is power.	It is a duty.
Main functions	Here, orders and commands play a vital role.	Here, duties and obedience play a vital role.
Time duration	It stays for a longer period as compared to responsibility.	It gets completed with the completion of the task so it has a shorter period.
Direction Flow	It flows downwards.	It flows upwards.
Delegation	It can be delegated to others.	It cannot be delegated.
Example	The right of a manager to command his subordinates.	The obligation of a subordinate to complete an assigned work.

CO5 BL1: 2. Describe The Importance Of Centralization?

An association would decide to be decentralized as a result of the accompanying signs of decentralization:

- Creates Initiative among Subordinates:
- Decentralization helps the directors at the lower levels to take that load of choices, which are for the advancement of association, they resolve all issues by themselves and to foster answers for taking care of the different issues they face. This aids in improving certainty and confidence among the representatives.
- Creates Managerial Talent for the Future:
- Decentralization gives an opportunity to the workers to demonstrate their capacities by taking care of different tasks freely. Such freedom to make choices is to increment their insight and involvement with all levels. It likewise gives qualified labour to satisfy the top positions through advancements.
- Fast Decision Making:
- Decentralization advances autonomous and speedy decisions by subordinates as they are near the tasks and are in steady touch with all activities of their specializations.

- Help for Top Management:
- It mitigates the top chiefs of unnecessary responsibility as the normal and everyday schedules are relegated to the subordinates. The saved time can be used by them in making vital planning and giving guidance to the association for additional development.
- Works with Growth:

Decentralization empowers the directors at the lower level just as the departmental heads to perform to their maximum capacity and fosters a feeling of competition among the offices. Such an aggressive spirit contributes a ton towards the development of the undertaking as well.

- Better Control:

Decentralization helps in learning the commitment of every office in gathering the goals of the association by utilizing different control methods like equilibrium scorecard, the executive's data framework, and so on. Along these lines, if there should arise an occurrence of deficiencies, remedial choices can be taken speedily at the perfect opportunity.

Part – C

Answer any ONE question. (1x10=10)

CO5 BL6: 1. Explain Briefly The Various Kind Of Policy ?

kinds of Policies

Policies may be classified as originated, implied, appealed and externally imposed policies. Let us discuss them briefly.

1. Originated Policies: Originated policies are formulated by top level management, by reference to the objectives of the organization and their achievement. The purpose of these policies is to guide the actions of their subordinates. Sometimes, these policies are formulated in active consultation with managers at lower levels.
2. Implied Policies: Implied policies are those evolved by themselves when a series of decisions are made by managers over a period of time. These policies exist in an unwritten form. They are not consciously formulated but emerge from recurring managerial decisions.
3. Appealed Policies: Appealed policies are formulated at the higher managerial level in response to appeals made by lower managerial levels. These policies may also exist in the form of precedents and serve as guides for decisions in future.
4. Externally Imposed Policies: Externally imposed policies are those policies which are influenced by the policies of the Government and other public agencies, trade unions, trade associations, etc.

CO4 BL4: 2. Explain the importance of control process

The control process consists of the following basic elements and steps:

1. Establishing goals and standards

The task of fixing goals and standards takes place while planning but it plays a big role in controlling also. This is because the main aim of controlling is to direct a business's actions towards its goals. If the members of an organization know their goals clearly, they will invest their entire focus in achieving them.

It is very important for managers to communicate their organization's goals, standards and objectives as clearly as possible. There must never be ambiguities amongst employees in this regard. If everybody works towards common goals, it becomes easier for an organization to flourish.

The goals that managers have to set and work towards may be either tangible/specific or intangible/abstract. Tangible goals are those which are easy to quantify in numerical terms. For example, achievement of sales worth Rs. 100 crores within one year is a tangible goal.

On the other hand, intangible goals are those which are not quantifiable numerically. For example, a company may aim to win some prestigious award for its corporate social responsibility activities.

2. Measuring actual performance against goals and standards

Once managers know what their goals are, they should next measure their actual performance and compare. This step basically helps them in knowing whether their plans are working as intended.

After implementing a plan, managers have to constantly monitor and evaluate them. They must always be ready to take corrective measures if things are not working properly. In order to do this, they should keep comparing their actual performance with their ultimate goals.

Apart from taking corrective action, this step of process control also helps managers in predicting future problems. This way they can take measures immediately and save their business from losses.

In order to compare their actual performance, managers first have to measure it. They can do so by measuring results in monetary terms, seeking customer feedback, appointing financial experts, etc. This can often become difficult if managers want to measure intangible standards like industrial relations, market reputation, etc.

3. Taking corrective action

In case there are discrepancies between actual performances and goals, managers need to take corrective actions immediately. Timely corrective actions can reduce losses as well as prevent them from arising in the future again.

Sometimes, business organizations formulate default corrective actions in the form of policies. This, however, can be difficult to do when it comes to complicated problems.

In such cases, managers need to first quantify the defect and prepare a course of action to remedy it. Sometimes, they may have to take extraordinary measures for unpredictable problems.

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PG DEPARTMENT OF COMMERCE &
INFORMATION SYSTEM MANAGEMENT
II UNIT EXAMINATION-APRIL 2023
INDIAN ECONOMY

Date: 17.04.2023 **Duration: 1 Hr**
Class: I B.Com – A & B **Max Marks: 25**

Section-A

I. ANSWER ANY FIVE QUESTIONS:- (5x2=10)

CO-3	BL- 1	1.What is meant by Land Reform.
CO-4	BL-1	2.What do you mean by Industrialization.
CO-5	BL-1	3.State Indicative planning.
CO-3	BL-2	4.Define the term Mixed Economy.
CO-3	BL-1	5.What is Subsidy.
CO-4	BL-4	6.Describe New Economic Policy.
CO-4	BL-1	7.What is Industrial Licensing.

Section-B

II. ANSWER ANY ONE QUESTION:- (1X5=5)

CO-3	BL- 1	8.What are the objectives of Land Reform measures.
CO-3	BL- 1	9.Briefly discuss the steps taken to increase productivity in agriculture.

Section-C

III. ANSWER ANY ONE QUESTION:- (1X10=10)

CO-4	BL- 1	10.What are the advantages of Small Scale Industry?
CO-4	BL- 4	11.Explain the criticisms level against the New Industrial policy 1991.

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INDIAN ECONOMY

ANSWER KEY

UNIT TEST-2

SECTION-A

1. What is meant by Land Reform?

Ans: - Land reform usually refers to the redistribution of land from the rich to the poor. More broadly, it includes regulation of ownership, operation, leasing, sales, and inheritance of land (indeed, the redistribution of the land itself requires legal changes).

2. What do you mean by Industrialization?

Ans: - Industrialization is the process of transforming the economy of a nation or region from a focus on agriculture to a reliance on manufacturing. Mechanized methods of mass production are an essential component of this transition.

3. State Indicative Planning?

Ans: - Indicative planning is a form of economic planning implemented by a state to solve the problem of imperfect information in market economies by coordination of private and public investment through forecasts and output targets.

4. Define the term Mixed Economy?

Ans: - A mixed economic system is a system that combines aspects of both capitalism and socialism. A mixed economic system protects private property and allows a level of economic freedom in the use of capital, but also allows for governments to interfere in economic activities to achieve social aims.

5. What is the Subsidy?

Ans: - Subsidy is a transfer of money from the government to an entity. It leads to a fall in the price of the subsidized product.

6. Describe the New Economic Policy?

Ans: - The new economic policy was made in India through **privatization, liberalization, and globalization.** It refers to the relaxation of many tariffs, opening the market for foreign players. It also refers to lessening the burden of taxes for the economic growth of India.

7. What is Industrial Licensing?

Ans: - An industrial license is written permission given by the government to an industrial undertaking for manufacturing specified articles included in the schedule.

SECTION-B

1. What are the objectives of Land Reform measures?

Ans: - **The important objectives of land reforms in India are:**

(I) Rational use of Resources:

The foremost important objective of land reforms in India is to make provision for more rational use of scarce land resources. It can be done by changing the conditions of holdings, and ceilings on land holdings. This helps the cultivation process most economically without any wastage of land, labor, and capital.

(ii) Raising Production Level:

Another important objective of land reforms is to raise the production level of the agricultural sector by motivating the farmers to raise their output. This is possible by giving incentives.

(iii) Removal of Exploitation:

The removal of exploitation of poor farmers is an important objective of land reforms. This can be attained by redistributing agricultural land in favor of the less privileged class of farmers and also by improving the terms and conditions for possessing the land for cultivation by actual tillers and the abolition of intermediaries.

(iv) Social Welfare:

Land reforms also aim at promoting social welfare for rural masses and ending social injustice through equitable distribution of income. It arranges to distribute land to landless cultivators by imposing a ceiling on land holdings and by acquiring ceiling surplus land. Besides by introducing tenancy reforms the level of social welfare of farmers can also be raised.

(v) Planned Development:

To attain planned development of the agricultural sector on a long-term basis is another objective of land reforms. Thus, it can pave the way for adopting modern methods of cultivation and farming through consolidation of holdings and by establishing a direct link

between government and farmers for the development of agriculture in a planned manner. The Planning Commission of India has rightly observed, "Land reforms have been treated as an integral part of eradicating poverty, modernization of agriculture and increasing the agricultural production program."

(vi) Raising the Standard of Living:

Land reforms help to raise the standard of living of the rural poor through re-distributive packages and programs. Upliftment of the economic condition of landless agricultural laborers and small and marginal farmers can be made through land reforms. To meet this objective various rural development programs are also designed to support land reforms as an effective measure to raise the standard of living of the rural poor by widening their land base. These programs are like IRDP, JRY, etc.

2. Briefly discuss the steps taken to increase productivity in agriculture.

Ans: - Top 10 Methods to Improve Farming Productivity.

1. Implementation of land reforms

For improving production, land reforms are the first and predominant point. Machines, tractors, and implements are involved in land reforms. These machines have the qualities that make rugged farming areas smooth to work on the field efficiently. Working in the field is easy, which means productivity improvement is easy. Land reforms are the best method to increase production.

2. Interplant

Interplanting is a practice in which different crops are growing together at the same time. It is the best way to maximize the productivity of your growing space. Some crops are the best together, some not.

3. Plant more densely

It is the simplest way to improve the productivity of farms, in this plant crops close together. Many farmers keep their vegetables excessively away, which leads to the abandonment of large areas growing well.

4.Plant many crops

The next method of improving productivity is to plant many crops.

5. Raised beds

Traditional farming systems place crops in separate rows by tractor paths, with permanent beds planting multiple rows of crops within beds of the same width. It creates dense plantations, fewer pathways, and more active growing areas. Raised beds are symbolic of improving the productivity of crops.

6. Smart water management

Water is an essential need for planting crops, and by the management of water, you can enhance production. Water management is the best way to improve production. Using the sprinkler irrigation system, you can increase the output by up to 50%. By manufacturing canals, tube wells get a better irrigation system for the safety of crops.

7. Heat-Tolerant Varieties

Heat-tolerant varieties allow the plant to maintain its yields in high temperatures. We must improve the heat-tolerant varieties, and it increases the crop yield by up to 23%.

8. Use nitrogen

Nitrogen is a necessary element for better plant growth, and without nitrogen, most crops would not exist. Annually, plus 100 million tonnes of nitrogen are applied to crops in the form of fertilizer to help them grow stronger and better. The use of nitrogen can enhance production by up to 22%.

9. Improved seeds

Seeds play an essential role in farms, and improved seeds are best to enhance farm productivity. Improved seeds are suitable for increasing production.

10. Plant protection

According to farming scientists, about 5% of crops are destroyed by insects, pests, and diseases. Most of the farmers are oblivious to the use of medicines and insecticides developed in recent years. To improve the production of crops, yields must use these medicines. To be aware, the farmers about these governments should take steps or employ their technical staff in spraying pesticides and insecticides.

SECTION-C

1. What are the advantages of a Small-Scale Industry?

Ans: - Small-scale industries have traditionally played a crucial part in the country's economic development. Small-scale industries have the following advantages:

1. Possibility of a huge workforce

Small-scale industries can generate many job opportunities. They have a labor-intensive nature to them. They employ more labor than other production elements. They may be set up in a short amount of time and employ a larger number of people. This is critical in a country with a large labor pool, such as India.

2. Less capital is required

When compared to large-scale industries, small-scale enterprises require less capital. Because India is a capital-scarce country, Small Scale Industries are better suited to the Indian environment. They can be founded and run by small business owners with limited cash.

3. Contribution to the output of the industrial sector

Small-scale industry products account for a major share of the country's industrial output. They manufacture a variety of consumer goods and also industrial components in big quantities to meet consumer demands. Small-scale industries produce consumer goods that are less expensive and meet the needs of the poor.

4. Obtaining foreign currency

Small-scale industries contribute to the country's foreign exchange earnings by exporting goods to various countries across the world. Simultaneously, their purchases are minimal, resulting in a lower foreign exchange outflow. As a result, Small Scale Industries generate

positive foreign exchange. Small Industries in Tirupur, for example, provide a significant share of India's export trade and earn precious foreign cash.

5. fair Distribution

Inequalities in wealth distribution and economic power concentration result from large-scale companies. Smaller businesses, on the other hand, divide resources & wealth more evenly. Because it is labor-intensive, money is dispersed among a larger number of workers. This has a positive impact on both the economy and society.

6. Make use of local resources

Small-scale industries make productive use of locally available resources that would otherwise be wasted. Tiny sums of money that might otherwise go unused are channeled into the establishment of small businesses. This boosts the economy's capital formation and investment.

7. Entrepreneurial opportunities

Entrepreneurs with low funding can benefit from small-scale industries. When compared to large-scale firms, establishing an SSI involves less finance and less expenditure on technology and machines. As a result, small business owners can simply create and run Small Scale Industries. Due to various small entrepreneurs who contributed considerably to the nation's development, Japan, which was ravaged by WWII, had become a major economic force.

8. Cost-effectiveness

Small-scale businesses can use lean manufacturing techniques to achieve more quality and variety at a reduced cost. When compared to large-scale units, they can be more cost-effective because their expenditures are reduced.

9. Migrator reduction

When people residing in rural areas are unable to find work, they migrate to urban regions in search of work. Large-scale migration places enormous strain on urban land, water, and other resources, resulting in low quality of life. Small-scale industries make use of the skills and abilities of rural craftsmen, artisans, and others, and they provide useful work to people with inherited skills, allowing them to improve their economic status. As a result, small-scale industries aid in the reduction of migration.

10. Operational flexibility

Small businesses are more adaptable. They can quickly adjust to shifting market conditions and capitalize on new opportunities. Some latest small-scale industries are bakeries, school

stationaries, beauty parlors, Candle Making Manufacturing Businesses, Incense Sticks or Agarbattis and Camphor, Handmade Chocolates, etc.

11. Flexibility in the face of change

Small-scale businesses are better able to recognize and respond to changing customer needs. They can adapt their procedures, methods, and approaches more quickly to meet changing consumer needs.

12. Personalization

Customers nowadays prefer products that are personalized to their unique requirements. They expect one-of-a-kind items. Large-scale production will not be appropriate in situations where products must be modified to meet the needs of individual customers. If products must be tailored, small industries are more suited.

13. Low social costs

Large-scale businesses impose enormous social costs in the form of air & water pollution, as well as environmental deterioration. Small businesses, on the other hand, face lower societal expenses.

14. Personal interaction with clients

The number of consumers is restricted, and the small business owner is personally involved in the operation. Customers can be kept in touch on a personal level. Their requirements and demands can be recognized and met. As a result, clients are satisfied, and demand remains consistent.22.

15. Self-interest

The solitary entrepreneur of a small business is usually in charge. He earns everything and puts everything on the line. Self-interest can be a powerful drive. As a result, he would put out his best efforts to ensure the company's success.

2. Explain the level of criticism against the new industrial policy in 1991.

Ans: - As such there are not many drawbacks of the new industrial policy (NIP), 1991 but still, some of them are discussed below.

- The new industrial policy mainly focuses on large-scale industries with good capital, thus exploiting small-scale industries.
- Liberalization of foreign trade allowed many multinational companies to do business in India which exploited the local business of India.
- The privatization of PSUs was a major feature of NIP 1991, however, it's one of the main options for underprivileged people to earn a job, and get good quality

services at lower prices. Thus, it can exploit the poor and underprivileged section of society.

- With the end of the licensing process, many industries got developed leading to an increased level of pollution.
- The NIP, 1991 focused on cherishing industries but it didn't have any provision for employment generation and fixed labor wages.

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II UNIT TEST, APRIL 2023

ADVANCED CORPORATE ACCOUNTING

DATE: 10.04.2023 **Max.Marks:** 25 Marks

CLASS: II B. COM (A & B) **DURATION:** 1 Hour

PART A – (5 X 1 = 5 Marks)

Answer any FIVE questions

CO4 BL 1 1. Explain Amalgamation.

CO4 BL1 2. Define Holding company.

CO4 BL1 3.write a short note on purchase consideration.

CO1 BL2 4. Explain the term external reconstruction.

CO1 BL3 5. Illustrate the word minority interest.

CO4 BL2 6. what are the various reasons for amalgamation of existing companies?

CO4BL1 7. Give the meaning of 'subsidiary company'.

PART B - (1 X 5 = 10 Marks)

Answer any ONE questions

CO4 BL4 8. What is purchase consideration? Explain the methods to calculate purchase consideration.

CO4 BL3 9.Raman Ltd. Agrees to purchase the business of Krishnan Ltd., on the following terms:

(a) For each of the 10,000 shares of Rs.10 each in Krishnan Ltd.2 shares in Raman Ltd. Of Rs.10 each will be issued at an agreed value of Rs.12 per share. In addition. Rs.4 per share cash also will be paid.

(b) 8% Debentures worth Rs.80,000 will be issued to settle the Rs.60,000 9%Debentures in Krishnan Ltd.

(c) Rs. 10,000 will be paid towards expenses of winding up.

Calculate the purchase consideration.

PART C– (1 X 10 = 10 Marks)

Answer any ONE questions

CO4 BL3 10. Distinguish between Amalgamation, Absorption & Reconstruction.

CO1 BL3 11. Vijay Ltd. went into liquidation with the following liabilities : (a) Secured creditors Rs. 30,000 (security realised Rs. 35,000) (b) Preferential creditors Rs. 700 (c) Unsecured creditors Rs. 40,500 Liquidator's expenses are Rs. 352. He is entitled to a remuneration of 4% on the amount realised (including securities with creditors) and 2% on the amount distributed to unsecured creditors. The various asset realised Rs. 36,000. Prepare the liquidators final statement account.

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II UNIT TEST, APRIL 2023

ADVANCED CORPORATE ACCOUNTING

ANSWER KEY

DATE: 10.04.2023 **Max.Marks:** 25 Marks

CLASS: II B. COM (A & B) **DURATION:** 1 Hour

PART A – (5 X 1 = 5 Marks)

Answer any FIVE questions

CO4 BL 1 1. Explain Amalgamation.

Answer: An amalgamation is a combination of two or more companies into a new entity.

CO4 BL1 2. Define Holding company.

Answer: A holding company is any company which holds more than half of the equity share capital of other companies or controls the composition of the board of directors of other companies.

CO4 BL1 3.write a short note on purchase consideration.

Answer: Purchase Consideration refers to the payment made by the transferee company to the transferor company for the business taken over.

CO1 BL2 4. Explain the term external reconstruction.

Answer: External reconstruction refers to forming of a new company to take over the assets and liabilities of old company.

CO1 BL3 5. Illustrate the word minority interest.

Answer: A minority interest is a partial ownership stake in a company where the majority of shares are controlled by a larger parent company.

CO4 BL2 6. what are the various reasons for amalgamation of existing companies?

Answer: Amalgamation is a way to acquire cash resources, eliminate competition, save on taxes, or influence the economies of large-scale operations.

CO4BL1 7. Give the meaning of 'subsidiary company'.

Answer: A subsidiary company is a business that is owned, either partially or completely, by another company.

PART B - (1 X 5 = 10 Marks)

Answer any ONE questions

CO4 BL4 8. What is purchase consideration? Explain the methods to calculate purchase consideration.

Answer: Methods of Purchase Consideration:

There are four various methods:

- **Net asset method** – Purchase consideration is equal to the total net assets of Transferor Company. Total agreed amount of asset – Total agreed amount of liabilities
- **Net payment method** –Payment made to the shareholders of Transferor Company in form of cash, shares or debentures.
- **Lump sum method** – Fixed amount paid by the transferee company to the transferor company. Both the companies decide the amount by mutual consent hence no calculation is required in Lump sum method.
- **Intrinsic value/ Share exchange method** –It is calculated by dividing the net asset value of transferor company by price of one share of transferee company.
-

CO4 BL3 9.Raman Ltd. Agrees to purchase the business of Krishnan Ltd., on the following terms:

(a) For each of the 10,000 shares of Rs.10 each in Krishnan Ltd.2 shares in Raman Ltd. Of Rs.10 each will be issued at an agreed value of Rs.12 per share. In addition Rs.4 per share cash also will be paid.

(b) 8% Debentures worth Rs.80, 000 will be issued to settle the Rs.60,000 9%Debentures in Krishnan Ltd.

(c) Rs. 10,000 will be paid towards expenses of winding up.

Calculate the purchase consideration.

Answer: Purchase consideration 2, 80,000

PART C– (1 X 10 = 10 Marks)

Answer any ONE questions

CO4 BL3 10. Distinguish between Amalgamations, Absorption & Reconstruction.

Answer:

Sr.No	Basis	Amalgamation	Absorption	External Reconstruction
1.	**Meaning**	Amalgamation is a fusion between two or more companies to consolidate their business activities by establishing a new company having a separate legal existence.	Absorption is the process in which the one leading company takes control over the weaker company.	External reconstruction refers to forming of a new company to take over the assets and liabilities of old company.
2	**Objectives**	To reduce the competition and to reap the benefit of Economies of scale	To reduce the competition and to reap the benefit of Economies of scale	The basic purpose is to reorganize the financial structure of the company.
3.	**Companies taken over**	Two or more companies are taken over by the new company and one new company is formed.	One or more companies are absorbed by the existing company.	One company is liquidated to form the new company
4.	**Example**	A ltd and B ltd amalgamate and for new company AB Ltd	A Ltd takes over B Ltd	B Ltd is formed to take over A Ltd

CO1 BL3 11. Vijay Ltd. went into liquidation with the following liabilities : (a) Secured creditors Rs. 30,000 (security realised Rs. 35,000) (b) Preferential creditors Rs. 700 (c) Unsecured creditors Rs. 40,500 Liquidator's expenses are Rs. 352. He is entitled to a remuneration of 4% on the amount realised (including securities with creditors) and 2% on the amount distributed to unsecured creditors. The various asset realised Rs. 36,000. Prepare the liquidators final statement account.

Answer: Liquidator's remuneration 1,480

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II-Unit Examination –April 2023

Company Law (CZ24B)

Date: 11.04.2023 **Max.Marks:25**

Class:II-B.Com A & B **Duration: 1 Hr**

Section A (5 x 2 = 10)

(Answer any **FIVE** questions)

CO-4 BL-1 1.Define Class Meeting.

CO-3 BL-1 2.What you understand by Women Director.

CO-4 BL-6 3.Write a note on CSR Committee.

CO-4 BL-1 4.What are the Requisites of valid meeting.

CO-4 BL-1 5.Define the term Quorum and Proxy.

CO-4 BL-2 6. Distinguish between dissolution and winding capital

CO-5 BL-2 7.Explain the common provisions of winding up of members and creditors Voluntary winding up.

Section B (1 x 5 = 5)

(Answer any **ONE** question)

CO-5 BL-2 8.Explain the powers and duties of liquidator and provisions regarding appointment of official liquidator.

CO-4 BL-2 9.Describe the various classifications of shareholders meeting.

Section C (1 x 10 = 10)

(Answer any **ONE** question)

CO-4 BL-2 10.Discuss the differences Company committees and its commissions.

CO-5 BL-2 11.Explain the different of mode of winding up of a company. Narrate the legal Provisions relating to compulsory winding up by NCLT.

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II-Unit Examination –April 2023
Company Law (CZ24B)

Date: 11.04.2023 **Max.Marks:25**
Class:II-B.Com A & B **Duration: 1 Hr**

Section A

(Answer any **FIVE** questions) (5 x 2 = 10)

CO-4 BL-1 1.Define Class Meeting.

Class meetings are meetings which are held by the holders of a particular class of shareholders e.g preference shareholders. Such meetings are normally called when it is proposed to vary the rights of that particular class of shares.

CO-3 BL-1 2.What you understand by Women Director.

Women director has to play the role like any other director. Women can take up a role of Nominee Director who will be nominated by a party in the company to take care of its interest. Also, Women can take up a role of Independent Director who is not liable to retire by rotation.

CO-4 BL-6 3.Write a note on CSR Committee.

CSR Committee will monitor the CSR policy of the Company from time to time. The CSR Committee will establish a transparent controlling mechanism for the implementation of the CSR projects or programs or activities undertaken by the company.

CO-4 BL-1 4.What are the Requisites of valid meeting.

Proper and adequate notice must have been given to all those entitled to attend. The meeting must be legally constituted. There maust be a chairperson. The rules of quorum must be maintained and the provisions of the Companies Act, 1956 and the articles must be complied with.

CO-4 BL-1 5.Define the term Quorum and Proxy.

The presence of Members representing a majority of the Members shall constitute a quorum for any meeting of the Members. Members may vote at any Member meeting either in person or by proxy executed in writing.

CO-4 BL-2 6. Distinguish between dissolution and winding capital

Winding up means appointing a liquidator to sell off the assets of the company, divide the proceeds among creditors, and file to the NCLT for dissolution. Dissolution means to dissolve the company completely. Any further operations cannot be done in the company name.

CO-5 BL-2 7.Explain the common provisions of winding up of members and creditors Voluntary winding up.

The criterion that determines whether a winding up is a members' or creditors' voluntary winding up is whether the company is solvent or insolvent. If the directors make a declaration of solvency in accordance with s. 163 IRDA, the winding up will be a members' voluntary winding up.

Section B

(Answer any **ONE** question) (1 x 5 = 5)

CO-5 BL-2 8.Explain the powers and duties of liquidator and provisions regarding appointment of

In a Company, Liquidator is appointed by a court, shareholders, and creditors to sell off the assets of a Company going for winding up. A person should be qualified to be a liquidator of the Company. The Liquidator will take control of the business and will distribute the assets of the Company.



Provide Notice Of Appointment

Section 275(6) and 310 (4) of the Companies Act, 2013, mandates the Company Liquidator appointed should **within 7 days of appointment notify the Tribunal about the appointment**. A declaration should also be made in which the conflict of interest or lack of independence will be disclosed by the Liquidator.

Conduct Proceedings While Winding Up

According to the provisions of **Section 457 of Companies Act, 2103,**[1] the Liquidator should conduct proceeding while winding up of the Company. The Liquidator should perform all the duties as referred by the court. The act should be valid as per law.

Submission Of Preliminary Report

- Statement of Affairs from Directors
- Capital issued of the Company
- Subscribed and paid Capital
- The estimated amount of Assets
- Cause of failure
- His opinion regarding fraud and punishable offence committed by Directors of Company

Collecting And Distributing Company Property

After winding up order is made by the court, immediately the Liquidator should manage all the assets of the Company. The right to enjoy those accumulated assets should vest with the Liquidator. The Liquidator, after preparing the schedules of all creditors, distributes the assets proportionately to all the creditors.

Obeying Order Of Court

While performing duties, the Liquidator should abide by the orders of the court. The Liquidator should also be careful regarding his/her actions that whether they are in line with the law or not. The duties should be carried out faithfully and honestly by the Liquidator.

Hold Meeting For Creditors And Contributories

The Liquidator can call meetings of Creditors and Contributors whenever he/she deems fit. The creditors, when direct the Liquidator to summon the meeting, he shall follow the directions of the Creditors and Contributories.

Maintaining Paper Books

The Liquidator is authorized to maintain proper books. The books should include each entry and minutes of the proceeding at meetings.

Maintain Accounts

is authorized to put all the cash with him with the Reserve Bank of India (RBI). The receipts and payments to Liquidator should be presented in the court twice a year.

Appointment Of Inspection Committee

The Liquidator is entitled to appoint an inspection committee under him if the court directs him. The committee should be formed within 2 months from the direction of the court. The committee should be formed with the consent of the majority of creditors. If the creditors form no committee, then the court will accordingly form 1 Committee for the Company.

Inform About Pending Liquidation

If the Winding Up of the Company is not completed in a year, then the Liquidator should file a statement in prescribed format about the proceedings of Winding up of the Company.

Investigate Affairs Of Company

The Liquidator can examine the conduct of the Company's present and past officers and can see whether they were guilty of any misconduct in the Company or not.

CO-4 BL-2 9.Describethe variousclassifications of shareholders meeting.

1 – Annual General Meeting (AGM)

- It is the most important meeting which is compulsorily held every year. They are mandatory for both **private companies** as well as public companies.
- The gap between the two AGMs should not exceed more than 15 months. In case of any difficulty arises in the conduct of an AGM within a prescribed time limit, the company may seek for extension of time from the Minister for special reasons only. However, such an extension shall be not more than three months.
- AGM should be held during business hours only.
- A notice period of a minimum of 21 days is required to be given before calling for an **AGM**. However, the notice period can be served by shorter notice if the consent of all the members who are entitled to attend and vote is obtained.

2 – Extra-Ordinary General Meeting (EGM)

- An extraordinary meeting means a meeting called in the unique circumstances of the company. The Board of Directors has the power to call an extraordinary general meeting whenever they deem fit.
- The primary reason for calling an EGM is to discuss any urgent matters (i.e., to transact a special business) or any crisis, and it requires the special attention of the members. Thus, the management cannot wait until AGM is called upon.
- An EGM can be held on any day, including holidays unlikely like an AGM must be held on days other than national holidays. An EGM can be called on the request of shareholders, members, or on the order of the tribunal.

3 – Class Meetings

- Class meetings are also called special shareholders' meetings.
- Such meetings are required when the company must pass a resolution where such resolution affects only a particular class of shareholders.

Section C (1 x 10 = 10)

(Answer any **ONE** question)

CO-4 BL-2 10.Discuss the differences Company committees and its commissions.

Committee	Commission
A group of individuals or experts appointed by an organization or government to investigate, study, or provide recommendations on specific issues.	A body appointed by the government to perform a specific task or function, with the power to make decisions or recommendations.
A committee submits its report to a specific ministry or department which sets it up.	Commission submits its report to the legislature so reports of the commissions are deliberated by the legislature.
May have advisory or supervisory roles and provide recommendations, but do not have decision-making authority	Have decision-making authority and may be empowered to make binding recommendations or take action.
Example – Kelkar committee on PPPs	Examples-National Human Rights Commission, the Central Vigilance Commission

CO-5 BL-2 11.Explain the different of mode of winding up of a company. Narrate the legal Provisions relating to compulsory winding up by NCLT.

Different modes of winding up a company

1. Compulsory Winding Up: Compulsory winding up is initiated by a court order, usually due to the company's inability to pay its debts. This mode of winding up is initiated by filing a petition in court by a creditor, shareholder or the company itself.
2. Voluntary Winding Up: Voluntary winding up is initiated by the company's shareholders, and there are two types: members' voluntary winding up and creditors' voluntary winding up.

- Members' Voluntary Winding Up: This winding mode is initiated when the company is solvent and its shareholders decide to wind up the company voluntarily. In this case, the shareholders appoint a liquidator to sell the assets of the company and distribute the proceeds among the shareholders.
- Creditors' Voluntary Winding Up: This mode of winding up is initiated when the company is insolvent, and its shareholders decide to wind up the company voluntarily. In this case, the creditors appoint a liquidator, who takes control of the company and its assets, sells them, and distributes the proceeds among the creditors.

3. Mergers and Acquisitions: Mergers and acquisitions are another way of winding up a company. In this case, the company is acquired by another company, and its assets are merged with the assets of

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II-Unit Examination –April 2023

Date: 13.04.2023 **Duration: 1 Hr**

Subject: Indirect Taxation(CZ24D) **Class: II-B.Com A & B**

Section A (5 x 2 = 10)

(Answer any **FIVE** questions)

1. 1. What is GST Council? CO 1 BL 1

2. What is profiteering? CO 2 BL 1

3. What Compound Levy Scheme? CO 2 BL 1

4.Explain ITC. CO 3 BL 2

5.Explain Principle Supply. CO 2 BL 2

6.Explain RCM? CO3 BL 2

7. Explain; Progressive Taxation, Regressive Taxation and Degressive Taxation. CO1 BL 2

Section B (1 x 5 = 5)

(Answer any **ONE** question)

8. Explain the types of GST returns to be filed. CO3 BL 2

9. Explain in details: Input Tax Credit. CO 3 BL 2

Section C (1 x 10 = 10)

(Answer any **ONE** question)

10. Explain: Appointment and powers of GST officers. CO 3 BL 2

11. Explain in details: Different Types of Supply. CO 3 BL 2

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II-Unit Examination –April 2023

Indirect Taxation(CZ24D)

Answer key

Date: 13.04.2023 **Class: II-B.Com A & B**

Part-A

1. What is GST Council?

The Government of India (GoI) introduced the GST Council to modify, regulate and reconcile the goods and services tax in India

2. What is profiteering?

Profiteering is defined as an activity that helps to generate an unreasonable amount of profit through sales of essential products during times of emergency

3. What Compound Levy ?

Composition Scheme is a simple and easy scheme under GST for taxpayers. Small taxpayers can get rid of tedious GST formalities and pay GST at a fixed rate of turnover

4.Explain ITC

Input Tax Credit

5.Explain Principle Supply

"Principal supply" means the supply of goods or services which constitutes the predominant element of a composite supply and to which any other supply forming part of that composite supply is ancillary 6.Explain RCM?

Reverse charge mechanism

7. What is a Taxable Supply

Taxable Supplies means any supply of goods or services made by a taxable person and does not include exempt supplies.

Part B

8. Explain the types of GST returns to be filed.

The basic features of the return mechanism in GST includes electronic filing of returns, uploading of invoice level information, auto-population of information relating to input tax credit from returns of supplier to that of recipient, invoice level information matching and auto-reversal of input tax credit in case of mismatch. The returns mechanism is designed to assist the taxpayer to file returns and avail ITC.

GSTR-1*	Statement of Outward supplies of Goods or Services
GSTR-2*	Statement of Inward supplies of Goods orservices
GSTR-3*	Return for a normal taxpayer
GSTR-3B	Simple Monthly Return for the period Jul 2017 to March 2018
GSTR-4	Quarterly Return

GSTR-5

Monthly return for a non- resident taxpayer

9. Explain in details: Input Tax Credit.

Input Tax Credit means claiming the credit of the GST paid on purchase of Goods and Services which are used for the furtherance of business. The Mechanism of Input Tax Credit is the backbone of GST and is one of the most important reasons for the introduction of GST.

As GST is a single tax levied across India (right from manufacture of goods/ services till it reaches the end customer), the chain does not get broken and everybody is able to take benefit of the same and there is seamless flow of credit.

Uninterrupted and seamless chain of input tax credit (hereinafter referred to as, "ITC") is one of the key features of Goods and Services Tax. ITC is a mechanism to avoid cascading of taxes. Cascading of taxes, in simple language, is 'tax on tax'. Under the present system of taxation, credit of taxes being levied by Central Government is not available as set-off for payment of taxes levied by State Governments, and vice versa. One of the most important features of the GST system is that the entire supply chain would be subject to GST to be levied by Central and State Government concurrently. As the tax charged by the Central or the State Governments would be part of the same tax regime, the credit of tax paid at every stage would be available as set-off for payment of tax at every subsequent stage.

Part-C

10. Explain: Appointment and powers of GST officers.

Appointment of officers under the Central Goods and Services Tax Act [section 5 of Model GST Law]

(1) The Board may appoint such persons as it may think fit to be officers under the Central Goods and Services Tax Act.

(2) Without prejudice to the provisions of sub-section (1), the Board may authorize a Principal Chief Commissioner/Chief Commissioner of Central Goods and Services Tax or a Principal Commissioner/Commissioner of Central Goods and Services Tax or an Additional/Joint or Deputy/Assistant Commissioner of Central Goods and Service Tax to

appoint officers of Central Goods and Services Tax below the rank of Assistant Commissioner of Central Goods and Services Tax.

Powers of officers under the Central Goods and Services Tax Act [section 6 of Model GST Law]

(1) Subject to such conditions and limitations as the Board may impose, an officer of the Central Goods and Services Tax may exercise the powers and discharge the duties conferred or imposed on him under this Act.

(2) An officer of Central Goods and Services Tax may exercise the powers and discharge the duties conferred or imposed under this Act on any other officer of Central Goods and Services Tax who is subordinate to him.

(3) The Board/Commissioner may, subject to such conditions and limitations as may be specified in this behalf by him, delegate its powers to any other officer subordinate to him.

(4) Notwithstanding anything contained in this section, a First Appellate Authority shall not exercise the powers and discharge the duties conferred or imposed on an officer of Central Goods and Services Tax other than those specified in section 79 of this Act.

11. Explain in details: Input Tax Credit.

Input Tax Credit means claiming the credit of the GST paid on purchase of Goods and Services which are used for the furtherance of business. The Mechanism of Input Tax Credit is the backbone of GST and is one of the most important reasons for the introduction of GST.

As GST is a single tax levied across India (right from manufacture of goods/ services till it reaches the end customer), the chain does not get broken and everybody is able to take benefit of the same and there is seamless flow of credit.

Uninterrupted and seamless chain of input tax credit (hereinafter referred to as, "ITC") is one of the key features of Goods and Services Tax. ITC is a mechanism to avoid cascading of taxes. Cascading of taxes, in simple language, is 'tax on tax'. Under the present system of taxation, credit of taxes being levied by Central Government is not available as set-off for payment of taxes levied by State Governments, and vice versa. One of the most important features of the GST system is that the entire supply chain would be subject to GST to be levied by Central and State Government concurrently. As the tax charged by the Central or the State Governments would be part of the same tax regime, the credit of tax paid at every stage would be available as set-off for payment of tax at every subsequent stage.

Goods and Services Tax (GST) would mitigate such cascading of taxes. Under this new system, most of the indirect taxes levied by Central and the State Governments on supply of goods or services or both, would be combined together under a single levy.

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II-Unit Examination –April 2023

Date: 12.04.2023 **Duration: 1 Hr**

Subject: Financial Services **Class:II-B.Com A & B**

Section A (5 x 2 = 10)

(Answer any **FIVE** questions)

CO-4 BL-1 1.Define Money market.

CO-3 BL-1 2.Define Capital market.

CO-4 BL-6 3.Explain the term SEBI and NSE.

CO-4 BL-1 4.Who are the Parties involved to a leasing contract?

CO-4 BL-1 5.Define the stock market.

CO-4 BL-2 6. Who are brocker?

CO-5 BL-2 7.What is international lease?

Section B (1 x 5 = 5)

(Answer any **ONE** question)

CO-5 BL-2 8.Explain the need to control stock exchange in India.

CO-4 BL-2 9.Difference between financial lease and operating lease.

Section C (1 x 10 = 10)

(Answer any **ONE** question)

CO-4 BL-2 10.How are lease classified? Explain

CO-5 BL-2 11.Discuss the steps taken by the government to improve money market and capital market.

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II-Unit Examination –April 2023

Answer Key

Subject: Financial Services

Section A

CO-4 BL-1 1.Define Money market.

Money market basically refers to a section of the financial market where financial instruments with high liquidity and short-term maturities are traded. Money market has become a component of the financial market for buying and selling of securities of short-term maturities, of one year or less, such as treasury bills and commercial papers.

CO-3 BL-1 2.Define Capital market.

Capital markets are financial markets that bring buyers and sellers together to trade stocks, bonds, currencies, and other financial assets. Capital markets include the stock market and the bond market.

CO-4 BL-6 3.Explain the term SEBI and NSE.

Securities and Exchange Board of India (SEBI)

National Stock Exchange of India Limited (NSE)

CO-4 BL-1 4.Who are the Parties involved to a leasing contract?

There are two parties to a lease: the owner called the lessor and the user called the lessee.

CO-4 BL-1 5.Define the stock market.

Traders in the stock market buy or sell shares on one or more of the stock exchanges that are part of the overall stock market.

CO-4 BL-2 6. Who are brocker?

A broker is an individual or firm that charges a fee or commission for executing buy and sell orders submitted by an investor.

CO-5 BL-2 7.What is international lease?

Whenever one or more parties of any lease agreement belong & have domicile of a different country, this kind of lease is termed an international lease.

Section B

CO-5 BL-2 8.Explain the need to control stock exchange in India.

1. Registration and Regulating the conduct of stock exchanges, intermediaries like brokers, sub-brokers, merchant bankers, CRAs, custodians etc.

2. Prevention of unwarranted and unfair practices in securities and other markets such as price manipulation, insider trading etc.
3. Promoting investor awareness and education schemes and redressal of their grievances.
4. Inspection, audit and enquiries of the offences prohibited under the act.
5. To penalise and punish in case of violation of any act, rules, regulations etc.

CO-4 BL-2 9.Difference between financial lease and operating lease.

	Financial Lease	Operating Lease
Lease criteria - Ownership	Ownership of the asset might be transferred to the lessee at the end of the lease term.	Ownership is retained by the lessor during and after the lease term.
Lease criteria - Bargain Purchase Option	The lease contains a bargain purchase option to buy the equipment at less than fair market value.	The lease cannot contain a bargain purchase option.
Lease criteria - Term	The lease term equals or exceeds 75% of the asset's estimated useful life	The lease term is less than 75 percent of the estimated economic life of the equipment
Cancelability	The lease cannot be cancelled by either of the parties	The lease can be cancelled at the option of the lessee and the lessor does not have the difficulty of leasing the same asset to other willingness lesses

Section C

CO-4BL-2 10.How are lease classified? Explain



CO-5 BL-2 11.Discuss the steps taken by the government to improve money market and capital market.

Steps taken by the government to improve money market

1. Nationalization of commercial banks to boost money market in India

Commercial banks were nationalized in order to stimulate the growth of Indian money market. The nationalization enabled banking sector to provide more loans to agriculture and discount agricultural bills.

2. Introduction of various relief acts to boost up growth of Indian money market

The passing of Public Debt Relief Act has released many people, especially in rural areas from the clutches of the money lenders. The Urban Debt Relief Act has given relief to the urban poor. In 1988, the discount and finance house was set up for discounting commercial bills brought by commercial banks.

3. Reduction of stamp duty

Reduction of stamp duty and re-discounting rate on promissory notes has made it more popular. In 1986, the Government issued 180-days treasury bills and in 1989 certificate of deposits, and commercial paper in 1990.

In 1991, Money Market Mutual fund was set up to allow more people to take part in the money market activities in India.

4. Steps taken to curb disparity in Interest rates

The interest rate of commercial banks which was controlled by RBI has been deregulated. This curtails the adverse effect of disparity in Interest rates among various money markets and in turn helps boost up the growth of Indian money market.

5. Repurchase of options of treasury bills to boost bill market

RBI has introduced repurchase of options of treasury bills to provide more additional funds to commercial banks. This attracts more activity in the bill market and help boost money market in India.

6. Relaxation fore foreign institutions by Indian Government

More relaxation for foreign institutions to invest foreign funds in the Indian money market. This brings in more liquidity during the period of *busy season* (between June to February).

7. Introduction of Credit rating for commercial paper and promissory notes

Credit rating has been introduced for promissory notes as well as commercial paper by which the credibility of these instruments has gone up. Credit worthiness of these instrument plays a major role for the growth of Indian money market.

Measures taken by Govt for promotion of Capital Market

1. Legal Measures: The passing of Companies Act and the Securities (Contract and Regulation) Act were responsible for the promotion of Capital Market in India.
2. Promotional Measures: The creation of more public sector undertakings and financial institutions was responsible for improving capital market. Life Insurance Corporation, Unit Trust of India, State Bank of India and the Development banks such as ICICI, IDBI, and SFC are responsible for the contribution of enormous funds in the capital market.
3. Regulatory measures: The controller of Capital Issues was acting as regulator and without his permission, a company cannot issue shares. At present, this function is taken over by SEBI (Securities Exchange Board of India). The working of stock exchanges was also regulated and there were penalty provisions for preventing any violation. Companies which are listing their shares should fulfill the conditions by which genuineness of the issue of shares is ensured. The Directorate of Stock Exchange enforces the provisions of the Act and streamlines the working of Stock Exchanges.
4. Liberalization measures: After 1990, the economic liberalization measures adopted by the Indian government has resulted in more private sector expansion. Even the existing public sector undertakings have started liquidating some of the shares to the public. Foreign investments are given more concession. Expansion of private sector is being allowed. An important measure in liberalization is the entry of the private sector into some of the major infrastructure industries. Example: Insurance, Transport, Banking and Power.

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II UNIT TEST – APRIL 2023

ADVANCED COST ACCOUNTING

Date: 10.04.2023 **Max.Marks:25**

Class: III B. Com A&B **Duration: 1 Hr**

PART – A (5*2=10)

Answer any 5 of the following

1. **Co2** Define Process Costing.
2. **Co2** What do you understand by Abnormal loss?
3. **Co3** What do you mean by operating costing?
4. **Co3** How is Passenger Kilometre calculated?
5. **Co4**What is contribution?
6. **Co4** What is Margin of Safety?
7. **Co5** Write short notes on Material Cost Variance.

PART – B (1*5=5)

Answer any 1 of the following

8. **Co3** From the following information, Calculate Total Passenger-km.

Number of buses	-	5
Days operated in the month	-	25
Trips made by each bus	-	4
Distance of route	-	20km long (one side)
Capacity of bus	-	50 passengers
Normal passenger travelling	-	90% of capacity

9. **Co5** from the following particulars, calculate (i) Material cost Variance (ii) Material Price Variance (iii) Material usage variance

Materials	**Standard**		**Actual**	
	Units	Price	Units	Price
A	1010	1	1080	1.2
B	410	1.5	380	1.8
C	350	2	380	1.9

PART – C (1*10=10)

Answer any 1 of the following

10. **Co4** From the following information you are required to find out (i) Contribution (ii) BEP (iii) Margin of safety (iv) Profit

	Rs.
Total Fixed cost	4500
Total variable cost	7500
Total sales	15000
Units sold	5000 units

Also calculate the volume of sales to earn a profit of Rs.6000.

11. **Co5** Mr A runs a tempo service in the city. He furnishes the following data and wants you to compute the cost per running km.

Cost of vehicle	25,000
Road license fee per annum	750
Supervisor's salary per annum	1,800
Driver's wage per hour	4
Cost of fuel per litre	6.50
Repairs & maintenance per km	1.50
Tyre allocation per km	2.00
Garage rent per annum	3,200
Annual insurance premium	1,200
Km. run per litre	6
Km. run during the year	12,000
Estimated life of vehicle in km	1,00,000

The vehicle runs 20km per hour on an average.

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II UNIT TEST – APRIL 2023

ADVANCED COST ACCOUNTING

Date: 10.04.2023 **Max.Marks:25**

Class: III B. Com A&B **Duration: 1 Hr**

PART – A (5*2=10)

Answer any 5 of the following

1. **Co2 Define Process Costing.**
   Process costing is one of the important methods of costing where the manufacturing of products involves distinct stages of production. Ascertainment of cost at each stage of production is called Process costing.
2. **Co2 What do you understand by Abnormal loss?**
   The losses that are in excess of normal limits and that cannot be avoided are called abnormal loss. They are caused by unexpected conditions and not due to the nature of production process.
3. **Co3 What do you mean by operating costing?**
   Operating costing is a method of costing used to ascertain cost per unit of service rendered.
4. **Co3 How is Passenger Kilometre calculated?**
   Ans: It means carrying one passenger over a distance of one km. it is calculated as follows: No. of vehicles x distance no. of trips x capacity x passenger actually carried
5. **Co4 What is contribution?**
   The excess of selling price over and above the variable cost is contribution.
6. **Co4 What is Margin of Safety?**
   The margin of safety, or safety margin, refers to the difference between actual sales and break even sales.
7. **Co5 Write short notes on Material Cost Variance.**
   Ans: It is the difference between the standard cost of materials allowed for the output achieved and the actual cost of materials used.
   MCV= Standard cost of materials – actual cost of materials.

PART – B (1*5=5)

Answer any 1 of the following

8. **Co3** From the following information, Calculate Total Passenger-km.

Number of buses	-	5
Days operated in the month	-	25
Trips made by each bus	-	4
Distance of route	-	20km long (one side)
Capacity of bus	-	50 passengers
Normal passenger travelling	-	90% of capacity

Ans: 9, 00,000 Passenger Km

9. **Co5** from the following particulars, calculate (i) Material cost Variance (ii) Material Price Variance (iii) Material usage variance

Materials	Standard		Actual	
	Units	Price	Units	Price
A	1010	1	1080	1.2
B	410	1.5	380	1.8
C	350	2	380	1.9

Ans: MCV – Rs.377 (Adverse), MPV – Rs.292 (Adverse), MUV – Rs.85 (Adverse)

PART – C (1*10=10)

Answer any 1 of the following

10. **Co4** From the following information you are required to find out (i) Contribution (ii) BEP (iii) Margin of safety (iv) Profit

	Rs.
Total Fixed cost	4500
Total variable cost	7500
Total sales	15000
Units sold	5000 units

Also calculate the volume of sales to earn a profit of Rs.6000.

Ans: (i) Contribution per unit – Rs.1.50, value – Rs.7500 (ii) BEP – 3000 units, Value Rs. 9000 (iii) Margin of safety – Rs. 6000 (iv) Profit- Rs.3000, (v)Required Sales volume - 21000

11. **Co5** Mr A runs a tempo service in the city. He furnishes the following data and wants you to compute the cost per running km.

Cost of vehicle	25,000
Road license fee per annum	750
Supervisor's salary per annum	1,800
Driver's wage per hour	4
Cost of fuel per litre	6.50
Repairs & maintenance per km	1.50
Tyre allocation per km	2.00
Garage rent per annum	3,200
Annual insurance premium	1,200
Km. run per litre	6
Km. run during the year	12,000
Estimated life of the vehicle in km	1,00,000

The vehicle runs 20km per hour on an average.

Ans: Total standing charges – Rs.6950 p.a, 0.579 per km; Maintenance charges – 1.50,2.00; Running charges – 1.083,.20, .25; Operating cost per running Km – Rs.5.612

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II-Unit Examination –April 2023
Human Resource Management

Date: 13.04. 2023 **Max.Marks:25**

Class: III-B.Com (A & B) **Duration: 1 Hr**

Part-A (5 x 2 = 10)

(Answer any **FIVE** questions)

1. Explain Stress Interview. CO 2 BL2
2. What are the Different types of tests? CO 2 BL 2
3. What do you mean by induction? CO 2 BL 2
4. Define Transfer. CO2 BL 1
5. What is career development. CO 3 BL 1
6. Explain Ctc Fixed and Flexible pay. CO 3 BL 2
7. Define Development. CO 3 BL 1

Part- B (1 x 5 = 5)

(Answer any **ONE** question)

8. Explain the identification of training needs? Explain in brief. CO 2 BL 2
9. What are the challenges and recent trends in compensation? CO 3 BL 1

Part- C (1 x 10 = 10)

(Answer any **ONE** question)

10. What are the need and functions of trade union? CO 3 BL2
11. Explain the following.CO 2 BL 2
    - Training and development
    - Performance appraisal
    - Career development

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II-Unit Examination –April 2023

Human Resource Management

Answer key

Date: 13.04. 2023 **Max.Marks:25**

Class: III-B.Com (A & B) **Duration: 1 Hr**

Part-A

1. Explain Stress Interview

'stress interview' – a technique to test how applicants deal with pressure by taking them out of the comfort zone of expected questions and answers.

2. What are the Different types of tests

- Written
- Achievement
- Intelligent
- Performance
- Aptitude
- psychological

3. What do you mean by induction

An induction programme is the process used within many businesses to welcome new employees to the company and prepare them for their new role. It helps in the integration of employees into the organization.

4. Define Transfer

Transfer is a process of placing employees in positions where they are likely to be more effective or where they are to get more job satisfaction

5. What is career development

Career development is a continual process that can bring optimal results with efficient management of one's own time and resources. The development process involves a thorough understanding of various aspects of work and life and the ways to balance both.

6. Explain Ctc Fixed And Flexible pay

CTC or Cost to Company is the total amount that a company spends (directly or indirectly) on an employee. It refers to the total salary package of the employee. CTC is inclusive of monthly components such as basic pay, various allowances, reimbursements, etc.

7. Define Development

Human Resource Development is the part of human resource management that specifically deals with training and development of the employees in the organization. Human resource

development includes training a person after he or she is first hired, providing opportunities to learn new skills, distributing resources that are beneficial for the employee's tasks, and any other developmental activities.

Part- B

8. Explain the identification of training needs? Explain in brief.

Training Need Identification

The key idea of training need typically refers to a discrepancy or gap between organization expects to happen and what actually occurs.

- Variations and gaps between employee's skill and skills required for effective current job performance
- The conditions under which HRD activity will occur
- Thus it is obvious that need assessment forms the foundation of any training programmed.
- The main purpose of a systematic exploration of the way things are and the way they should be. The difference is called THE PERFORMANCE GAP

Types of Need Analysis

The need analysis helps to determine which needs analysis is appropriate for your situation are described below:

a) Context analysis

An analysis of the business training needs or other reasons the training is desired. This type of training is generally more connected with organization background, history, why the training programme is seen as the recommended solution and other management interventions.

b) Cost benefit (Return on investment)

The cost benefit can be calculated through the analysis of the return on investment (ROI) of training

c) Training Suitability Analysis

Analysis of whether training is the desired solution. Because training is one of the several solutions of employment problems and training may or may not provide all solutions in one goal. Hence, it is essential to identify and analysis through proper process and tools as to derive the suitability and objectivity of conducting trainings

d) Work Analysis

Analysis of the tasks should be done through performance or outcome an employee. This is an analysis of the job and the requirements for performing the work. This helps ensure that the training, which is developed, will include relevant links to the content of the job.

e) User Analysis

Analysis dealing with potential participants and instructors involved in the process. The questions being answered by these analyses are who will active during the training and their levels of existing knowledge on the subject matter, what are their learning style is and who will contact the training.

Models of Need Analysis

Organization / Strategic level analysis organization analysis is a process used to determine where training and HRD efforts are need and the conditions within which they will be conducted

Job / task level analysis results of the task analysis are typically included the appropriate standards of performance, how task should be performance to meet these standards and the knowledge, skills , abilities and other characteristics that employees need to possess in order to meet the standards.

Individual level analysis in this type of analysis, the focus is typically on how well an individual employee is performance his task, i.e. whether he is competent to perform his job well as per the targets / objectives given to him.

9. What are the challenges and recent trends in compensation?

1. Setting the Hybrid Work Model for Collaboration

With things getting back on track, the workplace is evolving into a more suitable approach for its employees and their productivity — the hybrid work model. It's an employee-centric flexible work model that includes a mix of in-office and remote work.

2. "Human" Leadership

A recent HBR article about the distinction between managers and leaders quotes, "CEOs need to manage, not just lead. Middle 'managers' need the skills of leadership, too."

Now more than ever, following the shifts that the workplace has seen, the importance of an effective leader and manager has grown by leaps and bounds. The current scenario demands empathetic, adaptive and authentic leaders for their employees.

3. Change Management

What has the past few years taught us about dealing with unforeseen circumstances at the workplace? The answer is change management.

Change management systematically deals with changes in an organization's goals, processes or technologies. It aims to implement efficient strategies to execute changes, controlling them and helping people to adapt to them with minimal hindrances

So, while you're strategizing for change management in your organization, here are some factors to consider:

Digital adoption platforms to implement change

Managers and early adopters as change agents
Change as a part of company culture
Data-driven approach to change management
Humanized change.

Part- C

10. What are the need and functions of trade union?

The trade union is an association, either of employees or employers or of independent workers. It is a relatively permanent combination of workers and is not temporary or casual.

Characteristics of Trade Union

Association of employees: A trade union is essentially an association of employees belonging to a particular class of employment, profession, trade or industry. For example, there are unions for teachers, doctors, film, artistes, weavers, mine workers and so on.

Voluntary Association: An employee joins the trade union out of his free will. A person cannot be compelled to join a union.

Permanent Body: A trade union is usually a permanent body. Members may come and go but the trade union remains.

Common Interest: The member of a trade union have certain matters of common interest-job security, better pay and working conditions and so on, which bring them together.

Collective Action: Even when an individual employee has any grievance over certain management decisions, the matter is sorted out by the intervention of the trade union Employees are able to initiate collective action to solve any problem concerning any particular employee or all the employees.

Objectives of Trade Union

The major objectives of trade union are the following:
Better wages & working conditions and promotion of Industrial peace
Protection against Exploitation and Victimization.
Representation (Workers' Interests)
Negotiation (Collective Bargaining)
Voice in decisions (Lay off, Retrenchment) affecting workers
Member Service (Education, Training, Welfare, Discounts, Loans)
Purpose of Trade Union
Employment Protection and Job Creation.
Economic Protection.
Social Status – Identity.
Political Role – Democratic Institution

Societal Obligation – Transformation.
Competitiveness / Sustainable Development.

11. Explain the following.

- Training and development
- Performance appraisal
- Career development
- **Training and development**
  Training and development is a continuous process as the skills, knowledge and quality of work needs constant improvement. Since businesses are changing rapidly, it is critical that companies focus on training their employees after constantly monitoring them & developing their overall personality.

  Steps for training and development processes are:

  1. Determine the need of training and development for individuals or teams
  First of all the need has to be seen for training and development. it has to align with the company's goals and objectives. If a company is trying to start a new department or strengthen existing sales team in new products, then an appropriate training is needed.

  2. Establish specific objectives & goals which need to be achieved
  The goals and objectives of the training and development have to be established. Whether the goal is awareness about new products or even installation is required to be learnt.

  3. Select the methods of training
  Next, methods have to be defined. The training can be done as a :

  a. Classroom Training

  b. Online Self paced courses

  c. Course with certification

  d. Instructor led online training

  4. Conduct and implement the programs for employees
  After the plan and methods are finalized, the training and development programs have to be executed where courses, instructions are taught to the employees, partners or vendors.

  5. Evaluate the output and performance post the training and development sessions

Training and Development is incomplete without proper monitoring. Monitoring can be done through evaluation of the instructor as well as attendees. Instructor evaluation can be done through feedback or ratings but attendees can be evaluated through internal or external certifications or scores.

6. Keep monitoring and evaluating the performances and again see if more training is required
Based on the evaluation results in the previous step, management needs to ascertain that if the training and development program was sufficient for now or more training and enablement would be required. Also, if future trainings are to be planned.

- Performance appraisal
A performance appraisal is the periodic assessment of an employee's job performance as measured by the competency expectations set out by the organization.
The performance assessment often includes both the core competencies required by the organization and also the competencies specific to the employee's job. The appraiser, often a supervisor or manager, will provide the employee with constructive, actionable feedback based on the assessment. This in turn provides the employee with the direction needed to improve and develop in their job.

Based on the type of feedback, a performance appraisal is also an opportunity for the organization to recognize employee achievements and future potential.

- Career development

Career development is a continual process that can bring optimal results with efficient management of one's own time and resources. The development process involves a thorough understanding of various aspects of work and life and the ways to balance both.
Self-development plays a major role in career development.
Some of the primary aspects we need to focus on for proper self-development are:

Values: Assessing one's values will help to choose a career that aligns with those values. This step will create a deep interest in the work you do and generates job satisfaction.
Interests: Find out the things that capture your attention, focus, and motivation. They could be things that you may or may not like. Finding opportunities with similar interests will help in maximizing your potential.
Personality: Self-reflect and identify your qualities as an individual. Are you a team player, socially extrovert or introvert, answers to these questions will help in narrowing down the options that are best suited for your personality. The negative side to your personality should also be paid heed, too and should be worked on to achieve success at work.

Skills: The skills you acquire will determine the progress in your career. Learning new skills, reskilling or upskilling, and gaining acumen on existing skills will significantly improve one's career trajectory.

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PG DEPARTMENT OF COMMERCE

II UNIT TEST, APRIL 2023

CLASS: III B.Com (A&B) TIME: 1 Hour

SUB: MANAGEMENT ACCOUNTING Max: 25 Marks

PART A (5 X 2 = 10 Marks)
Answer any FIVE questions

CO1 BL1 1.List out two functions of Management Accounting.

CO2 BL1 2.Write a note on common size statement.

CO5 BL1 3.What is Pay-Back Period?

CO5 BL1 4.What is Flexible Budgeting?

CO3 BL1 5.What is Ratio?

CO4 BL1 6.State any two advantages of cash flow statement.

CO5 BL3 7. Calculate P.V. Ratio.

Sales	Rs. 4,00,000
Variable cost	Rs. 3,00,000
Fixed cost	Rs. 40,000

PART B – (1 X 5 = 5 Marks)
Answer any ONE questions

CO3 BL3 8.From the following details, Calculate Gross Profit ratio and Net Profit ratio.

Sales	Rs. 3,50,000
Cost of goods sold	Rs. 1,50,000
Administration expenses	Rs. 50,000
Selling expenses	Rs. 10,000

CO5 BL3 9.Following information relates to Project A and B.

	Project A Rs	Project B Rs.
Investment	25,000	37,500
Expected Life (In years)	4	5
Net earnings after depreciation and taxes		
Years		
1	2,500	3,750
2	1,875	3,750
3	1,875	2,500
4	1,250	1,250
5	-------	1,250
Total	7,500	12,500

Calculate average rate of return. If the desired rate of return is 12%, which project should be selected?

PART C – (1 X 10 = 10 Marks)

Answer any ONE questions

CO3 BL3 10. Following is the Balance sheet of New Indra Ltd., for the year ending 31.12.1997

Liabilities	Rs.	Assets	Rs.
Equity capital	1,00,000	Goodwill	1,00,000
9% Preference capital	5,00,000	Land & Building	6,50,000
8% Debentures	2,00,000	Plant	8,00,000
Long term loan	1,00,000	Furniture	1,50,000
Bills payable	60,000	Bills receivable	70,000
Sundry creditors	70,000	Sundry debtors	90,000
Bank O/D	30,000	Bank balance	45,000
Outstanding expenses	5,000	Investments (Short term)	25,000
		Prepaid expenses	5,000
		Closing Stock	30,000
	19,65,000		19,65,000

Calculate (a) Current Ratio; (b) Acid-test Ratio; (c) Absolute Liquid Ratio.

CO5 BL3 11. Prepare flexible budget from the following data at 50% and 70% capacity.

	At 60% capacity Rs.
Variable overheads:	
Indirect material	6,000
Indirect labour	18,000
Semi-variable overheads:	
Electricity (40% Fixed)	30,000
Repairs (80% Fixed)	3,000
Fixed overheads:	
Depreciation	16,500
Insurance	4,500
Salaries	15,000
Total overheads	93,000

Estimated labour hours 1,86,000 hr.

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II UNIT TEST, APRIL 2023

CLASS: III B.Com (A&B) TIME: 1 Hour

SUB: MANAGEMENT ACCOUNTING Max: 25 Marks

Answer Key

PART A (5 X 2 = 10 Marks)

Answer any FIVE questions

CO1 BL1 1. List out two functions of Management Accounting.

Ans: The following are the functions of Management Accounting. They are as follows:

- Forecasting and Planning
- Modification of data
- Analysis and Interpretation
- Co-ordination
- Using qualitative information

CO2 BL1 2. Write a note on common size statement.

Ans: The common-size financial statement converts each amount in the statement to a percentage of the total amount of the group of which it is part. It may include common-size profit and loss account and common-size balance sheet.

CO5 BL1 3. What is Pay-Back Period?

Ans: It determines the period in which the investment is recovered. The period of repayment is popularly known as pay-back period. The pay-back period can be computed with the help of the following formula:

$$\text{Pay-back period} = \frac{\text{Initial investment in project/ Initial cost of assets}}{\text{Annual cash inflow}}$$

CO5 BL1 4. What is Flexible Budgeting?

Ans: Flexible budget is one which is designed to change with the level of activity actually attained. It portrays budgeted costs, sale and profits at the various levels actually achieved.

CO3 BL1 5. What is Ratio?

Ans: A ratio is a mathematical relationship between two items expressed in a quantitative form. It is also called accounting ratio or financial ratio.

CO4 BL1 6. State any two advantages of cash flow statement.

- **Ans:** The projected cash flow statement helps finance manager in exploring the possibility of repayment of long-term debts which depends upon the availability of cash.
- It can be used for making appraisal of various capital investment projects.

- It supplements the analysis provided by funds flow statements as cash is a part of the working capital.

CO5 BL3 7. Calculate P.V. Ratio.

Sales	Rs. 4,00,000
Variable cost	Rs. 3,00,000
Fixed cost	Rs. 40,000

Ans: P.V Ratio = 25%

PART B – (1 X 5 = 5 Marks)

Answer any ONE questions

CO3 BL3 8. From the following details, Calculate Gross Profit ratio and Net Profit ratio.

Sales	Rs. 3,50,000
Cost of goods sold	Rs. 1,50,000
Administration expenses	Rs. 50,000
Selling expenses	Rs. 10,000

Ans: Gross Profit ratio = 57.142%
Net Profit ratio = 40%

CO5 BL3 9. Following information relates to Project A and B.

	Project A Rs	Project B Rs.
Investment	25,000	37,500
Expected Life (In years)	4	5
Net earnings after depreciation and taxes		
Years		
1	2,500	3,750
2	1,875	3,750
3	1,875	2,500
4	1,250	1,250
5	-------	1,250
Total	7,500	12,500

Calculate average rate of return. If the desired rate of return is 12%, which project should be selected?

Ans: Project A = 15%; Project B = 13.33%

Comment: Project A can be selected due to higher rate of return.

PART C – (1 X 10 = 10 Marks)

Answer any ONE questions

CO3 BL3 10. Following is the Balance sheet of New Indra Ltd., for the year ending 31.12.1997

Liabilities	Rs.	Assets	Rs.
Equity capital	1,00,000	Goodwill	1,00,000
9% Preference capital	5,00,000	Land & Building	6,50,000
8% Debentures	2,00,000	Plant	8,00,000
Long term loan	1,00,000	Furniture	1,50,000
Bills payable	60,000	Bills receivable	70,000
Sundry creditors	70,000	Sundry debtors	90,000
Bank O/D	30,000	Bank balance	45,000
Outstanding expenses	5,000	Investments (Short term)	25,000
		Prepaid expenses	
		Closing Stock	5,000
			30,000
	19,65,000		19,65,000

Calculate (a) Current Ratio; (b) Acid-test Ratio; (c) Absolute Liquid Ratio.

Ans: Current Ratio = 1.61: 1

Acid-test Ratio = 1.39: 1

Absolute Liquid Ratio = 0.42: 1

CO5 BL3 11. Prepare flexible budget from the following data at 50% and 70% capacity.

	At 60% capacity Rs.
Variable overheads:	
Indirect material	6,000
Indirect labour	18,000
Semi-variable overheads:	
Electricity (40% Fixed)	30,000
Repairs (80% Fixed)	3,000
Fixed overheads:	
Depreciation	16,500
Insurance	4,500
Salaries	15,000
Total overheads	93,000

Estimated labour hours 1,86,000 hr.

Ans: Flexible budget:

At 50% capacity = Rs.85,900

At 60% capacity =Rs.93,000

At 70% capacity = Rs.1,00,100

Overhead rate per hour:

At 50% capacity = 0.554

At 60% capacity = 0.500

At 70% capacity = 0.461

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PG DEPARTMENT OF COMMERCE
II UNIT TEST, APRIL - 2023
INCOME TAX LAW AND PRACTICE-II

Date: 17.03.2023 **Max.Marks:25**
Class:III B.Com "A" &" B" **Duration: 1 Hr**

Section – A

I. Answer Any FIVE Questions: **(5*2=10)**

CO3 BL1-**1**. State the meaning Clubbing of Income?
CO3 BL1-**2**. Explain the term Set-off and carry forward of loss?
CO3 BL1-**3**. What do you mean Revocable Transfer?
CO5 BL1-**4**. What is Gross total Income?
CO4 BL1-**5**. State the note on loss from race horses?
CO3 BL1-**6**. State the provisions for income from spouse?
CO5 BL1-**7** State the provisions of section 80G?

Section – B

II.Answer Any ONE Question: **(1*5=5)**

CO1 BL1-**8:** Calculate seduction u/s 80-c from the following
Contribution to RPF – 15000
Contribution towards NSC-VII issue – 11,000
Insurance premium on own life (sum assured Rs. 1,50,000)-25000
Contribution towards the life of his wife (sum assured Rs.45000)- 2500

CO1 BL1-**9:** The income of the family is as under:

Mr. Ram from Business - Rs.1,50,000

Mrs.Ram from employment- Rs. 80,000

Minor son of Mr.Ram (interest from a company) the amount of investment received from his grandfather – Rs. 10,000

Minor son of Mr.Ram, Mr.Krishna (from acting in film)- Rs. 60,000

Minor daughter of Mr.Ram , Miss Anjali - Rs.6000

Discuss in whose hands the incomes are assessable and to what extent.

Section – C

III. Answer Any ONE Question: **(1*10=10)**

CO1 BL1: **10.** Shri.Sudhir, an individual , submits the following information relevant for the AY:2022-23

Particulars	profit(Rs.)	Loss (Rs.)
salary income (computed)	84000	
Income from House property(computed) House X House Y House Z	30,000	 34,000 42,000
Profits and gains of business or profession: Business A Business B Business (C) speculation Business (D) speculation	 16,000 22,000	 20,000 46,000
Capital gains: STCG STCL LTCG	 12,000 25,000	 56,000
Income from other sources: Income from card games Income from betting Loss from card games	 38,000 30,000	 14,020
Loss on maintenance of race horses		12,000
Interest on securities	8,000	

Compute the Gross Total Income of Sudhir for the AY:2022-23

CO1 BL1: 11:Explain the stages in Assessment Procedure?

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II UNIT TEST, APRIL - 2023
INCOME TAX LAW AND PRACTICE-II

Date: 17.03.2023 **Max.Marks:25**
Class: III B. Com "A" &" B" **Duration: 1 Hr**

Section – A

I. Answer Any FIVE Questions: **(5*2=10)**

CO3 BL1-**1**. State the meaning Clubbing of Income?

Clubbing of income refers to the process of adding the income of one person to another person's income for taxation purposes. This is done when the income of one person is transferred to another person, but the tax liability is still attributed to the original owner of the income. Clubbing of income is generally done to prevent tax evasion by transferring income to a lower tax bracket or to a person who has no or lower tax liability.

CO3 BL1-**2**. Explain the term Set-off and carry forward of loss?

- Set-off and carry forward of losses refer to the utilization of losses incurred in one financial year to reduce the taxable income of another financial year.
- Set-off of losses means the adjustment of losses incurred in a particular financial year against the profits earned in the same financial year. In other words, the losses are used to reduce the taxable income of the same year.
- Carry forward of losses means that the losses incurred in a financial year are not fully set-off against the profits earned in that year, and the remaining losses are carried forward to the subsequent financial years.

CO3 BL1-**3**. What do you mean Revocable Transfer?

A revocable transfer refers to a transfer of property or assets where the transferor retains the right to revoke or cancel the transfer at any time before their death. In other words, a revocable transfer is a transfer of property or assets that can be revoked or cancelled by the transferor during their lifetime.

CO5 BL1-**4**. What is Gross total Income?

- The term Gross total income includes, income under all the five heads.
- Gross total income is subject to eligible deductions
- It is the total salary income, income from house property, business and profession, capital gains and other sources, which are taxable.

CO4 BL1-**5**. State the note on loss from race horses?

Loss on maintenance of horses can be set-off against stake money. It can be carried forward and set off against stake money (for four subsequent years)

CO3 BL1-**6**. State the provisions for income from spouse?

- A person is said to have a substantial interest in a concern if,
- In a case of a company he/she at any time during the pervious year owns beneficially whether alone or along with relatives, equity shares entitled to not less than 20% of the voting power.

- In other concerns other than a company, such as HUF, Firm, AOP, etc., he/she or along with relatives is entitled at least 20% of the profits of such concerns.

CO5 BL1-7 State the provisions of section 80G?

- Section 80G is in respect of donation made by an Assessee.
- Section 80G specifies funds towards which donations to be made and deductible.
- The 3 types of Donations are: fully deductible,50% deductible, Restricted donations

Section – B

II. Answer Any ONE Question: **(1*5=5)**

CO1 BL1-**8:** Calculate Deduction u/s 80-c from the following

Answer: Rs. 43,500

CO1 BL1-**9:** The income of the family is as under:

Answer: Ram's income- Rs. 1,63,000; Mrs. Ram's Income: Rs. 80,000

Section– C

III. Answer Any ONE Question: **(1*10=10)**

CO1 BL1: **10**. Gross total income = Rs. 1,10,000; Loss on maintenance of horse = Rs.55,000

CO1 BL1: 11: Explain the stages in Assessment Procedure?

- The Income Tax Department of India follows a specific assessment procedure for determining the tax liability of individuals or entities. The following are the stages in the assessment procedure of income tax department 1961:
- Issue of notice: The first stage in the assessment procedure is the issue of notice by the Income Tax Department. The notice is issued to the taxpayer to provide information regarding their income, expenses, and deductions claimed in their tax return.
- Submission of information: The taxpayer is required to submit the relevant information and documents, such as bank statements, salary certificates, and investment proofs, to support their claims. The information must be submitted within the stipulated timeframe mentioned in the notice.
- Scrutiny of information: Once the information is submitted, the Income Tax Department scrutinizes the same to verify the accuracy and authenticity of the information provided. Any discrepancies or inconsistencies in the information are noted, and further inquiries may be made to clarify the same.
- Assessment order: After scrutinizing the information, the Income Tax Department prepares an assessment order. The assessment order contains details of the income, deductions, and tax liability of the taxpayer, based on the information provided and verified. The taxpayer is informed about the tax liability and any additional tax to be paid, if any.
- Appeal: If the taxpayer is not satisfied with the assessment order, they can file an appeal with the Appellate Authority within a specified timeframe. The Appellate Authority reviews the case and may modify the assessment order if necessary.
- Revision: The taxpayer or the Income Tax Department can apply for revision of the assessment order if there are errors or omissions in the order.
- Overall, the assessment procedure of income tax department 1961 is aimed at ensuring compliance with the tax laws and ensuring that taxpayers pay the correct amount of tax based on their income and expenses.

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II UNIT TEST, APRIL 2023
ENTREPRENEURIAL DEVELOPMENT

Date: 12.04.2023 **Max.Marks:25**
Class: III B.COM "A"& "B" **Duration: 1 Hr**

Part – A

Answer any **FIVE** questions. **(5x1=5)**

1. CO3 BL1: 1. What Is Market Analysis?
2. CO3 BL1: 2. What Is Technical Analysis?
3. CO3 BL1: 3. What Is Cost Benefit?
4. CO4 BL2: 4. Define Business Plan?
5. CO4 BL1: 5. Expand CPM & PERT?
6. CO5 BL1: 6. What is meant by Venture capital
7. CO5 BL1: 7. What is Business angles

Part – B

Answer any **TWO** questions. **(2x5=10)**

CO5 BL1: 1. Explain the venture capital and it's Process.
CO4 BL1: 2.Explain the Business plan process.

Part – C

Answer any **ONE** question. **(1x10=10)**

CO3 BL6: 1. Explain The Factors Affecting Identification Of Business Opportunities?
CO4 BL5: 2. Explain The Stages In Project Formulation?

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II UNIT TEST, APRIL 2023
ENTREPRENEURIAL DEVELOPMENT
ANSWER KEY

Part – A

Answer any **FIVE** questions.**(5x1=5)**

1. What Is Market Analysis?

Market analysis is a detailed assessment of your business's target market and competitive landscape within a specific industry. This analysis lets you project the success you can expect when you introduce your brand and its products to consumers within the market.

2. What Is Technical Analysis?

Technical analysis is a trading discipline employed to evaluate investments and identify trading opportunities in price trends and patterns seen on charts.

3. What Is Cost Benefit?

A cost-benefit analysis is the process of comparing the projected or estimated costs and benefits (or opportunities) associated with a project decision to determine whether it makes sense from a business perspective.

4. Define Business Plan?

A business plan is an executive document that acts as a blueprint or roadmap for a business. It is quite necessary for new ventures seeking capital, expansion activities, or projects requiring additional capital. It is also important to remind the management, employees, and partners of what they represent.

5. Expand CPM & PERT?

The Program Evaluation Review Technique
The critical path method (CPM)

6. What is meant by Venture capital

Start up companies with a potential to grow need a certain amount of investment. Wealthy investors like to invest their capital in such businesses with a long-term growth perspective. This capital is known as venture capital and the investors are called venture capitalists.

7. What is Business angles.

A business angel is a private individual, often with a high net-worth, and usually with business experience, who directly invests part of their assets in new and growing private businesses. Business angels can invest individually or as part of a syndicate where one angel typically takes the lead role.

Part – B

Answer any **TWO** questions

1. Explain the venture capital and it's Process.

Venture capital (VC) is a form of private equity and a type of financing that investors provide to startup companies and small businesses that are believed to have long-term growth potential. Venture capital generally comes from well-off investors, investment banks, and any other financial institutions.

- Deal Origination
- Screening

- Evaluation
- Deal Negotiation
- Post Investment Activity
- Exit Plan

Deal origination

Origination of a deal is the primary step in venture capital financing. It is not possible to make an investment without a deal therefore a stream of deal is necessary however the source of origination of such deals may be various. One of the most common sources of such origination is referral system. In referral system deals are referred to the venture capitalist by their business partners, parent organisations, friends etc.

Screening

Screening is the process by which the venture capitalist scrutinises all the projects in which he could invest. The projects are categorised under certain criterion such as market scope, technology or product, size of investment, geographical location, stage of financing etc. For the process of screening the entrepreneurs are asked to either provide a brief profile of their venture or invited for face-to-face discussion for seeking certain clarifications.

Evaluation

The proposal is evaluated after the screening and a detailed study is done. Some of the documents which are studied in details are projected profile, track record of the entrepreneur, future turnover, etc. The process of evaluation is a thorough process which not only evaluates the project capacity but also the capacity of the entrepreneurs to meet such claims. Certain qualities in the entrepreneur such as entrepreneurial skills, technical competence, manufacturing and marketing abilities and experience are put into consideration during evaluation. After putting into consideration all the factors, thorough risk management is done which is then followed by deal negotiation.

Deal negotiation

After the venture capitalist finds the project beneficial he gets into deal negotiation. Deal negotiation is a process by which the terms and conditions of the deal are so formulated so as to make it mutually beneficial. The both the parties put forward their demands and a way in between is sought to settle the demands. Some of the factors which are negotiated are amount of investment, percentage of profit held by both the parties, rights of the venture capitalist and entrepreneur etc.

Post investment activity

Once the deal is finalised, the venture capitalist becomes a part of the venture and takes up certain rights and duties. The capitalist however does not take part in the day to day procedures of the firm; it only becomes involved during the situation of financial risk. The venture capitalists participate in the enterprise by a representation in the Board of Directors and ensure that the enterprise is acting as per the plan.

Exit plan

The last stage of venture capital investment is to make the exit plan based on the nature of investment, extent and type of financial stake etc. The exit plan is made to make minimal losses and maximum profits. The venture capitalist may exit through IPOs, acquisition by

involved. The fascinating interest compels the entrepreneur to intensify his or her competences that eventually result in an insightful knowledge of the subject matter.

iv.c. Discovery versus Purposeful Search Factor

Some entrepreneurs absolutely believe that opportunity identification has to be through a purposeful search for opportunities while others believe that opportunity is something that had been readily available and overlooked but now discovered accidentally. Businesses established on accidentally discovered venture ideas and which had not been subjected to prescribed screening achieved break-even sales faster than those businesses that had undergone purposeful searches.

iv.d. Networking versus Solo Entrepreneurship Factor

Entrepreneurs' network is vital in opportunity identification. The main contribution of network to identifying potential venture opportunities is from information gathered from social exchange of ideas. The common sources for such opportunity are from friends, relatives, businessmen, lawyers, bankers, participation in professional
seminars, workshops and conferences, newspapers, books, periodicals and manuals. It is the belief that an individual's strong-tie network within the family and friends set up are fragile information sources compared with weak ties that are casual acquaintances. People with widespread networks discover more pungent opportunities than those businessmen who do not have social networks.

iv.e. Creativity Factor

There is a link between creativity and entrepreneurship and are sometimes refer to be same. The nature of creativity is about innovation leading to the creation of new ventures while entrepreneurship itself is a form of creativity or can even be referred to as business creativity and in most cases new businesses are creatively original and functional. Most successful entrepreneurs identify opportunities that others do not see due to the special creativity attribute they possess. These creative attributes has a lot to do in business decision making and therefore very significant in opportunity- identification process. To entrepreneurs, the more innovative the idea the better the idea This makes creativity a fundamental component in the entrepreneurial process. Hence creative entrepreneurship is described as the accomplishment of original useful ideas to start a new business to product and service delivery level.

2. Explain The Stages In Project Formulation?

Feasibility Analysis:
- First stage in project formulation
- Examination to see whether to go in for a detailed investment proposal or not
- Screening for internal and external constraints Conclusion could be:
- The project idea seems to be feasible
- The project idea is not a feasible one
- Unable to arrive at a conclusion for want of adequate data

Techno-economic Analysis
- Choice of Optimal Technology, Plan and Design etc.
- Specifications and standards
- Demand for the project output(goods/services)
- Overall benefits
- Provides platform for preparation of detailed project design

Project Design and Network Analysis
- It is the heart of the project
- It defines the sequence of events of the project
- Time and resources are allocated for each activity
- It is presented in the form of a network diagram/bar chart

2. Explain the Business plan process.

Business planning is the process whereby an organization's leaders figure out the best roadmap for growth and document their plan for success.

The Better Business Planning Process

The business plan process includes 6 steps as follows:

1. Do Your Research
2. Strategize
3. Calculate Your Financial Forecast
4. Draft Your Plan
5. Revise & Proofread
6. Nail the Business Plan Presentation

We've provided more detail for each of these key business plan steps below.

1. Do Your Research

Conduct detailed research into the industry, target market, existing customer base, competitors, and costs of the business begins the process. You may ask yourself the following questions:

- What are your business goals?
- What is the current state of your business?
- What are the current industry trends?
- What is your competition doing?

There are a variety of resources needed, ranging from databases and articles to direct interviews with other entrepreneurs, potential customers, or industry experts. The information gathered during this process should be documented and organized carefully, including the source as there is a need to cite sources within your business plan.

You may also want to complete a SWOT Analysis for your own business to identify your strengths, weaknesses, opportunities, and potential risks as this will help you develop your strategies to highlight your competitive advantage.

2. Strategize

Now, you will use the research to determine the best strategy for your business. You may choose to develop new strategies or refine existing strategies that have demonstrated success in the industry. Pulling the best practices of the industry provides a foundation, but then you should expand on the different activities that focus on your competitive advantage.

This step of the planning process may include formulating a vision for the company's future, which can be done by conducting intensive customer interviews and understanding their motivations for purchasing goods and services of interest. Dig deeper into decisions on an appropriate marketing plan, operational processes to execute your plan, and human resources required for the first five years of the company's life.

3. Calculate Your Financial Forecast

All of the activities you choose for your strategy come at some cost and, hopefully, lead to some revenues. Sketch out the financial situation by looking at whether you can expect revenues to cover all costs and leave room for profit in the long run.

Begin to insert your financial assumptions and startup costs into a financial model which can produce a first-year cash flow statement for you, giving you the best sense of the cash you will need on hand to fund your early operations.

4. Draft Your Plan
With financials more or less settled and a strategy decided, it is time to draft through the narrative of each component of your business plan. With the background work you have completed, the drafting itself should be a relatively painless process.

5. Revise & Proofread
Revisit the entire plan to look for any ideas or wording that may be confusing, redundant, or irrelevant to the points you are making within the plan. You may want to work with other management team members in your business who are familiar with the company's operations or marketing plan in order to fine-tune the plan.

6. Nail the Business Plan Presentation
The presentation of the business plan should succinctly highlight the key points outlined above and include additional material that would be helpful to potential investors such as financial information, resumes of key employees, or samples of marketing materials. It can also be beneficial to provide a report on past sales or financial performance and what the business has done to bring it back into positive territory.

Part – C

Answer any **ONE** question **(1x10=10)**

1. Explain The Factors Affecting Identification Of Business Opportunities?

There are five factors that influence identification of opportunities. These are:

a. Entrepreneurial Alertness b. Prior Knowledge
c. Discovery versus Purposeful Search
d. Networking versus Solo Entrepreneur e. Creativity

iv.a. Entrepreneurial Alertness Factor

This is a predisposition to observe and be responsive to information about objects, incidents, and patterns of behavior in the environment, with special sensitivity to maker and user problems, unmet needs and interests, and novel combinations of resources. This is usually preceded by a position of enthusiastic awareness of information. Entrepreneurs constantly search about for opportunities that have been overlooked before then but unfortunately not all that have entrepreneurial alertness become successful entrepreneurs. Opportunity identification is only an indispensable stage of a process in initiating a new successful business.

There are two types of alertness. These are the potentially worthwhile goal s that have remained unnoticed and the unnoticed but potentially valuable resources. The alert entrepreneur is said to be alert to the receipt of information rather than already being in possession of it. Entrepreneurial alertness is of major importance in opportunity identification. Alertness for a venture is built upon the three ideas of personality traits, social networks and prior knowledge.

People's self-perception of creativity, high intelligence and a supportive family environment that encourages creative thinking contributes highly to execution of entrepreneurial plans.

The optimism acquired from these builds up a self confidence attitude and eventually success in recognizing entrepreneurial opportunities when it comes. It is the belief by many people that they are very good experts in decision making, thereby detect opportunities and take risks.

iv.b. Prior Knowledge Factor

People tend to discover opportunities from the information that is related to the information they already know. Prior knowledge and experience are the primary source of searching for opportunities. Entrepreneurs narrowed their search to areas where they had specific prior knowledge. Prior knowledge triggers identification of the value of new information. There are two main areas of prior knowledge relevant to the identification process. The first one is the knowledge that is of special fascinating interest to the entrepreneur. The second area is the knowledge accumulated over the years and eventually got familiar with customer problems and issues

• It helps to identify project inputs, finance needed and cost- benefit profile of the project

Input Analysis

• Its assesses the input requirements during the construction and operation of the project
• It defines the inputs required for each activity
• Inputs include materials, equipment, machines, software, human resources etc

Financial Analysis

• Involves estimation of the project costs, operating cost and fund requirements
• It helps in comparing various project proposals on a common scale
• Analytical tools used are discounted cash flow, IRR, cost-volumeprofit relationship and ratio analysis
• Investment decisions involve commitment of resources in future
• It needs caution and foresight in developing financial forecasts .

Cost- Benefit Analysis

• The overall worth of a project
• The project design forms the basis of evaluation
• Total costs and benefits there to (Benefits > Costs or B/C>1)

Pre-investment Analysis

• The results obtained in previous stages are consolidated to arrive at clear conclusions

• Helps the project-sponsoring body, the project-implementing body and the consulting agencies to accept/reject the proposal

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II UNIT TEST,APRIL - 2023

ADVANCED COST AND MANAGEMENT ACCOUNTING

Date: 10.04.2023 **Max.Marks:25**

Class: I M.com **Duration: 1 Hr**

Part – A

Answer any **FIVE** questions. **(5x1=5)**

CO3 BL1: 1. Define Marginal costing.

CO5 BL1: 2. What does PV ratio indicates?

CO3 BL1: 3. Define the term margin of safety.

CO5 BL2: 4. What is mean by cash flow statement.

CO3 BL1: 5. What is ratio analysis?

CO3 BL1: 6. What is dividend payout ratio?

CO3 BL1: 7. Define the term capital employed?

Part – B

Answer any **TWO** questions. **(2x5=10)**

CO3 BL2: 8. Calculate the earnings per share from the following data:

Net profit after tax	-	76,000
12% Preference share capital(rs.10 each_	-	3,00,000
Equity share capital (Rs. 10 each)	-	2,00,000

CO5 BL1: 9. From the following, calculate funds from operation:

Profit and Loss A/c

To operating exp	1,00,000	By Gross Profit	2,00,000
To Depreciation	40,000	By gain on sale of plant	20,000
To Loss on sale of building	10,000		
To Advertisement suspense a/c	5,000		
To discount allowed	500		
To preliminary exp	12,000		
To Net Profit	52,500		
	2,20,000		2,20,000

CO3 BL5: 10.From the following particulars find out the selling price per unit if BEP is to be brought down to 4,000 units:

Variable cost per unit	Rs.60
Fixed exp	Rs.2,00,000
Selling price per uni	Rs.100

CO5 BL4: 11. From the following balanced, you are required to calculate the cash from operations:

Particulars	31/12/77	31/12/78
Debtors	50000	47000
Bills receivables	10000	12500
Creditors	20,000	25000
Bill Payable	8000	6000
Outstanding expenses	1000	1200
Prepaid expenses	800	700
Accrued income	600	750
Income received in advance	300	250
Profit made during the year	--	130000

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Part – C

Answer any **ONE** question. **(1x10=10)**

CO4 BL6: 12.You are given the following data for the year 1997 of the company.

Variable cost	6,00,000
Fixed cost	3,00,000
Profit	1,00,000
Sales	10,00,000

Find :

1. P/V Ratio
2. BEP
3. Profit when sales amounted to Rs.12,00,000
4. Sales required to earn a profit of Rs.2,00,000

CO3 BL5: 13. The capital X company is as follows:

9% preference shares of Rs.10 each	=	6,00,000
Equity shares Rs. 10 each	=	16,00,000
		22,00,000

The accountant has ascertained the following information:

Profit after tax 50%	-Rs. 5,40,000	
Depreciation	-	Rs.120000
Equity dividend paid	- 20%	
Market price of equity share	-	40

You are required to state the following,showing the necessary working

1. The dividend yield on equity shares
2. The cover for the preference and equity dividend
3. The earning per share
4. The price earnings ratio
5. The net cash flow.

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II UNIT TEST, APRIL -2023

ADVANCED COST AND MANAGEMENT ACCOUNTING

Date: 10.04.2023 **Max.Marks:25**

Class: I M.com **Duration: 1 Hr**

Part – A

Answer any **FIVE** questions. **(5x1=5)**

CO1 BL1: 1. Define Marginal costing.

The marginal cost is the change in total production cost that comes from making or producing one additional unit. To calculate marginal cost, divide the change in production costs by the change in quantity. The purpose of analyzing marginal cost is to determine at what point an organization can achieve economies of scale to optimize production and overall operations. If the marginal cost of producing one additional unit is lower than the per-unit price, the producer has the potential to gain a profit.

CO1 BL1: 2. What does PV ratio indicates?

P/V ratio = Contribution/ Sales. It is used to measure the profitability of the company. Contribution is the excess of sales over variable cost. So basically P/V ratio is used to measure the level of contribution made at different volumes of sales.

CO1 BL1: 3. Define the term margin of safety.

Margin of safety is a principle of investing in which an investor only purchases securities when their market price is significantly below their intrinsic value.

CO2 BL2: 4. What is mean by cash flow statement.

A cash flow statement is a financial statement that shows how cash entered and exited a company during an accounting period. Cash coming in and out of a business is referred to as cash flows, and accountants use these statements to record, track, and report these transactions.

CO2 BL1: 5.What is ratio analysis?

Ratio analysis compares line-item data from a company's financial statements to reveal insights regarding profitability, liquidity, operational efficiency, and solvency.

CO2 BL1: 6. What is dividend payout ratio?

The Dividend Payout Ratio (DPR) is the amount of dividends paid to shareholders in relation to the total amount of net income the company generates.

CO2 BL1: 7. Define the term capital employed?

Capital employed, also known as funds employed, is the total amount of capital used for the acquisition of profits by a firm or project

Part – B

Answer any **TWO** questions. **(2x5=10)**

CO1 BL2: 8. Calculate the earnings per share from the following data:

Net profit after tax	-	76,000
12% Preference share capital(rs.10 each_	-	3,00,000
Equity share capital (Rs. 10 each)	-	2,00,000

CO1 BL1: 9. From the following, calculate funds from operation:

Profit and Loss A/c

To operating exp	1,00,000	By Gross Profit	2,00,000
To Depreciation	40,000	By gain on sale of plant	20,000
To Loss on sale of building	10,000		
To Advertisement suspense a/c	5,000		
To discount allowed	500		
To preliminary exp	12,000		
To Net Profit	52,500		
	2,20,000		2,20,000

(Ans: Funds from operation: 99,500)

CO2 BL5: 10.From the following particulars find out the selling price per unit if BEP is to be brought down to 4,000 units:

Variable cost per unit	Rs.60
Fixed exp	Rs.2,00,000
Selling price per uni	Rs.100

(Ans: Selling price unit:110; Required contribution per unit. 50(ie:2,00,000/4000)

CO1 BL4: 11. From the following balanced, you are required to calculate the cash from operations:

Particulars	**31/12/77**	**31/12/78**
Debtors	50000	47000
Bills receivables	10000	12500
Creditors	20,000	25000
Bill Payable	8000	6000
Outstanding expenses	1000	1200
Prepaid expenses	800	700
Accrued income	600	750
Income received in advance	300	250
Profit made during the year	--	130000

(ANs: Cash from operation:Rs. 1,33,600)

Part – C

Answer any **ONE** question. **(1x10=10)**

CO1 BL6: 12.You are given the following data for the year 1997 of the company.

Variable cost	6,00,000
Fixed cost	3,00,000
Profit	1,00,000
Sales	10,00,000

Find :

1. P/V Ratio
2. BEP
3. Profit when sales amounted to Rs.12,00,000
4. Sales required to earn a profit of Rs.2,00,000

(Ans: A- 40%; B- Rs.7,50,000; C-Rs.180000; D-Rs.12,50,000)

CO2 BL5:13.The capital X company is as follows:

9% preference shares of Rs.10 each	=	6,00,000
Equity shares Rs. 10 each	=	16,00,000
		22,00,000

The accountant has ascertained the following information:

Profit after tax 50%	-Rs. 5,40,000	
Depreciation	-	Rs.120000
Equity dividend paid	- 20%	
Market price of equity share	-	40

You are required to state the following,showing the necessary working

1. The dividend yield on equity shares
2. The cover for the preference and equity dividend
3.The earning per share
4. The price earnings ratio
5. The net cash flow.

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II UNIT EXAMINATION, APRIL - 2023

CORPORATE LAWS

Date: 12.04.2023 **Max.Marks:25**

Class: I M.Com **Duration: 1 Hr**

Part – A

Answer any **FIVE** questions. **(5x1=5)**

1. What is SEBI?
2. State the object of the Competition Act.
3. Define Foreign Exchange.
4. What is digital signature?
5. Who is an author?
6. What do you understand by Trade Mark?
7. Who is a 'complainant' under the consumer Protection Act?
8.

Part – B

Answer any **TWO** questions. **(2x5=10)**

9. What are the Functions of SEBI?
10. State the provisions of the Information Technology Act in respect of attribution, acknowledgement and dispatch of electronic records.
11. Define a person resident in India under the FEMA.
12. What are not inventions under the Patents Act?

Part – C

Answer any **ONE** question. **(1x10=10)**

13. Discuss the provisions in respect of the management of the SEBI .
14. Discuss the agreements that require compulsory registration under the MRTP Act.

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CORPORATE LAWS

II UNIT TEST, APRIL 2023

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Part – A

1.What is SEBI?

SEBI stands for the Securities and Exchange Board of India. It is the regulatory authority in India responsible for overseeing and regulating the securities and capital markets in the country. SEBI's primary role is to protect the interests of investors, promote the development of the securities market, and ensure its proper functioning.

2.State the object of the Competition Act.

1. Promotion of Competition
2. Prevention of Anti-Competitive Practices
3. Consumer Protection
4. Prohibition of Unfair Trade Practices:
5. Market Efficiency

3. Define Foreign Exchange.

Foreign exchange, often abbreviated as "forex" or "FX," refers to the global marketplace where currencies are bought and sold. It is the process of exchanging one country's currency for another with the aim of conducting international trade, investment, or speculation. The foreign exchange market serves as a decentralized financial market where currencies are traded around the clock, five days a week.

4. What is digital signature?

A digital signature is a cryptographic technique used to verify the authenticity and integrity of digital documents, messages, or transactions in electronic communication and online activities. It

serves as a digital equivalent of a handwritten signature or a seal on a physical document, providing a means to confirm the identity of the sender or signatory and ensuring that the document has not been altered since it was signed.

5.Who is an author?

In the context of corporate law, an "author" typically refers to someone who is responsible for drafting or creating legal documents and materials related to a corporation's governance, operations, or transactions. This can include a range of individuals and professionals who play crucial roles in corporate legal matters.

6.What do you understand by Trade Mark?

A trademark, often written as "trademark" or "trade mark," is a distinctive symbol, word, phrase, design, or combination of these elements that is legally registered or recognized and used by an individual, business, or organization to uniquely identify and distinguish its products or services from those of others. Trademarks play a crucial role in branding and protecting the intellectual property associated with goods and services.

7. Who is a 'complainant' under the consumer Protection Act?

Under the Consumer Protection Act (CPA) or similar consumer protection laws in various jurisdictions, a "complainant" refers to an individual or entity that initiates a complaint or grievance against a product or service provider. The complainant is typically a consumer who has encountered a problem or issue with a product or service they have purchased and seeks resolution or redress for their concerns.

Part – B

8. What are the Functions of SEBI?

The Securities and Exchange Board of India (SEBI) is the regulatory authority in India responsible for overseeing and regulating the securities and capital markets. SEBI plays a crucial role in maintaining the integrity and efficiency of India's

efforts contribute to the growth and stability of the Indian economy.

9.State the provisions of the Information Technology Act in respect of attribution, acknowledgement and dispatch of electronic records.

The Information Technology Act, 2000 (IT Act) in India contains provisions related to the attribution, acknowledgment, and dispatch of electronic records. These provisions establish the legal framework for electronic communication and transactions in the country. Below are some key provisions of the IT Act concerning these aspects:

1. **Attribution of Electronic Records (Section 3):** Section 3 of the IT Act deals with the attribution of electronic records. It states that an electronic record shall be attributed to the originator if it was sent by the originator or with their authority, and the electronic record was properly received by the addressee. This provision establishes the basic principle that the sender of an electronic record is generally considered its originator.
2. **Acknowledgment of Receipt (Section 13):** Section 13 of the IT Act deals with the acknowledgment of receipt of electronic records. It states that unless otherwise agreed upon, an acknowledgment of the receipt of an electronic record shall be deemed to have been given if the receiver of the electronic record has expressly or impliedly communicated the acknowledgment to the sender. In other words, acknowledgment can be explicit or inferred from the recipient's actions.
3. **Dispatch of Electronic Records (Section 4):** Section 4 of the IT Act discusses the dispatch of electronic records. It establishes that an electronic record is considered dispatched when it enters a system capable of receiving it in a form capable of being processed by that system,

regardless of whether the recipient has received it or not. This provision recognizes that the act of dispatching electronic records occurs when they are transmitted to the intended recipient's system.

10. Define a person resident in India under the FEMA.

Under the Foreign Exchange Management Act, 1999 (FEMA), a "person resident in India" is defined as an individual, business, or entity that is ordinarily residing in India for a specified duration and for various purposes related to foreign exchange transactions. FEMA is an Indian law that regulates foreign exchange transactions, including those involving residents and non-residents.

Key points regarding the definition of a "person resident in India" under FEMA include:

1. **Ordinary Residence:** A person resident in India is someone who ordinarily resides in India for a specified period. This definition is primarily based on the individual's physical presence within the country.
2. **Duration of Residence:** The specific duration for determining ordinary residence may vary depending on the purpose of the FEMA regulation in question. For certain purposes, a person may be considered a resident if they have been residing in India for a specific number of days during a financial year.
3. **Residential Status:** The residential status of an individual under FEMA can be categorized into three main categories:
    - Resident Indian: A person who is ordinarily residing in India as per FEMA provisions.
    - Non-Resident Indian (NRI): A person who is an Indian citizen but is residing outside India for a specified duration.

- Person of Indian Origin (PIO): A person who is not an Indian citizen but can establish a significant connection with India, such as being of Indian origin, for certain purposes under FEMA.

4. **Implications of Residential Status:** The residential status of a person under FEMA determines their eligibility and restrictions related to various foreign exchange transactions, such as acquiring foreign assets, holding foreign currency accounts, and engaging in foreign investments.
5. **Compliance and Reporting:** Residents in India are required to comply with FEMA regulations and report foreign exchange transactions to the relevant authorities, such as the Reserve Bank of India (RBI).
6. **Change in Residential Status:** Individuals may undergo changes in their residential status due to factors such as extended periods of stay abroad. It is essential to be aware of the implications of such changes on foreign exchange transactions and regulatory compliance.

The definition of a "person resident in India" under FEMA is fundamental in determining who is subject to the regulations and restrictions related to foreign exchange transactions within the country. It is important for individuals and entities to understand their residential status under FEMA and adhere to the applicable regulations to ensure compliance with Indian foreign exchange laws.

11. What are not inventions under the Patents Act?

Under the Patents Act, the term "invention" is defined broadly, but not everything qualifies as an invention eligible for patent protection. The Patents Act typically excludes certain subject matters from patentability. While the specifics can vary from one jurisdiction to another, including country-specific provisions, here are some common categories of subject matters

that are generally not considered inventions and are excluded from patent protection in many patent systems:

1. **Discoveries and Scientific Theories:** Discoveries of natural phenomena or scientific theories are generally not considered inventions. Purely observational or theoretical findings, such as laws of nature, physical constants, and mathematical equations, are typically excluded.
2. **Abstract Ideas:** Abstract ideas, mental processes, and mathematical algorithms are generally not patentable. This exclusion is to prevent patents on fundamental concepts that should remain in the public domain.
3. **Natural Substances:** Naturally occurring substances, such as minerals, elements, and naturally isolated biological materials, are not typically patentable. However, inventions involving novel and non-obvious applications or modifications of natural substances may be eligible for patent protection.
4. **Scientific Principles and Methods:** Patents cannot be granted for scientific principles, methods of medical treatment, diagnostic methods, and surgical or therapeutic methods for the treatment of humans or animals. These are often considered areas of public interest and healthcare.
5. **Works of Literature, Art, and Aesthetic Creations:** Creative works, such as literary works, art, music, and other aesthetic creations, are not patentable. These are typically protected by copyright and related intellectual property rights instead.
6. **Plant and Animal Varieties:** In some jurisdictions, plant and animal varieties or species, as well as essentially biological processes for producing them, are not eligible for patent protection. However, certain genetically modified organisms may be patentable.
7. **Methods of Doing Business:** Methods of doing business or financial schemes are generally not considered inventions,

8. **Takeovers and Mergers:** SEBI regulates takeovers and mergers of listed companies. It ensures that these transactions are conducted fairly, transparently, and in the best interests of minority shareholders.
9. **Derivatives Markets:** SEBI regulates the derivatives markets in India, which include futures and options trading. It sets rules, margins, and risk management requirements for derivative instruments.
10. **Investor Education:** SEBI conducts investor education programs to promote financial literacy and awareness among investors. It helps investors make informed decisions and understand the risks associated with investing.
11. **International Cooperation:** SEBI collaborates with international regulatory authorities and organizations to align its regulatory framework with global standards and best practices.
12. **Enforcement:** SEBI has enforcement powers to investigate and take action against violations of securities laws and regulations. It can impose fines, suspend trading, or take legal action against entities that breach the rules.
13. **Research and Policy Analysis:** SEBI conducts research and collects data on various aspects of the securities markets. It uses this information to formulate policies and regulations that support the development and stability of the markets.
14. **Legal Framework:** SEBI helps develop and update the legal framework governing securities markets in India. It proposes amendments to existing laws and regulations to keep them relevant and effective.

SEBI plays a pivotal role in the functioning of India's financial markets, ensuring investor protection, market integrity, and the development of robust and transparent capital markets. Its

financial markets and ensuring the protection of investors. Its functions encompass a wide range of responsibilities, including:

1. **Regulation and Oversight:** SEBI regulates various segments of the Indian securities market, including stock exchanges, stockbrokers, investment banks, mutual funds, portfolio managers, and credit rating agencies. It formulates and enforces regulations to govern their operations.
2. **Investor Protection:** Protecting the interests of investors is one of SEBI's primary functions. It ensures that investors receive accurate and timely information about securities, companies, and market conditions. SEBI also takes measures to prevent fraudulent and unfair trade practices.
3. **Market Development:** SEBI promotes the development and growth of the Indian capital markets. It introduces reforms, policies, and initiatives aimed at enhancing market efficiency, transparency, and competitiveness.
4. **Regulation of Market Participants:** SEBI regulates market participants to maintain market integrity and prevent malpractices. This includes setting rules and standards for stock exchanges, brokers, depository participants, and other intermediaries.
5. **Market Surveillance:** SEBI conducts market surveillance to detect and prevent market manipulation, insider trading, and other illegal activities that can undermine market integrity.
6. **Listing and Disclosure Requirements:** SEBI prescribes listing requirements for companies that seek to list their securities on stock exchanges. These requirements ensure that investors have access to relevant information about listed companies.
7. **Corporate Governance:** SEBI promotes good corporate governance practices among listed companies. It issues guidelines and codes of conduct to improve the governance standards of corporations.

although there may be exceptions if a business method includes a novel and inventive technological component.

8. **Computer Programs as Such:** Computer programs or software, as such, may not be patentable in some jurisdictions. However, software-related inventions that provide a technical solution to a technical problem may be eligible for patent protection.
9. **Inventions Contrary to Public Order and Morality:** Inventions that are considered contrary to public order, morality, or public health may be excluded from patentability. This can vary between jurisdictions and often involves ethical considerations.
10. **Prior Art and Lack of Novelty:** Inventions that lack novelty or are already disclosed in the prior art (existing body of knowledge) are generally not patentable. The novelty requirement is a fundamental criterion for patentability.

It's important to note that patent laws and regulations can vary significantly from one country to another, and some countries may have specific provisions or interpretations regarding what is patentable subject matter. Additionally, patent offices may apply different criteria when examining patent applications. Therefore, individuals or entities seeking patent protection should consult with legal experts and patent professionals to understand the specific requirements and exclusions in the jurisdiction in which they are seeking a patent.

PART – C

12.Discuss the provisions in respect of the management of the SEBI .

The Securities and Exchange Board of India (SEBI) is governed by its regulatory framework, including the SEBI Act, 1992, and various regulations and guidelines issued by SEBI. The management and functioning of SEBI are governed by these

provisions, which outline the organizational structure, decision-making processes, and roles and responsibilities of various authorities within SEBI. Here are some key provisions related to the management of SEBI:

1. **Composition of the SEBI Board (Section 4):** The SEBI Act establishes the SEBI Board, which consists of a Chairman, one member from the Reserve Bank of India (RBI), one member from the Ministry of Finance, and five other members appointed by the central government. The Board is responsible for the overall management and administration of SEBI.
2. **Appointment of Chairman and Members (Section 5):** The Chairman and other members of the SEBI Board are appointed by the central government. The Chairman holds office for a specified term and is eligible for reappointment. Members are appointed based on their expertise and experience in various areas related to securities markets.
3. **Functions and Powers of the Board (Section 11):** The SEBI Board is granted extensive powers and functions to regulate and develop the securities markets in India. This includes the power to make regulations, issue guidelines, investigate violations, protect investor interests, and take measures to ensure market integrity.
4. **SEBI Committees:** SEBI may constitute various committees to assist in its decision-making and regulatory functions. These committees may include advisory committees, expert committees, and committees for specific market segments or issues.
5. **Executive Directors (Section 4B):** The SEBI Board can appoint Executive Directors who assist in the day-to-day administration and management of SEBI. Executive Directors are responsible for specific departments or functions within SEBI.

guided by these provisions to ensure transparency, investor protection, and the efficient operation of the Indian securities markets.

13.Discuss the agreements that require compulsory registration under the MRTP Act.

The Monopolies and Restrictive Trade Practices (MRTP) Act, 1969, was an Indian law that aimed to prevent monopolistic and restrictive trade practices and promote fair competition in the Indian market. The MRTP Act mandated the registration of certain agreements and practices to ensure compliance with its provisions. While the MRTP Act has been repealed and replaced by the Competition Act, 2002, the requirements for compulsory registration of agreements under the MRTP Act are still relevant in historical and analytical contexts. Here are some key types of agreements that required compulsory registration under the MRTP Act:

Agreements Relating to Restrictive Trade Practices:
Agreements that included restrictive trade practices, such as agreements to fix prices, limit production, allocate markets, or control distribution, were required to be registered. These practices were seen as detrimental to competition and consumer interests.

Agreements Relating to Monopolistic Trade Practices:
Agreements that promoted monopolistic trade practices, including practices that led to the monopolization of markets or the abuse of dominant positions, were subject to compulsory registration.

Agreements Relating to Anti-Competitive Behavior:
Agreements that hindered competition in any manner, including those that prevented new entrants, created barriers to entry, or

6. **Delegation of Powers (Section 30):** SEBI has the authority to delegate certain powers to its Chairman, members, or officers, as it deems fit, to facilitate efficient decision-making and administration.
7. **Advisory Committee (Section 24):** SEBI may establish an Advisory Committee consisting of representatives from the securities industry, market intermediaries, and other stakeholders to provide advice on policy matters and regulatory issues.
8. **Investigation and Enforcement (Sections 11A and 11B):** SEBI is empowered to investigate violations of securities laws and take enforcement actions against entities and individuals involved in such violations. This includes the power to impose penalties and issue directions for compliance.
9. **Investor Protection Fund (Section 11(1A)):** SEBI has the authority to create an Investor Protection Fund to compensate investors who have suffered losses due to fraudulent or unfair trade practices in the securities market.
10. **Regulatory Framework (Various Regulations):** SEBI issues regulations, guidelines, and circulars to regulate various aspects of the securities markets, including listing and disclosure requirements, insider trading, corporate governance, mutual funds, and more.
11. **Market Oversight (Various Regulations):** SEBI regulates stock exchanges, depositories, and market intermediaries to ensure their compliance with regulatory requirements and market integrity standards.
12. **Market Surveillance (Section 11AA):** SEBI conducts market surveillance to detect and prevent market manipulation, insider trading, and other market abuses.

The SEBI Act and related regulations provide a comprehensive framework for the management and regulation of securities markets in India. The functioning and management of SEBI are

restricted the availability of goods or services, required registration.

Agreements Involving Mergers and Acquisitions:
Mergers and amalgamations of enterprises that exceeded certain prescribed financial thresholds were required to be registered with the MRTP Commission (the regulatory authority under the MRTP Act). This was to ensure that mergers did not create monopolies or reduce competition significantly.

Agreements Affecting Market Concentration:
Agreements that led to a substantial concentration of economic power in the hands of a few enterprises were subject to registration. The MRTP Act sought to prevent the concentration of economic power, which could harm competition.

Agreements with Anti-Competitive Clauses:
Agreements containing clauses that restricted or hindered competition, such as non-compete clauses, exclusive dealing agreements, or tie-in arrangements, required registration to ensure that such practices did not harm competition.

Agreements with Vertical Integration Elements:
Agreements that involved vertical integration, where one enterprise controlled multiple stages of production or distribution, were subject to scrutiny and registration to prevent anti-competitive behavior.

Agreements with Anti-Competitive Object or Effect:
Any agreement, whether explicit or implicit, that had the object or effect of preventing, restricting, or distorting competition in the market was required to be registered.

It's important to note that the MRTP Act has been repealed, and its provisions have been replaced by the Competition Act, 2002,

which established the Competition Commission of India (CCI) as the regulatory authority for competition-related matters in India. The CCI regulates anti-competitive agreements, abuse of dominance, and mergers and acquisitions under the Competition Act, and it has its own set of rules and thresholds for registration and review.

While the MRTP Act is no longer in force, the principles of competition and the need to prevent anti-competitive agreements and practices remain important under the Competition Act. The CCI continues to address these issues and promote fair competition in the Indian market.

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II UNIT EXAMINATION,APRIL– 2023

INDUSTRIAL RELATIONS AND LABOUR WELFARE (KDABB)

Date:13 .04.2023 **Max.Marks:25**

Class: I M.Com **Duration: 1 Hr**

Part – A

Answer any 5 Questions: **(5*1=05)**

CO 3 1. What is labor welfare?

CO 3 2.What is mean by employee education

CO 4 3. Point out the causes for accident

CO 4 4. What do you mean psychological problem

CO 4 5. Why does labour force need Counselling?

CO 5 6. What do you mean by contract labour

CO 5 7. What is meant by social assistance?

Part – B

Answer any 2 Question: **(2*5=10)**

CO 3 8. What are the objectives of welfare measures?

CO 4 9. What are occupational diseases ?

CO 4 10. List out and explain problems and challenges of industrial health and hygiene.

CO 5 11. What are the social security measures introduced by the government?

Part – C

Answer any 1 Question: **(1*10=10)**

CO 3 12. What are the welfare measures stipulated by Indian laws. Explain

CO 4 13. Describe the legal provisions relating to health of workers.

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II UNIT EXAMINATION,APRIL– 2023

INDUSTRIAL RELATIONS AND LABOUR WELFARE (KDABB)

ANSWER KEY

Part – A

Answer any 5 Questions:

CO 3 1. What is labour welfare?

Labour welfare refers to all the facilities for labourers to improve their working conditions, provide social security, and raise their standard of living.

CO 3 2.What is mean by employee education

The basis of employee education is mainly **to increase the potential of human resources and human capital**, which constitutes the major part of the organization and enables organizations competitiveness in the labor market and of course personal development of employees.

CO 4 3. Point out the causes for accident.

Human Factors – causes of industrial disasters

Normal human factors that cause modern mishaps include: Human Error – Mistakes made by workers, such as miscommunication, lack of training, or negligence, can lead to accidents. Unfortunate housekeeping – An unkempt work area can prompt slips, excursions, and falls.

CO 4 4. What do you mean psychological problem.

Depression, Anxiety Disorders Schizophrenia, Childhood Disorders, Impulse Control Disorders, Personality Disorders, Adjustment Disorders, Family Problems.

CO 4 5. Why does labour force need Counselling?

Counseling can help improve mood, treat mental illness, reduce medical costs, improve communication and relationships, and promote self-esteem and resilience.

CO 5 6. What do you mean by contract labour.

contract labour, the labour of workers whose freedom is restricted by the terms of a contractual relation and by laws that make such arrangements permissible and enforceable. The essence of the contract labourer's obligation is his surrender for a specified period of the freedom to quit his work and his employer.

CO 5 7. What is meant by social assistance?

Social assistance refers to the assistance rendered by the society to the poor and needy persons voluntarily without placing any obligation on them to make any contribution to be entitled to relief such as workmen's compensation, maternity benefit and old age pension etc.

Part – B

Answer any 2 Question:

CO 3 8. What are the objectives of welfare measures?

(i)To enhance the level of morale of employees.
(ii) To create a loyal, contented workforce in organization.
(iii) To develop a better image of the company in the minds of the employees.
(iv) To enable the workers to live comfortably and happily.
(v) To develop efficiency of the workers.
(vi) To reduce influence of trade unions over the workers.
(vii) To expose philanthropic and benevolent activities of the company.
(viii) To make the workers know that the company takes care of them.
(ix) To develop positive attitude towards job, company and management.
(x) To reduce tax burden.
(xi) To develop a feeling of satisfaction of employees with the company.

CO 4 9. What are occupational diseases ?

1. Strength of Association

The stronger the association, the more likely that the relationship is causal. Heavy smoking is associated with 20 times the increased risk of lung cancer and only 2 times the increased risk of coronary heart disease. The association between smoking and lung cancer is far more likely to be causal than the association to heart disease.

2. Consistency

The association is consistent when the results are confirmed by different people, in different places, circumstances and times, using different experimental methods. This consideration is why many different studies need to be done before meaningful statements can be made about the causal relationship between two or more factors. For example, it required thousands of highly technical studies of the relationship between cigarette smoking and cancer before a definitive conclusion could be made that cigarette smoking increases the risk of lung cancer.

Tools like a "meta-analysis" means that studies that meet certain inclusion criteria are gathered and analyzed together. The conclusions from meta-analyses are much stronger than those from a single or a few studies.

3. Specificity of Association

Specificity of association means that there is a one-to-one relationship between the cause and effect, or one cause equals one effect. An example of specificity of association is mesothelioma (a form of cancer) that is believed to be only caused by asbestos exposure – it is a one to one relationship.

Specificity of association is considered by some to be the weakest criteria of causation. For example, it does not hold true for cigarette smoking and lung cancer. If you smoke you do not have a 100% chance of developing lung cancer. Likewise, if you have lung cancer, it does not mean that there it is 100% certain that you were exposed to cigarette smoke.

4. Temporal Relationship

The exposure must always precede (come before) the outcome or effect. This consideration is essential. If smoking is a cause of lung cancer, the smoking must occur before the cancer, not after.

5. Biological Gradient (Dose-Response Relationship)

Biological gradient refers to exposure levels and resulting health effects. An increase in the exposure increases the effect or disease incidence; a lower exposure decreases the effect. The presence of a dose-response relationship is strong evidence for a causal relationship. If you consider our smoking and cancer example, light smokers would be less likely to develop lung cancer than moderate smokers and both of these would be less than heavy smokers – this effect is known as a dose-response relationship.

However, a threshold may exist below which the effect of interest will not be seen. Stated another way, the exposure may be so low that the effect is not observed or is very rarely observed – this observation does not mean that the exposure does not cause the effect.

In addition, sometimes a low exposure may produce no effect, a moderate exposure may produce a beneficial effect (e.g., a drug or vitamin) and a high exposure may cause harm.

CO 4 10. List out and explain problems and challenges of industrial health and hygiene.

The Joint I.L.O AND W.H.O committee on organizational health held in 1950 defined organizational health as

- The promotion and maintenance of physical, mental and social well-being of workers in all occupations.
- Preventing among workers of ill health caused by the working conditions.
- Protection of workers in their employment from risk factors adverse to health.
- Placing and maintenance of worker in an occupational environment adapted to his physical and psychological equipment.

Importance of Industrial Health

- As the large member of workers spend a great deal of their time in an organization, their environment is not usually conducive to a health life.
- Malnutrition, insanity and psychological conditions and the stress and strain under which they work is very injurious to their health.
- The symptoms of bad health are a high rate of absenteeism and turnover and indiscipline, poor performance and low productivity.
- Industrial health programmes are very useful for reduction in the rate of labour turnover, absenteeism, accidents, lower performance and occupational diseases.

Industrial Hygiene:

Protecting the labour working in all the occupations from diseases

1.Maintaining the highest standard of their physical, mental and social welfare

2.Protecting the workers from diseases and accidents caused by their working conditions and its ill effects on their health

3.Making adjustments between the work and the nature of individual

CO 5 11. What are the social security measures introduced by the government?

India's social security system is composed of a number of schemes and programs spread throughout a variety of laws and regulations. Generally, India's social security schemes cover the following types of social insurances:

- Employee provident fund
- Health insurance and medical benefit
- Disability benefit
- Maternity benefit
- Gratuity

Part – C

Answer any 1 Question:

CO 3 12. What are the welfare measures stipulated by Indian laws. Explain?

INTRODUCTION:

The term 'Labour Welfare' refers to the facilities provided to workers in and outside the factory premises such as canteens, rest and recreation facilities, housing and all other services that contribute to the wellbeing of workers. Welfare measures are concerned with general wellbeing and efficiency of workers. In the early stages of industrialization, welfare activities for factory workers did not receive adequate attention.

WELFARE MEASURES

The welfare measures involve three major aspects which are - occupational health care, suitable working time and appropriate salary. It refers to the physical, mental, moral, and emotional well-being of an individual. The safe work environment provides the basis for the person to enjoy working. The work should not pose a health hazard for the person. The welfare measures aim at integrating the socio-psychological needs of employees, the unique requirements of a particular technology, the structure and processes of the organization and the existing socio-cultural environment. It creates a culture of work commitment in organizations and society which ensure higher productivity and greater job satisfaction to the employees. The welfare measures are defined in the same way as defined by the I.L.O. at its Asian Regional Conference, "A term which is understood to include such services, facilities and amenities as may be established in or in the vicinity of undertakings to enable the persons employed in them to perform their work in healthy, congenial surroundings and to provide them with amenities conducive to good health and high morale."

Due to the welfare measures, the employees feel that the management is interested in taking care of the employees that result in the sincerity, commitment and loyalty of the employees towards the organization. The employees work with full enthusiasm and energetic behavior which results in the increase in production and ultimately the increased profit.

The measures of welfare give result after a long period of time. It is a long process, so the management has to keep patience while providing the welfare facilities for the employees. While deciding the welfare facility for the employees, the management has to do discussions with the persons who are now going to avail the facilities. The communication increases the cohesiveness between the management and the employees and thus industrial relations improve.

CO 4 13. Describe the legal provisions relating to health of workers.

The Factories Act, 1948, has been promulgated primarily to provide safety measures and to promote the health and welfare of the workers employed in factories. The object thuss brings this Act, within the competence of the Central Legislature to enact. State Governments/Union Territory Administrations have been empowered under certain provisions of this Act, to make rules, to give effect to the objects and the scheme of the Act.

Applicability: This Act applies to factories, which qualify the definition of "Factory" under the section 2(m) of the Act or to those industrial establishments, to whom section 85 have been made applicable by the State Government, by notification in the Official Gazette. This applies to any premises wherein 10 or more persons with the aid of power or wherein 20 or more workers without aid of power are/were working on any day in the preceding 12 months, wherein manufacturing process is being carried on. The main focus of Factories Act is towards the Health benefits to the workers. Health Chapter of the Act contains specification from Section 11 to 20. Detailed information of the sections of is provided as under:

Section 11: This section basically specifies the issues of cleanliness at the workplace. It is mentioned in the provision that every factory shall be kept clean and free from effluvia arising from any drain, privy or other nuisance. This includes that there should be no accumulation of dirt and refuse and should be removed daily and entire area should be kept clean.

Section 12: This section specifies on disposal of wastes and effluents. That every factory should make effective arrangements for the treatment of wastes and effluents due to the manufacturing process carried on therein, so as to render them innocuous and for their disposal.

Section 13: This section focuses on ventilation and temperature maintenance at workplace. Every factory should work on proper arrangements for adequate ventilation and circulation of fresh air.

Section 14: This section details on the proper exhaustion of dust and fume in the Factory. In this it is mentioned that factory which deals on manufacturing process should take care of the proper exhaustion of dust, fume and other impurities from its origin point.

Section 15: This section specifies regarding the artificial humidification in factories. In this the humidity level of air in factories are artificially increased as per the provision prescribed by the State Government.

Section 16: Overcrowding is also an important issue which is specified in this section. In this it is mentioned that no room in the factory shall be overcrowded to an extent that can be injurious to the health of workers employed herein.

Section 18: This section specifies regarding arrangements for sufficient and pure drinking water for the workers. There are also some specified provisions for suitable point for drinking water supply. As in that drinking water point should not be within 6 meters range of any washing place, urinal, latrine, spittoon, open drainage carrying effluents. In addition to this a factory where there are more than 250 workers provisions for cooling drinking water during hot temperature should be made.

Section 19: This section provides details relating to urinals and latrine construction at factories. It mentions that in every factory there should be sufficient accommodation for urinals which should be provided at conveniently situated place. It should be kept clean and maintained. There is provision to provide separate urinals for both male and female workers.

Section 20: This section specifies regarding proper arrangements of spittoons in the factory. It is mentioned that in every factory there should be sufficient number of spittoons situated at convenient places and should be properly maintained and cleaned and kept in hygienic condition.

What are the provisions relating to safety for employees working in factories and the manufacturing process addressed by the Factories Act, 1948?

The Factories Act, 1948 also provides provisions relating to safety measures for the workers employed herein. This is to ensure safety of workers working on or around the machines. The detailed information on each provision relating to safety measures is as under:

Section 17: Under section it has been described that there should be proper arrangement of lighting in factories. In every part of the factory where workers are working or passing should be well equipped with lighting arrangement either by natural sources or artificial sources.

Section 21: This section specifies that fencing of machinery is necessary. That any moving part of the machinery or machinery that is dangerous in kind should be properly fenced.

Section 23: This section prescribes that employment of young person on dangerous machinery is not allowed. In the case where he is been fully instructed in the usage of the machinery and working under the supervision he might be allowed to work on it.

Section 24: This section provides provision of striking gear and devices for cutting off power in case of emergency. Every factory should have special devices for cutting off of power in emergencies from running machinery. Suitable striking gear appliances should be provided and maintained for moving belts.

Section 28: This section prohibits working of women and children on specific machinery. As per this section women and children should not be appointed for any part

of factory working on cotton pressing.

Section 32: In this section it has been specified that all floors, stairs, passages and gangways should be properly constructed and maintained, so that there are no chances of slips or fall.

Section 34: This section specifies that no person in any factory shall be employed to lift, carry or move any load so heavy that might cause in injury. State Government may specify maximum amount of weight to be carried by workers.

Section 35: This section provides specification regarding safety and protection of eyes of workers. It mentions that factory should provide specific goggles or screens to the workers who are involved in manufacturing work that may cause them injury to eyes.

Section 36: As per this section it is provided that no worker shall be forced to enter any chamber, tank, vat, pit, pipe, flue or other confined space in any factory in which any gas, fume, vapour or dust is likely to be present to such an extent as to involve risk to persons being overcome thereby.

Section 38: As per this section there should be proper precautionary measures built for fire. There should be safe mean to escape in case of fire, and also necessary equipments and facilities to extinguish fire.

Section 45: This section specifies that in every factory there should be proper maintained and well equipped first aid box or cupboard with the prescribed contents. For every 150 workers employed at one time, there shall not be less than 1 first aid box in the factory. Also in case where there are more than 500 workers there should be well maintained ambulance room of prescribed size and containing proper facility.

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II UNIT TEST- APRIL 2023

TOTAL QUALITY MANAGEMENT – KDAXA

Class: I M.Com Time: 1 Hour

Date : 17.04.2023 Max: 25 Marks

PART A – (5 X 1 = 5 Marks)

Answer any FIVE questions

1. What do you mean by quality improvement? (CO3)
2. Define value engineering. (CO3)
3. Write short notes on Human Resource Development. (CO3)
4. What do you understand by the term Quality Circle? (CO4)
5. What is TQC? (CO4)
6. Expand the term ISO. (CO5)
7. Write a note on ISO 9000 standard series. (CO5)

PART B– (2 X 5 = 10 Marks)

Answer any TWO questions

8. Describe in detail the phases of achieving the six sigma state. (CO3)
9. Explain about the 5S principle (CO3)
10. Explain the various advantages of ABC Analysis. (CO4)
11. Bring out any five goals of ISO 9000:2000 revisions. (CO5)

PART C – (1 X 10 = 10 Marks)

Answer any ONE question

12. List out the elements of ISO 9000 and explain. (CO5)
13. Elucidate the process of implementing quality circles (CO4)

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II UNIT TEST- APRIL 2023

TOTAL QUALITY MANAGEMENT – KDAXA ANSWERS KEY

Class: I M.Com Time: 1 Hour

PART A – (5 X 1 = 5 Marks)

Answer any FIVE questions

1. What do you mean by quality improvement? (CO3)

   Quality improvement refers to the process of identifying areas that need improvement, implementing changes to address those areas, and monitoring the results to ensure that they meet the organization's quality standards.

2. Define value engineering. (CO3)

   value engineering is a structured approach that aims to improve the value of a product or service by identifying opportunities for improvement and implementing changes that reduce costs while maintaining or improving performance and quality.

3. Write short notes on Human Resource Development. (CO3)

   Human Resource Development is the process of improving the knowledge, skills, abilities, and attitudes of an organization's employees through training, education, coaching, mentoring, and other developmental programs.

4. What do you understand by the term Quality Circle? (CO4)

   Quality Circle is a small group of employees who voluntarily come together to identify, analyze, and solve problems related to their work processes, products, and services through active participation, teamwork, and collaboration.

5. What is TQC? (CO4)

   TQC or Total Quality Control is a management philosophy that emphasizes the involvement of all employees in continuously improving the quality of an organization's products, services, processes, and systems.

6. Expand the term ISO. (CO5)

   ISO stands for International Organization for Standardization, which is a non-governmental organization that develops and publishes international standards for various industries and sectors.

7. Write a note on ISO 9000 standard series. (CO5)

The ISO 9000 standard series is a set of international standards that provide guidelines for establishing, implementing, maintaining, and improving a quality management system (QMS) in an organization. It consists of several standards, including ISO 9001, ISO 9004, ISO 19011, and others.

PART B– (2 X 5 = 10 Marks)

Answer any TWO questions

8. Describe in detail the phases of achieving the six sigma state. (CO3)

The phases of achieving the six sigma state include: Define, Measure, Analyze, Improve, and Control (DMAIC). In the Define phase, the problem is identified, the goals are established, and the project team is formed. In the Measure phase, the process is measured, and the data is collected. In the Analyze phase, the data is analyzed to identify the root cause of the problem. In the Improve phase, the solution is implemented, and the results are monitored. In the Control phase, the process is monitored to ensure that it remains in the six sigma state.

9. Explain about the 5S principle (CO3)

The 5S principle is a methodology that promotes workplace organization and standardization by following five key steps: Sort, Set in Order, Shine, Standardize, and Sustain. In the Sort step, unnecessary items are removed from the workplace. In the Set in Order step, a place is assigned to everything. In the Shine step, the workplace is cleaned and maintained. In the Standardize step, procedures are established to maintain the 5S system. In the Sustain step, the 5S system is continuously monitored and improved.

10. Explain the various advantages of ABC Analysis. (CO4)

- Better inventory management,
- Improved resource allocation,
- Increased profitability,
- Better decision-making.

11. Bring out any five goals of ISO 9000:2000 revisions. (CO5)

The five goals of ISO 9000:2000 revisions include: enhanced customer satisfaction, increased involvement of top management, improved process management, increased emphasis on continuous improvement, and alignment with other management systems.

PART C – (1 X 10 = 10 Marks)

Answer any ONE question

12. List out the elements of ISO 9000 and explain. (CO5)

The elements of ISO 9000 include:

- Quality management system
- Management responsibility
- Resource management
- Product realization
- Measurement, analysis, and improvement

13. Elucidate the process of implementing quality circles (CO4)

The process of implementing quality circles includes six steps:

1. Orientation and Training
2. Identifying the Problem
3. Brainstorming Solutions
4. Selecting the Best Solution
5. Implementation of Solution
6. Follow-up and Evaluation

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II UNIT TEST- APRIL 2023

SECURITY ANALYSIS AND PORTFOLIO MANAGEMENT – KDA4G

Class: II M.Com Time: 1 Hour

Date : 11.04.2023 Max: 25 Marks

PART A – (5 X 1 = 5 Marks)

Answer any FIVE questions

1. What is market efficiency? (CO4)
2. What is Elliot wave principle? (CO4)
3. What is Sharpe index model? (CO4)
4. Define APM. (CO5)
5. Define Covariance. (CO5)
6. Define the term Diversification. (CO4)
7. Write a note on IRR. (CO3)

PART B– (2 X 5 = 10 Marks)

Answer any TWO questions

8. Explain the functions of portfolio manager. (CO4)
9. Write in detail about Markowitz Portfolio Analysis. (CO4)
10. Explain the Random Walk Theory. (CO4)
11. What are the components of CAPM? Explain. (CO5)

PART C – (1 X 10 = 10 Marks)

Answer any ONE question

12. Explain the various steps involved in portfolio selection. (CO4)
13. The returns of two assets under four possible states of nature are given below: (CO5)

State of Nature	Probability	Return on asset 1	Return on asset 2
1	0.10	5%	0%
2	0.30	10%	8%
3	0.50	15%	18%
4	0.10	20%	26%

(a) What is the standard deviation of the return on asset 1 and on Asset 2?

(b) What is the covariance between the return on assets 1 and 2?

(c) What is the coefficient of correlation between the returns on assets 1 and 2?

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II UNIT TEST- APRIL 2023

SECURITY ANALYSIS AND PORTFOLIO MANAGEMENT – KDA4G

Class: II M.Com Time: 1 Hour

Date : 11.04.2023 Max: 25 Marks

PART A – (5 X 1 = 5 Marks) Answer any FIVE questions

1. What is market efficiency? (CO4) Market efficiency is the degree to which stock prices reflect all available and relevant information about the company. It is categorized into three levels: weak, semi-strong, and strong.
2. What is Elliot wave principle? (CO4) The Elliot wave principle is a technical analysis tool used to predict future stock market trends by identifying price patterns and market trends.
3. What is Sharpe index model? (CO4) The Sharpe index model is a method used to calculate the expected return of an investment based on its risk level. It takes into account the risk-free rate of return, the expected return on the market, and the investment's beta.
4. Define APM. (CO5) APM stands for Absolute Performance Measures. It is a technique used to evaluate an investment's performance against a benchmark or a risk-free rate.
5. Define Covariance. (CO5) Covariance is a statistical measure that shows how two variables are related to each other. It measures the degree to which two variables move together.
6. Define the term Diversification. (CO4) Diversification is a strategy that involves investing in a variety of assets in order to reduce the overall risk of an investment portfolio.
7. Write a note on IRR. (CO3) IRR stands for Internal Rate of Return. It is a method used to measure the profitability of an investment. It is the discount rate that makes the net present value (NPV) of an investment equal to zero.

PART B– (2 X 5 = 10 Marks) Answer any TWO questions

8. Explain the functions of portfolio manager. (CO4) Portfolio managers are responsible for managing investment portfolios on behalf of investors. Their functions include analyzing market trends, selecting securities to include in the portfolio, monitoring the performance of the portfolio, and making adjustments to the portfolio as needed.
9. Write in detail about Markowitz Portfolio Analysis. (CO4) Markowitz Portfolio Analysis is a method used to construct investment portfolios that maximize returns while minimizing risk. It involves identifying the expected returns and standard deviations of various investments, and then using this information to construct a portfolio that maximizes the return for a given level of risk.
10. Explain the Random Walk Theory. (CO4)
    The Random Walk Theory is a theory that suggests that stock prices are determined

by random events and that past price movements cannot be used to predict future price movements.

11. What are the components of CAPM? Explain. (CO5) CAPM stands for Capital Asset Pricing Model. The components of CAPM are the risk-free rate, the expected return on the market, and the asset's beta. The risk-free rate is the rate of return on a risk-free investment, such as a U.S. Treasury bond. The expected return on the market is the average return on all investments in the market. Beta measures an asset's volatility relative to the market.

PART C – (1 X 10 = 10 Marks) Answer any ONE question

12. Explain the various steps involved in portfolio selection. (CO4) The steps involved in portfolio selection are as follows:

- Determine investment objectives and constraints.
- Develop capital market expectations.
- Establish performance measurement criteria.
- Determine asset allocation strategy.
- Select specific investments for the portfolio.
- Monitor and evaluate portfolio performance.

13. (CO5)

The returns of two assets under four possible states of nature are given below:

State of Nature	Probability	Return on asset 1	Return on asset 2
1	0.10	5%	0%
2	0.30	10%	8%
3	0.50	15%	18%
4	0.10	20%	26%

(a) What is the standard deviation of the return on asset 1 and on Asset 2?

(b) What is the covariance between the return on assets 1 and 2?

(c) What is the coefficient of correlation between the returns on assets 1 and 2?

(a) To calculate the standard deviation of the return on asset 1:

1. Calculate the expected return of asset 1: Expected return = (0.10 x 5%) + (0.30 x 10%) + (0.50 x 15%) + (0.10 x 20%) = 13%
2. Calculate the variance of asset 1: Variance = (0.10 x (5% - 13%)^2) + (0.30 x (10% - 13%)^2) + (0.50 x (15% - 13%)^2) + (0.10 x (20% - 13%)^2) = 0.0184
3. Calculate the standard deviation of asset 1: Standard deviation = sqrt(Variance) = 13.56%

Therefore, the standard deviation of the return on asset 1 is 13.56%.

To calculate the standard deviation of the return on asset 2:

1. Calculate the expected return of asset 2: Expected return = (0.10 x 0%) + (0.30 x 8%) + (0.50 x 15%) + (0.10 x 26%) = 11.6%
2. Calculate the variance of asset 2: Variance = (0.10 x (0% - 11.6%)^2) + (0.30 x (8% - 11.6%)^2) + (0.50 x (15% - 11.6%)^2) + (0.10 x (26% - 11.6%)^2) = 0.0583
3. Calculate the standard deviation of asset 2: Standard deviation = sqrt(Variance) = 24.14%

Therefore, the standard deviation of the return on asset 2 is 24.14%.

(b) To calculate the covariance between the return on assets 1 and 2:

Covariance = (0.10 x (5% - 13%)(0% - 11.6%)) + (0.30 x (10% - 13%)(8% - 11.6%)) + (0.50 x (15% - 13%)(15% - 11.6%)) + (0.10 x (20% - 13%)(26% - 11.6%)) = 0.041

Therefore, the covariance between the return on assets 1 and 2 is 0.041.

(c) To calculate the coefficient of correlation between the returns on assets 1 and 2:

Correlation coefficient = Covariance / (Standard deviation of asset 1 x Standard deviation of asset 2) = 0.041 / (13.56% x 24.14%) = 0.14

Therefore, the coefficient of correlation between the returns on assets 1 and 2 is 0.14.

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II UNIT TEST, APRIL 2023

MANAGEMENT INFORMATION SYSTEM

Date: 10.04.2023 **Max.Marks:25**

Class: II M.com **Duration: 1 Hr**

Part – A

Answer any **FIVE** questions. **(5x1=5)**

CO3 BL1: 1. Define System analysis?

CO4 BL1: 2. What is Decision support system?

CO4 BL1: 3. What is the need for executive support system?

CO4 BL2: 4. Explain office automation system?

CO4 BL1: 5. What is Transaction processing system?

CO5 BL1: 6. What is financial information system?

CO5 BL1: 7. What is financial audit?

Part – B

Answer any **TWO** questions. **(2x5=10)**

CO4 BL2: 1. Explain the types of Decision support system?

CO4 BL2: 2. Explain the process of Transaction processing system?

CO4 BL5: 3. Explain the concept of office automation system in detail?

CO3 BL5: 4. Explain the process of system analysis and design?

Part – C

Answer any **ONE** question. **(1x10=10)**

CO5 BL6: 1. Elaborate the Role and functions of Functional Information System?

CO4 BL5: 2. Explain the term Expert system and Artificial Intelligence in MIS?

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II UNIT TEST, APRIL 2023
MANAGEMENT INFORMATION SYSTEM

Date:10.04.2023 **Max.Marks:25**
Class: II M.com **Duration: 1 Hr**

Part – A

Answer any **FIVE** questions. **(5x1=5)**

CO3 BL1: 1. Define System analysis?

System analysis is the process of examining and evaluating the components and functions of a system in order to understand how it works, identify its strengths and weaknesses, and suggest improvements or modifications to optimize its performance. This may involve analyzing technical systems, such as computer software or hardware, as well as organizational systems, such as business processes or workflows. The goal of system analysis is to identify opportunities for improvement, streamline processes, and increase efficiency, effectiveness, and productivity.

CO4 BL1: 2. What is Decision support system?

A Decision Support System (DSS) is a computer-based tool or software application that is designed to help people make informed and effective decisions by providing relevant information and analysis. A DSS typically includes data management tools, mathematical models, and analytical tools that can be used to analyze data and generate reports and recommendations based on that analysis.

CO4 BL1: 3. What is the need for executive support system?

Executive Support Systems (ESS) are specialized Decision Support Systems designed to meet the needs of senior executives in an organization. The need for ESS arises from the fact that executives require timely and accurate information to make critical strategic decisions, which can have a significant impact on the organization's performance.

CO4 BL2: 4. Explain Office automation system?

Office Automation System (OAS) is a computer-based information system designed to support and automate the routine clerical and administrative tasks in an office environment. OAS can be used in any organization, ranging from small businesses to large corporations, and can help increase efficiency, productivity, and accuracy of office tasks.

BL1: 5. What is Transaction processing system?

A Transaction Processing System (TPS) is a computer-based system that captures, processes, and stores transactions in real-time. A transaction is any event that generates or modifies data that is eventually stored in an information system. Examples of transactions include purchases, sales, deposits, withdrawals, and other types of financial or operational transactions.

CO5 BL1: 6. What is financial information system?

A Financial Information System (FIS) is a computer-based system that manages financial data and supports the financial operations of an organization. FIS provides a centralized platform for financial data management, analysis, and reporting, enabling organizations to make informed financial decisions.

CO5 BL1: 7. What is financial audit?

A financial audit is an independent examination of an organization's financial statements and records to ensure that they accurately represent the financial position and performance of the organization. The primary objective of a financial audit is to provide assurance to stakeholders, such as investors, creditors, and regulators, that the financial statements are reliable and free from material misstatements.

Part – B

Answer any **TWO** questions. **(2x5=10)**

CO4 BL2: 1. Explain the types of Decision support system?

Decision Support Systems (DSS) are computer-based systems that provide support to decision-makers in complex and unstructured decision-making environments. There are several types of DSS, each designed to support different types of decisions. The following are the main types of DSS:

Model-driven DSS: This type of DSS uses mathematical and analytical models to analyze data and support decision-making. These models can be statistical, optimization, or simulation models, and are used to identify trends, patterns, and relationships in the data. Model-driven DSS is commonly used in finance, marketing, and operations management.

Data-driven DSS: This type of DSS focuses on processing and analyzing large volumes of data to support decision-making. Data-driven DSS uses techniques such as data mining, machine learning, and artificial intelligence to identify patterns and trends in data. Data-driven DSS is commonly used in healthcare, retail, and finance.

Knowledge-driven DSS: This type of DSS uses expert knowledge and rules to support decision-making. Knowledge-driven DSS uses techniques such as expert systems, neural networks, and fuzzy logic to capture and process expert knowledge. Knowledge-driven DSS is commonly used in legal, medical, and engineering fields.

Communication-driven DSS: This type of DSS focuses on facilitating communication and collaboration among decision-makers. Communication-driven DSS includes tools such as group decision support systems and virtual meeting systems, which enable decision-makers to communicate, share information, and collaborate in real-time.

CO4 BL2: 2. Explain the process of Transaction processing system?

A Transaction Processing System (TPS) is a type of computerized system designed to manage and process large volumes of transactions, such as sales, orders, or reservations. Here is a general overview of how a TPS works:

Data collection: The TPS collects data from various sources, such as point-of-sale (POS) systems, online orders, or phone reservations.

Data validation: The TPS checks the collected data for accuracy, completeness, and consistency. If any errors or inconsistencies are detected, the system may reject the transaction and notify the user.

Data processing: The TPS processes the validated data according to predefined business rules and algorithms. This may involve calculations, updates to databases, or generation of reports.

Data storage: The TPS stores the processed data in a database or other storage system for future use.

Data retrieval: The TPS allows authorized users to retrieve and view the stored data, such as sales reports, customer orders, or inventory levels.

Reporting: The TPS generates reports based on the stored data, such as daily sales reports, weekly inventory reports, or monthly financial statements.

Auditing: The TPS may include auditing features to ensure that transactions are properly recorded and tracked. This may include audit trails, security controls, or user access controls.

Overall, a TPS helps organizations manage and track large volumes of transactions efficiently and accurately, allowing them to make informed decisions based on real-time data

CO4 BL5: 3. Explain the concept of office automation system in detail?

Office automation system (OAS) refers to the use of technology to automate and streamline administrative and managerial processes in an office or business setting. An OAS is a software system that manages and facilitates the

flow of information within an organization, automating routine tasks such as data entry, record-keeping, and document management.

An OAS typically includes a suite of software applications that help businesses to perform their daily activities more efficiently. Some of the common features of an OAS include:

Email and messaging systems: An OAS can help streamline communication within an organization by providing email and messaging systems that enable users to send and receive messages, share files, and collaborate on projects.

Document management systems: An OAS can help manage the creation, storage, and retrieval of documents, making it easier for users to find and share information.

Accounting and financial management systems: An OAS can help automate financial tasks such as billing, invoicing, and bookkeeping, reducing errors and streamlining the financial management process.

Human resources management systems: An OAS can help automate tasks such as recruiting, hiring, and training employees, as well as managing employee records and benefits.

Customer relationship management systems: An OAS can help businesses manage their relationships with customers by tracking customer interactions, sales leads, and customer service requests.

Project management systems: An OAS can help businesses manage projects by providing tools for scheduling, tracking, and collaborating on tasks.

CO3 BL5: 4. Explain the process of system analysis and design?

System analysis and design is a process that involves the development of information systems. It involves a series of steps that are used to identify, analyze, design, implement, and maintain an information system.

Requirements Gathering: This involves gathering information about the system requirements. The system analyst conducts interviews with stakeholders to identify their needs, documents the existing system, and defines the scope of the new system.

Feasibility Study: In this stage, the analyst examines the technical feasibility, economic feasibility, and operational feasibility of the proposed system. They determine if the system can be built within the budget and if it will be effective.

System Analysis: This involves breaking down the requirements into smaller components that can be analyzed and designed. The analyst uses various techniques such as data flow diagrams, use cases, and entity-relationship diagrams to represent the system.

Design: In this stage, the analyst creates a blueprint for the system. They design the user interface, database, and software components of the system. They also specify the hardware and software requirements.

Implementation: This stage involves building the system. The analyst writes code, tests the system, and installs it. They also train users and provide support during the transition from the old system to the new system.

Testing: In this stage, the system is tested to ensure that it meets the requirements. Various testing techniques such as unit testing, integration testing, and system testing are used to test the system.

Deployment: This is the final stage of the system development process. The system is installed and made operational. The analyst ensures that the system is working as expected and provides ongoing support.

Maintenance: This stage involves keeping the system up to date and making changes as necessary. The analyst monitors the system and fixes any bugs or issues that arise. They also make updates and modifications to the system to keep it running smoothly.

Part – C

Answer any **ONE** question. **(1x10=10)**

CO5 BL6: 1. Elaborate the Role and functions of Functional Information System?

Functional Information Systems (FIS) are computer-based systems that support the activities of functional areas within an organization such as accounting, finance, human resources, marketing, and operations. The main role of FIS is to help streamline business processes by automating repetitive tasks and providing real-time information to decision-makers. The functions of a FIS vary depending on the functional area it supports, but here are some common examples:

Accounting: A FIS for accounting typically includes modules for general ledger, accounts payable, accounts receivable, and payroll. The system automates tasks such as posting journal entries, generating financial statements, and processing payroll.

Finance: A FIS for finance may include modules for financial planning and analysis, risk management, and investment management. The system can help analyze financial data, forecast future cash flows, and evaluate investment opportunities.

Human Resources: A FIS for human resources may include modules for recruitment, onboarding, performance management, and benefits administration. The system can help automate the hiring process, track employee performance, and manage employee benefits.

Marketing: A FIS for marketing may include modules for customer relationship management (CRM), market research, and campaign management. The system can help analyze customer data, track sales leads, and plan marketing campaigns.

Operations: A FIS for operations may include modules for inventory management, supply chain management, and production planning. The system can help optimize inventory levels, track shipments, and schedule production runs.

Overall, the functions of a FIS help to improve the efficiency and effectiveness of functional areas within an organization, leading to better decision-making and increased competitiveness.

CO4 BL5: 2. Explain the term Expert system and Artificial Intelligence in MIS?

An expert system is a computer program that emulates the decision-making ability of a human expert in a specific domain. Expert systems are designed to solve complex problems and make decisions based on knowledge, rules, and inference mechanisms. They are typically used in domains where human expertise is crucial, such as medical diagnosis, financial analysis, and engineering design.

Artificial Intelligence (AI) is a branch of computer science that focuses on creating intelligent machines that can perform tasks that typically require human intelligence, such as perception, reasoning, learning, and decision-making. AI is a broad field that encompasses many subfields, including machine learning, natural language processing, robotics, and expert systems.

In Management Information Systems (MIS), expert systems and AI technologies can be used to automate decision-making processes, improve data analysis, and enhance decision-making capabilities. For example, an expert system can be used to diagnose medical conditions based on patient symptoms, while AI-powered chatbots can be used to improve customer service by providing automated responses to frequently asked questions. Overall, expert systems and AI can help organizations streamline their operations, reduce costs, and improve the quality of their products and services.

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II UNIT EXAMINATION, APRIL - 2023

INTERNATIONAL MARKETING- KDACE

Date: 13.04.2023 **Max.Marks:25**

Class: II M.Com **Duration: 1 Hr**

Part – A

Answer any **FIVE** questions. **(5x1=5)**

1. Define 'International Marketing'.
2. Expand 'TRIMS'.
3. What is 'Balance of Trade'?
4. What is product planning?
5. Give the meaning for Bill of lading.
6. What is Payment by documentary credit?
7. What is Certificate of origin?

Part – B

Answer any **TWO** questions. **(2x5=10)**

8.State the nature of International marketing.

9.Write a note on WTO.

10.What is Exports of principle products?

11.State the objectives of pricing

Part – C

Answer any **ONE** question. **(1x10=10)**

12.Explain the features of International marketing.

13.What are the various procedures to be followed in the Export trade.?

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II UNIT TEST, APRIL 2023

INTERNATIONAL MARKETING- KDACE

PART – A

1.Define 'International Marketing'

International marketing refers to the planning, promotion, distribution, and sale of products or services in multiple countries or across international borders. It involves adapting a company's marketing strategies and tactics to suit the unique characteristics, preferences, and regulations of various foreign markets. International marketing aims to expand a company's presence beyond its domestic market and capitalize on global opportunities.

2. **Expand 'TRIMS'**.

Trade-Related Investment Measures

TRIMs are rules that restrict preference of domestic firms and thereby enable international firms to operate more easily within foreign markets.

3. What is 'Balance of Trade'?

The balance of trade (also known as the trade balance or net exports) is a financial metric that represents the difference between a country's exports and imports of goods during a specific period, typically measured annually or quarterly. It is a crucial component of a country's balance of payments, which accounts for all financial transactions between a country and the rest of the world.

The balance of trade is calculated as follows:

Balance of Trade = Total Exports - Total Imports

4. What is product planning ?

Product planning in international marketing involves developing and adapting products or services to effectively meet the needs and preferences of consumers in different countries and markets. It is a critical aspect of international marketing strategy because products often need to be tailored to fit diverse cultural, economic, regulatory, and competitive environments.

5. Give the meaning for Bill of lading,.

A Bill of Lading (B/L) is a crucial legal document used in international shipping and transportation. It serves as both a receipt for goods shipped and a contract between the shipper (usually the exporter) and the carrier (typically a shipping company or carrier). The Bill of Lading outlines the details of the cargo being transported and specifies the terms and conditions of the shipment

6. What is Payment by documentary credit?

A payment under a documentary credit, also known as a letter of credit, refers to the process of settling a trade transaction in which a financial institution (usually a bank) acts as an intermediary to guarantee payment to the seller (beneficiary) on behalf of the buyer (applicant) once the terms and conditions specified in the letter of credit are met. This payment mechanism is commonly used in international trade to provide security and assurance to both parties involved.

7. What is Certificate of origin?

A Certificate of Origin (COO) is an official document used in international marketing and trade to certify the country of origin of a particular product. It provides information about the place where the product was manufactured or produced.

Part – B

8.State the nature of International marketing.

International marketing is a dynamic and complex field characterized by the following key aspects and features:

Global Scope: International marketing involves reaching customers in multiple countries and regions around the world. It goes beyond domestic markets and considers the global marketplace.

Diverse Cultures and Markets: International marketers must navigate diverse cultures, languages, consumer preferences, and economic conditions. Understanding and adapting to these differences is crucial for success.

Market Research: Extensive market research is essential. Companies must gather data on foreign markets to identify opportunities, assess competition, and understand consumer behavior.

Adaptation and Localization: Products, services, and marketing strategies often require adaptation and localization to suit the unique needs and preferences of each target market. This may involve changes in branding, packaging, pricing, and messaging.

landscape, and capable of developing strategies that resonate with international consumers while adhering to legal and ethical standards.

9.Write a note on WTO.

The World Trade Organization (WTO) is an international organization established to promote and regulate global trade. It serves as a forum for member countries to negotiate trade agreements, resolve trade disputes, and oversee the implementation of international trade rules. Here are some key points to note about the WTO:

Foundation and History:

The WTO was established on January 1, 1995, succeeding the General Agreement on Tariffs and Trade (GATT), which had been in existence since 1948.

The WTO was created as a result of the Uruguay Round of trade negotiations, which led to the Marrakesh Agreement, establishing the WTO and its rules.

Membership:

The WTO has 164 member countries (as of my last knowledge update in September 2021), making it one of the most significant international organizations.

Membership is open to any country willing to accept the organization's rules and commitments.

Objectives:

Facilitate International Trade: The primary objective of the WTO is to facilitate the smooth flow of international trade by reducing barriers, such as tariffs and non-tariff barriers.
Promote Economic Growth: The WTO aims to promote global economic growth by providing a predictable and stable trading environment.

Prevent Discrimination: It seeks to prevent discrimination among trading partners and promote the principle of nondiscrimination, known as the Most-Favored-Nation (MFN) principle.

Functions and Activities:

Legal and Regulatory Compliance: International marketing involves complying with various international trade laws, regulations, and customs requirements. This includes understanding import/export restrictions, tariffs, and intellectual property rights in different countries.

Distribution and Supply Chain: Establishing efficient distribution channels and supply chains for international markets is critical. This involves considerations like transportation logistics, customs clearance, and warehousing.

Currency and Exchange Rate Management: Companies engaged in international marketing must manage currency exchange risks, as fluctuations in exchange rates can impact pricing and profitability.

Global Branding and Positioning: Building and maintaining a global brand presence while adapting to local market nuances is a delicate balance. Companies often need to tailor their branding and positioning strategies accordingly.

Multilingual and Multichannel Marketing: International marketers frequently use multiple languages and channels to reach their target audiences effectively. This includes website localization, multilingual advertising, and cross-cultural communication.

Political and Economic Instability: International marketing is affected by geopolitical events, economic fluctuations, and changes in trade policies. Companies must be prepared to adapt to political and economic shifts.

Technology and E-commerce: Technology plays a significant role in international marketing, enabling companies to reach global audiences through e-commerce, digital advertising, and online marketplaces.

Competitive Landscape: Companies face both local and global competitors in international markets. Understanding the competitive landscape and differentiating products and services is essential.

Ethical and Social Responsibility: International marketers must consider ethical and social responsibility issues, including sustainable business practices, environmental impact, and corporate social responsibility.

Market Entry Strategies: Companies can choose from various market entry strategies, such as exporting, joint ventures, licensing, franchising, or establishing subsidiaries, depending on the market and industry.

Relationship Building: Building and maintaining relationships with international partners, customers, and stakeholders is crucial for long-term success in international marketing.

Market Segmentation: Effective market segmentation is essential in international marketing to identify target audiences with specific needs and preferences.

Overall, the nature of international marketing is characterized by complexity, diversity, and the need for adaptability. Successful international marketers must be attuned to the nuances of different markets, responsive to changes in the global

Trade Negotiations: The WTO conducts trade negotiations, known as rounds, to negotiate agreements that cover a wide range of trade-related issues, including tariffs, agricultural subsidies, and intellectual property rights.

Dispute Settlement: The WTO provides a mechanism for member countries to resolve trade disputes through a formal and impartial process.

Trade Policy Review: The WTO conducts periodic reviews of member countries' trade policies to ensure transparency and compliance with WTO rules.

Technical Assistance: The WTO provides technical assistance and capacity-building support to developing countries to help them participate effectively in global trade.

Principles and Agreements:

Most-Favored-Nation (MFN): Member countries must treat all other members equally in terms of trade preferences and cannot discriminate among trading partners.

National Treatment: Foreign goods and services must be treated no less favorably than domestic ones.

Market Access: Member countries agree to reduce trade barriers, including tariffs, to facilitate market access for goods and services.

Intellectual Property: The WTO Agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPS) sets global standards for the protection of intellectual property rights.

Challenges and Controversies:
The WTO faces challenges related to stalled trade negotiations, disagreements among member countries, and criticisms regarding its impact on labor and environmental standards.

Critics argue that the WTO's focus on free trade has sometimes led to negative social and environmental consequences.

Relevance:
The WTO plays a crucial role in shaping the rules and regulations of global trade, and its activities impact economies and industries around the world.

It remains a significant forum for addressing trade-related issues and disputes on the international stage.

The World Trade Organization continues to be a central institution in the global trade landscape, with the aim of promoting freer and fairer international trade while addressing the complexities and challenges of the global economy. Its effectiveness and relevance in addressing contemporary trade issues remain subjects of ongoing debate and reform efforts among member countries.

10.What is Exports of principle products?

Exports of principal products refer to the international sale of a country's primary or major goods or commodities, which typically make up a significant portion of its export earnings. These principal products are often essential to a nation's economy and may include raw materials, agricultural products, minerals, or industrial goods that form the foundation of its export trade. Exports of principal products are crucial for generating foreign exchange earnings, supporting economic growth, and often serve as a key indicator of a country's comparative advantage in global trade. Here are some examples of exports of principal products:

Agricultural Products: Many countries export agricultural commodities as their principal products. These can include crops like grains (wheat, rice, corn), fruits, vegetables, and livestock products (meat, dairy).
Minerals and Ores: Countries rich in mineral resources often export minerals and ores as their primary products. Examples include oil, natural gas, coal, iron ore, copper, and precious metals like gold and silver.
Energy Resources: Energy-exporting countries rely on the export of energy resources such as crude oil, natural gas, and coal as their principal products. These exports play a significant role in their economies.
Industrial Goods: Some countries export industrial products as their principal exports. These can include machinery, automobiles, electronics, chemicals, and textiles.
Raw Materials: Exporting raw materials like timber, pulp and paper, and raw textiles (cotton, wool) is common in countries with abundant natural resources.
Fisheries: Coastal nations with thriving fishing industries often export seafood products as their principal goods. This includes fish, shrimp, and other marine products.
Processed Food Products: Certain countries specialize in the export of processed food products such as canned goods, processed meats, and packaged snacks.

Pharmaceuticals and Chemicals: Some countries, particularly those with strong pharmaceutical and chemical industries, export a range of chemical products and medications as their principal exports.
Textiles and Apparel: Textile-producing nations may focus on exporting textiles, clothing, and apparel as their principal products.

The composition of exports of principal products can vary widely from one country to another, depending on factors like natural resource endowments, industrial capabilities, and economic specialization. These exports are often influenced by global demand, international commodity prices, and market dynamics.

It's important to note that many countries diversify their export portfolios to reduce dependence on a single product or market, as relying heavily on one principal product can make an economy vulnerable to fluctuations in global commodity prices or shifts in demand. Diversification can help mitigate risks and promote economic stability.

11.State the objectives of pricing

Pricing in international marketing serves several key objectives that are essential for a company's success in global markets. These objectives go beyond simply setting a price and encompass strategic considerations that address the complexities and challenges of operating in diverse international markets. The primary objectives of pricing in international marketing include:

Profit Maximization: One of the central objectives of pricing is to maximize profitability. Companies aim to set prices that generate optimal profit margins, taking into account production costs, market demand, and competitive dynamics in each target market. Profit maximization is often achieved through effective pricing strategies that consider local market conditions.

Market Entry and Expansion: Pricing can be used strategically to facilitate market entry and expansion into new international markets. Initially, companies may adopt competitive pricing or penetration pricing strategies to gain market share, and later adjust prices as they establish their presence.

Competitive Positioning: Pricing is a critical tool for positioning a product or service in the global marketplace. Companies must assess the pricing strategies of competitors in each market and determine whether they want to position their offering as premium, mid-range, or budget-friendly to gain a competitive advantage.

Market Adaptation: Pricing strategies should be adapted to suit the economic conditions and consumer preferences of each target market. Companies may need to customize prices based on factors such as income levels, purchasing power, and price elasticity of demand in different regions.

Currency Management: Managing exchange rate risks is crucial in international pricing. Companies need to consider the impact of currency fluctuations on pricing decisions and may use strategies such as currency hedging to mitigate these risks.

Cost Recovery: Pricing should cover production and distribution costs while ensuring a reasonable profit margin. Companies need to consider factors like tariffs, import duties, and transportation costs when determining the pricing structure for international markets.

Legal and Regulatory Compliance: Pricing must adhere to local laws and regulations, including antitrust, competition, and pricing controls that may vary from one country to another.

Cultural Sensitivity: Pricing should take into account cultural nuances and local customs, as perceptions of value and pricing tolerance can differ significantly across cultures.

Distribution Channel Support: Pricing strategies may need to align with the preferences and requirements of local distribution channels, including wholesalers, retailers, and agents. Ensuring that the pricing structure supports the efficiency of distribution partners is essential.

Brand Image and Reputation: Pricing can impact a company's brand image and reputation in international markets. Companies must strike a balance between competitive pricing and maintaining the perception of quality and value associated with their brand.

Long-Term Sustainability: Sustainable pricing strategies consider the long-term viability of the business in international markets. Companies must avoid aggressive pricing that may lead to short-term gains but harm their reputation or profitability in the long run.

Profit Protection: In addition to profit maximization, pricing strategies should also consider profit protection by being resilient to economic shocks, changes in market conditions, or shifts in consumer preferences.

Overall, the objectives of pricing in international marketing are multifaceted, requiring a strategic approach that integrates market research, competitive analysis, cultural awareness, and financial considerations to optimize pricing decisions for success in the global marketplace.

PART – C

12.Explain the features of international marketing.

International marketing, as a subset of marketing that focuses on reaching customers and conducting business in multiple countries or across international borders, possesses several distinctive features that set it apart from domestic marketing. These features highlight the complexities and challenges associated with conducting business on a global scale:

Global Scope: International marketing involves operating in multiple countries and regions around the world. It goes beyond the domestic market and requires companies to address the global marketplace.

Cultural Diversity: International marketing necessitates an understanding of diverse cultures, languages, customs, and consumer behaviors. Adapting marketing strategies to these cultural differences is essential for success.

Legal and Regulatory Complexity: Each country has its own set of laws, regulations, and trade policies that can impact international marketing efforts. Companies must navigate these complexities, which may include import/export rules, intellectual property laws, and advertising regulations.

Currency Exchange and Risk: Conducting business internationally often involves dealing with multiple currencies and exchange rate fluctuations. Companies must manage currency risk, which can affect pricing and profitability.

Market Research: In-depth market research is crucial to understand the specific needs, preferences, and behaviors of consumers in different countries. Companies must adapt their products and marketing strategies accordingly.

Customization and Localization: Products, services, and marketing campaigns often require customization and localization to cater to the unique demands of each target market. This includes changes in branding, packaging, pricing, and messaging.

Global Competition: Companies face both local and global competitors in international markets. Understanding the competitive landscape and differentiating products and services is essential.

Trade Barriers: Various trade barriers, including tariffs, quotas, and non-tariff barriers, can hinder market access in international marketing. Companies must navigate these barriers and, if possible, leverage trade agreements to their advantage.

Supply Chain and Logistics: Establishing efficient distribution channels and supply chains is critical to ensure that products reach international markets on time and in good condition. This involves considerations like transportation, customs clearance, and warehousing.

Technological Advances: Technology plays a significant role in international marketing, enabling companies to reach global audiences through e-commerce, digital advertising, and online marketplaces.

Ethical and Social Responsibility: Companies must consider ethical and social responsibility issues, including sustainable business practices, environmental impact, and corporate social responsibility, which can vary across countries.

Geopolitical Factors: Geopolitical events, economic fluctuations, and changes in trade policies can significantly impact international marketing efforts. Companies must be prepared to adapt to political and economic shifts.

Market Entry Strategies: Companies can choose from various market entry strategies, such as exporting, joint ventures, licensing, franchising, or establishing subsidiaries, depending on the market and industry.

Relationship Building: Building and maintaining relationships with international partners, customers, and stakeholders is crucial for long-term success in international marketing.

Market Segmentation: Effective market segmentation is essential in international marketing to identify target audiences with specific needs and preferences.

In summary, international marketing is a complex and dynamic field that requires companies to be adaptable, culturally sensitive, and well-informed about global markets and trade dynamics. Successful international marketing efforts can lead to increased market share, revenue growth, and global brand recognition for businesses willing to navigate the challenges of operating in diverse international markets.

13.What are the various procedures to be followed in the Export trade.?

Export trade involves various procedures that must be followed to ensure the smooth and legal export of goods from one country to another. These procedures are designed to facilitate international trade, comply with regulations, and protect the interests of both the exporter and the importing country. While specific requirements can vary by country and product, here is a general overview of the procedures typically involved in export trade:

1. **Market Research and Planning:**
   - Research potential international markets to identify demand for your products.
   - Evaluate market conditions, competition, and pricing strategies.
   - Develop an export business plan outlining your market entry strategy and goals.
2. **Product Adaptation and Compliance:**
   - Ensure your products comply with the technical and regulatory requirements of the target market, including safety, quality, and labeling standards.
   - Make any necessary modifications to meet these requirements.
3. **Register Your Business:**
   - Ensure that your business is registered and compliant with all relevant export regulations and licensing requirements in your country.
4. **Pricing and Terms:**
   - Determine your pricing strategy, including factors like production costs, market demand, and currency exchange rates.
   - Decide on payment terms (e.g., letter of credit, open account, advance payment) and trade terms (e.g., Incoterms) to govern the transaction.
5. **Export Documentation:**
   - Prepare necessary export documents, including a pro forma invoice, commercial invoice, packing list, certificate of origin, and any required permits or licenses.
   - Ensure that the documents are accurate and comply with the regulations of both your country and the destination country.
6. **Export Licensing and Controls:**
   - Check whether your products require an export license or are subject to export controls, such as dual-use goods, sensitive technologies, or military items.
   - Apply for the necessary export licenses or permits, if applicable.
7. **Customs Procedures:**
   - Familiarize yourself with the customs procedures and requirements of both your country and the importing country.
   - Prepare the required customs documentation, including a bill of lading or airway bill, and submit it to the relevant authorities.

8. **Freight and Logistics:**
    - Arrange for transportation of the goods, whether by sea, air, rail, or road.
    - Choose a suitable freight forwarder or shipping agent to handle the logistics of moving your goods.
9. **Insurance:**
    - Consider purchasing export insurance to protect against potential risks during transit.
    - Ensure that you have adequate coverage for the value of the goods.
10. **Export Packing and Labeling:**
    - Package your goods securely to prevent damage during transportation.
    - Label packages with essential information, including shipping marks, handling instructions, and compliance labels.
11. **Export Financing:**
    - Explore export financing options, such as export credit insurance, export working capital loans, or letters of credit.
    - Secure appropriate financing to fund the export transaction.
12. **Export Declaration:**
    - File an export declaration with your country's customs authorities, providing details about the exported goods.
13. **Quality Control and Inspection:**
    - If required by the destination country, arrange for inspections and quality control checks to ensure that your products meet their standards.
14. **Transport and Delivery:**
    - Coordinate the transportation and delivery of your goods to the designated port or location for export.
15. **Payment and Settlement:**
    - Ensure that payment is received as per the agreed-upon terms and that all financial transactions are properly documented.
16. **Post-Shipment Documentation:**
    - Prepare any post-shipment documentation required by the destination country, such as certificates of origin or sanitary certificates.
17. **Follow-Up and Customer Support:**
    - Maintain communication with your overseas customers, provide after-sales support, and address any issues that may arise.
18. **Market Entry and Distribution:**
    - Implement your market entry strategy, which may include establishing local distributors or representatives in the target market.
19. **Legal and Compliance Checks:**

- Ensure that your export activities comply with all relevant trade laws, sanctions, embargoes, and regulations, both in your country and the destination country.

20. **Record Keeping:**

- Maintain accurate records of all export transactions, including financial records, shipping documents, and correspondence.

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PG DEPARTMENT OF COMMERCE

II UNIT TEST – APRIL 2023

MERCHANT BANKING AND FINANCIAL SERVICES (KDA4C)

Date:.12.4.2023 **Max.Marks:25**

Class: II M. Com **Duration: 1 Hr**

PART – A (5*1=5)

Answer any 5 of the following

1. **Co4** Give the meaning of credit rating?
2. **Co4** What is a Stock exchange?
3. **Co3** What is offer for sale?
4. **Co3** What is Firm underwriting?
5. **Co3** What is bought-out deal?
6. **Co3** What is Factoring?
7. **Co5** Name the different types of depository receipts.

PART – B (2*5=10)

Answer any 2 of the following

8. **Co5** Explain the various Steps in Stock trading.
9. **Co4** What are the features of OTCEI?
10. **Co2** What are the advantages and limitations of Rights issue?
11. **Co2**Explain the types of Prospectuses.

PART – B (1*10=10)

Answer any 1 of the following

12. **Co5** Explain and illustrate the working mechanism of depository receipts.
13. **Co4** Explain the SEBI guidelines for Employee Stock Option Scheme.

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II UNIT TEST – APRIL 2023

MERCHANT BANKING AND FINANCIAL SERVICES

ANSWER KEY

Class: II M. Com

PART – A (5*1=5)

Answer any 5 of the following

1. **Co4 Give the meaning of credit rating?**
   When a company borrows or when a businessman raises loan, the lenders are interested in
   knowing the credit worthiness of the borrower not only in the present condition but also in
   future.

2. **Co4 What is a Stock exchange?**
   A stock exchange, is an exchange where stockbrokers and traders can buy and sell securities, such as shares of stock, bonds, and other financial instruments.

3. **Co3 What is offer for sale?**
   Where the marketing of securities takes place through intermediaries, such as issue houses, stockbrokers and others, it is a case sale of securities takes place in two stages. Accordingly, in the first stage, the issuer company makes an end-block sale of securities to intermediaries such as the issue houses and share brokers at an agreed price. Under the second stage, the securities are re-sold to ultimate investors at a market-related price. The difference between the purchase price and the issue price constitutes profit for the intermediaries.

4. **Co3 What is Firm underwriting?**
   Firm Underwriting is one in which the underwriters apply for a block of securities. Under it, the underwriters agree to take up and pay for this block of securities as ordinary subscribers in addition to their commitment as underwriters.

5. **Co3 What is bought-out deal?**

   A method of marketing of securities of a body corporate whereby the promoters of an unlisted company make an outright sale of a chunk of equity shares to a single sponsor or the lead sponsor is known as bought-out deals.

6. **Co3 What is Factoring?**

Factoring implies a financial arrangement between the factor and client, in which the firm (client) gets advances in return for receivables, from a financial institution (factor). It is a financing technique, in which there is an outright selling of trade debts by a firm to a third party, i.e. factor, at discounted prices.

7. **Co5 Name the different types of depository receipts.**
   - American Depositary Receipt (ADR)
   - Global Depositary Receipt (GDR)
   - European Depositary Receipt (EDR)

PART – B (2*5=10)

Answer any 2 of the following

8. **Co5 Explain the various Steps in Stock trading.**
   - Selecting a Broker or Sub-broker
   - Opening a Demat Account
   - Placing Orders
   - Execution of the Order
   - Settlement
9. **Co2 What are the features of OTCEI?**
   - Use of Modern Technology: It is an electronically operated stock exchange.
   - Restrictions for other stocks: Stocks and shares listed in other stock exchanges will not be listed in the OTCEI and similarly, stock listed in OTCEI will not be listed in other stock exchanges.
   - Minimum issued capital requirements: Minimum issued equity capital should be Rs.30 lakhs, out of which minimum public offer should be Rs.20 lakhs.
   - Restrictions for large companies: No company with the issued equity share capital of more than Rs.25 crores is permitted for listing.
   - Base Capital requirement for members: Members will be required to maintain a minimum base capital of Rs. 4 lakhs to trade on the permitted or on listed segment.
   - All India network: The network of counters links OTCEI members, located in different parts of the country.
   - Satellite facility: The satellite required for OTCEI for its operations is jointly held with Press Trust of India
   - Computerization of transactions: Computers at each counter enable the dealers to enter various transactions or queries or quotes through a central OTCEI computer, using telecommunication links.
10. **Co2 What are the advantages and limitations of Rights issue?**

Advantages

- Economy: Rights issue constitutes the most economical method of raising fresh capital, as it involves no underwriting and brokerage costs. Further, the

expenses by way of advertisement and administration, etc. are less.

- Easy: The issue management procedures connected with the rights issue are easier as only a limited number of applications are to be handled.
- Advantage of shareholders: Issue of rights shares does not involve any dilution of ownership of existing shareholders. Further, it offers freedom to shareholders to subscribe or not to subscribe the issue.

Drawbacks

- Restrictive: The facility of rights issue is available only to existing companies and not to new companies.
- Against society: The issue of rights shares runs counter to the overall societal considerations of diffusion of shares ownership for promoting dispersal of wealth and economic power.

11. Explain the types of Prospectuses.

- Deemed Prospectus
- Red Herring Prospectus
- Shelf prospectus
- Abridged Prospectus

PART – C (1*10=10)

Answer any 1 of the following

12. Co5 Explain and illustrate the working mechanism of depository receipts.

Step 1 : US broker, through an international office or a local brokerage house in India, purchases the shares of Indian Software Company and deliver to the domestic custodian (India) of the depository bank.

Step 2 : Domestic custodian bank verifies the delivery /receipt of shares by informing the depository bank that the shares can now be issued in US.

Step 3 : Based on a determined ADR ratio, each ADR may be issued as representing one or more of the Indian local shares and price of each ADR would be stated in US dollars converted from the equivalent Indian price of the shares held by the depository bank.

Step 4 : US Broker receives so formulated ADRs and proceeds for the process of listing of ADRs on stock exchange.

Thus, ADRs of the Indian software company is issued. ADRs can be traded freely among the investors and transferred from the buyer to seller on the NYSE through a procedure known as intra-market trading. All ADR transactions of the Indian software company will now take place in US dollars and are settled like any other US transaction on the NYSE.

The ADR investor hold privileges like those granted to shareholders of the ordinary shares, such as voting rights and cash dividends. The rights of the ADR holder are stated on the ADR certificate.

13. Co4 Explain the SEBI guidelines for Employee Stock Option Scheme.

- **Issue at discount** Issue of stock option at a discount to the market price would be regardedas another form of employee compensation and would be treated as such in the financial statements of the company regardless the quantum of discount on the exercise price of the options.
- **Approval** The issue of ESOPs is subject to the approval by the shareholders through a special resolution.
- **Maximum limit** There would be no restriction on the maximum number of shares to be issued to a single employee. However, in case of employees being offered more than 1 percent shares, a specific disclosure and approval would be necessary in the AGM.
- **Minimum period** A minimum period of one year between grant of options and its vesting has been prescribed. After one year, the company would determine the period during which the option can be exercised.
- **Superintendence** The operation of the ESOP Scheme would have to be under the superintendence and direction of a Compensation Committee of the Board of Directors in which there would be a majority of independent directors.
- **Eligibility** ESOP scheme is open to all permanent employees and to the directors of the company but not to promoters and large shareholders. The scheme would be applicable to the employees of the subsidiary or a holding company with the express approval of the shareholders.
- **Director's report** The Director's report shall make a disclosure of the following: a. Total number of shares as approved by the shareholders b. The pricing formula adopted c. Details as to options granted, options vested, options exercised and options forfeited, extinguishments or modification of options, money realized by exercise of options, total number of options in force, employee-wise details of options granted to senior managerial personnel and to any other employee who receive a grant in anyone year of options amounting to 5 percent or more of options granted during that year d. Fully diluted EPS computed in accordance with the IAS **IPO** SEBI's stipulations prohibiting initial public offerings by companies having outstanding options should not apply to ESOP. If any ESOPs are outstanding at the time of an IPO issue by an unlisted company, the promoters 'contribution shall be calculated with reference to the enlarged capital that would arise if all vested options were exercised.

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SRM Arts and Science College
Department of Commerce
Kattankulathur
Internal Examination – September 2022

DATA STRUCTURE

Date: 13.09.2022
Class: II B.Com ISM

Marks: 25

PART A (5x2=10)

Answer any FIVE questions

1. Define 'data structure'.
2. List the data types.
3. State the array?
4. Examine the 'Stack'.
5. Identify the Linear and Non Linear Structure.
6. Define 'Queue'
7. Define an expression?

PART B (1x5=5)

Answer any ONE question

8. Describe the operations on data structure. B2, C1.
9. Discuss an algorithm for inserting new element into the stack.

PART C (1x10=10)

Answer any ONE question

10. Explain the Storage representation of arrays.
11. Convert the following the expression form postfix Evaluation.

6	5	2	3	+	8	*	+	3	+	*	)

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DATA STRUCTURE

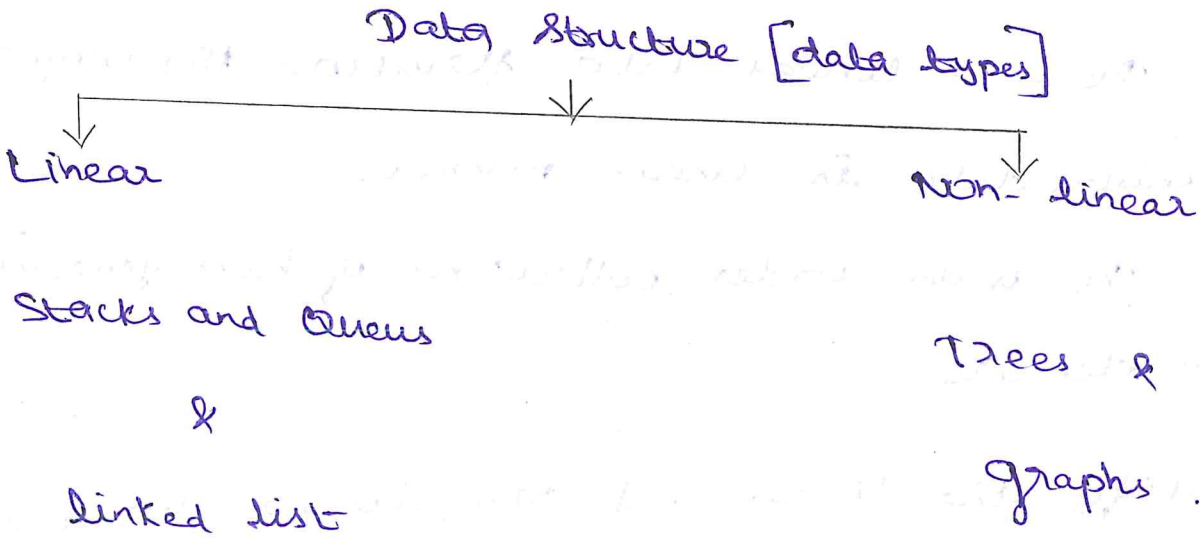
PART - A

1, Define data structure.

A collection of data elements which arrangement is characterizied by accessing functions that are used to store under retrive individual data elements called data structure.

Mathamatically the data structure can be defined as DS = AO + DO.

2, List the data types.



3. State the array?

An array is a group of consecutive memory location with a same name and data type.

Simple variable in single memory location with unique name and a type, but an array is a collections of different adjacent memory locations in the array are known as elements of an array. The total number of elements in an array is called length.

4) Examine the 'stack'?

Stack is a collections of items accessed by last in first out order. Its referred as LIFO [Last in first out] order.

It is a linear data structure the way of organising data in linear manner.

It is an order collections of homogeneous data elements.

5. Identify the linear and Non-linear structure.

Linear - Array.

Stack.

Queue.

...

Non - linear - Tree.

graph

set.

6. Define 'Queue'

Homogeneous data elements and also linear data structure. FIFO [First in first out].
The rear end is used to insert element into the Queue. The front end is used to delete element into the Queue.

7. Define an expression?

Operand with an Operator. combination of operand with an operator is called an expression variable and constants are called operand

Example : $E = a^2 + b^2 - 4ac$

PART - B

8. Describe the operations on data structure

Data structure: A collection of data elements which arrangement is characterized by accessing functions that are used to store under retrive individual data elements called data structure.

Operations on Data structure :-

* Traversal.
* Insertion.
* Deletion.
* Sorting
* Searching
* Merging.

* Traversal - Visiting all nodes in the structure is called Traversal
* Insertion - Inserting a new record into the data structure.
* Deletion - Deleting or removing a record from the data structure.
* Sorting - Arranging the records in a specific order so that each item can be required can be required easily from the structure
* Searching - It is the process of checking in which a particular record is available this structure or not.
* Merging - It is the process in which two structures are combined into single structure.

9. Discuss an algorithm for inserting new element into the stack.

Step 1; Start

Step 2: If TOP >= SIZE, then exit

Step 3; else
TOP = TOP + 1
S[TOP] = Item

Step 4: Stop

Part-C

10) Explain the storage representation of arrays :-

Arrays :-

An array is a group of consecutive memory location with a same name and data type.

Simple variable in single memory location with unique name and a type, but an array is a collection of different adjacent memory location. A memory location in the array are known as elements of an array.

Declaring a single dimensional array:-

Data type identifier [length] - data type of value to be stored in the array.

Identifier - Name of the array.

Length - Number of elements (E.g) Integer marks [5];



Accessing element of array:-

Individual Element

Array_name [index]

Using loop

```
int marks [5];
for (int i=0; i<=4; i++)
Marks [i] = i;
```

Advantages / Uses of Arrays:-

* Array can store a large number of value in a single name.

* Arrays are used to process many values easily and quickly.

* The values stored in an array can be shortened easily.

* The search process can be applied and arrays are easy.

Types of array:-

One-dimensional Array

Two-dimensional Array

Multi-dimensional Array

Single / one-dimensional Array:-

A type of array in which all elements are arranged in the form of a list is known as single or one-dimensional array.

Two-dimensional array:-

Two dimensional array can be considered as table that consists of rows and columns. Each element in 2D array is referred with the help of two indexes.

Indexes: One indicates row and second indicates the column.

Declaring a two dimensional array:-

* Datatype identifier [row] [column] Eg: int arr[4][3];

: Datatype of values to be stored in the arrays.

: Identifier is the name of the array.

: # rows in the table of the array.

: # columns in the table of the array.

0,0	0,1	0,2
1,0	1,1	1,2
2,0	2,1	2,2
3,0	3,1	3,2

11) convert the following the expression from postfix Evaluation.

6 5 2 3 + 8 * + 3 + *)

Symbol	Stack
6	6
5	6,5
2	6,5,2
3	6,5,2,3
+	6,5,5
8	6,5,5,8
*	6,5,40
+	6,45
3	6,45,3
+	6,48
*	288
)	—

Algorithum

Infix to postfix

Step 1 : Start

Step 2 : Add left peranthesis "(" and ")" right peranthesis to the equations respectively.

Step 3 : Scan the equation from left to right.

Step 4 : If an operand is encounted move the operand to the postfix expression.

Step 5: If a left parantheis is encounted push into a stack.

Step 6: If a operator is encounted push the operator into stack.

Step 7: If a right parantheis is encounted pop all the operators from the stack and renew the left parantheis from stack.

Step 8: Repeat the above step until the last right parenthesis is encounted

Step 9: Stop

Example : (A+B)

Symbol	stack	postfix
(	(	-
A	(	A
+	(+	A
B	(+	AB
)		AB+

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DEPARMENT OF COMMERCE (ISM)

I UNIT TEST, SEPTEMBER- 2022

BANKING THEORY LAW & PRACTICE

CLASS: II B.Com (ISM) **TIME: 1 Hour**

DATE : 15/09/2022 **Max: 25 Marks**

PART A – (5 X 2 = 10 Marks)
Answer any FIVE questions

CO 1	B 1	1. Define banking
CO 1	B 1	2. State the commercial bank.
CO 1	B 1	3. Define Cheque.
CO 2	B 1	4 State the central bank.
CO 1	B 1	5. Define mixed banking.
CO 3	B 1	6 . State the ATM.
CO 2	B 1	7. State any two features of central bank.

PART B – (1 X 5 = 5 Marks)
Answer any ONE questions

CO 2	B 2	8. Distinguish between central banking and commercial banking.
CO 1	B 2	9. Discuss the role of banks in the economic development.

PART C – (1 X 10 = 10 Marks)
Answer any ONE questions

CO1	B 2	10. Explain the various classification of banks.
CO2	B 2	11. Explain the various functions of central bank.

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I st model Test

Banking Theory law and Practice

key answers

class: II Bcom (Ism)

Part - A

(1) Banking

Sec 5 (b) of the banking companies Act 1949 Defines banking as "accepting for the purpose of lending or investment of deposists of money received from the Public, repayable on demand and withdrawble by cheque, draft, order or otherwise

(2) commerical bank

A commerical bank is a financial institution which accept deposists from the Public and gives loans for purposes of consumption and investment to make profit. In fact, commerical banks, as their name suggests, Profit-seeking insitutions, i.e, they do banking business to earn profit.

③ Cheque

A cheque or check is a document that orders a bank to pay a specific amount of money from a person's account to the person in whose name the cheque has been issued. The person writing the cheque, known as the drawer.

④ Central bank

A central bank is a public institution that manages the currency of country or group of countries and controls the money supply - literally, the amount of money in circulation. The main objective of many central bank is price stability.

⑤ Mixed banking

Mixed banking is that system of banking under which the commercial banks perform the dual function of commerical banking and investment banking. Commerical banks usually offer both short-term as well medium-term loans. The German banking system is the best example of mixed banking.

(6) ATM

An ATM (Automated Teller machine) is a specialized computer that makes it convenient to manage a bank account holder's fund.

(7) Two Features of central Bank

(i) Currency regulator or bank of issue.

(ii) Bank to the government.

Part - B

(8) central banking vs commercial banking

€	central Banking	commercial banking
Definition	central bank can be called the apex bank, which is responsible for formulating the monetary policy of an economy.	commercial bank, on the otherhand, are those bank that help in the flow of money in an economy by providing deposit and credit facilities.

ownership	central bank is always having public ownership	Commercial bank can be either public or Private in their ownership
Number of banks	There is only one central bank in a country	There can be many commercial banks in country.
Profit motive	central bank does not operate for making Profit	commerical banks operate with the motive of earning Profit
clients	commerical banks and the government	Individuals and business-es
source of money supply	central bank are the source of money supply in an economy.	commercial banks run on the deposits obtained from the individuals and hence they perform no such function

(9) Role of banks in the Economic development

(i) Role in Primary sector

For increasing the Production in agriculture sector the Farmer should be provide with agriculture & Input. For this purpose their prearire short & medium term loan which are entended by bank.

(ii) Role in secondary sector

Banks are also encouraged industrial Production by extending the loan to the industrial the investar are given loan for Purchase of heavy machine on long term basis.

(iii) Role in Territary sector

This sector consists of service sector, this sector helps for growth of economic, it provide more employment opportunities and economic development of the country depends on this sector.

Part - C

(b) Classification of banks:

(i) commercial bank

commerical banks as their name suggests, profit-seeking insitution, i.e they do banking to make profit.

(a) Public sector bank: when the banks fully owned by government.

(b) Private sector: It is a bank which are owned by group of shareholder who elect their director for managing bank

(c) Foreign bank: which are belonging to the foreign to country having their in India.

(ii) Regional Rural bank (RRB)

These are special type of commerical banks that provide concessional credit to agricultural and rural sector.

(iii) Co-operative sector bank:

These banks are run under the co-operative principles of service motive, rather than profit motive, which are mainly help the various section of a society.

(iv) Central Bank

The Reserve Bank of India is the central bank of our country. Each country has a central bank that regulates all the other banks in that country.

(v) Local area Banks (LAB)

Introduced in India in the year 1996. There are organized by the Private sector. Earning Profit is the main objective of Local area bank.

(vi) Small Finance banks:-

AS the name suggests, this type of bank looks after the micro industries and small farmers. There banks are governed by central bank of country.

(ii) Function of central bank.

(i) Currency regulator (or) bank of issue: All the central banks across in the world are involved in issuing notes to the economy.

(ii) Bank to the government: central banks also offer short term loans to the government in order to recover from bad Phases in the economy.

(iii) Controller of credit: central bank control credit in the economy. It happen when commercial banks create a lot of credit in economy that increases the inflation.

(iv) Custodian of cash reserves: It is a practice of commercial banks of a country to keep a part of their cash balances in the form of deposits with the central bank. central bank also plays an important role in the credition Policy of commerical banks.

(v) Custodian of international currency: An important function of central bank is to maintain a minimum balance of foreign currency.

(vi) Lenders of last resort: The central bank acts as a lender of last resort by providing money to its member banks in times of cash crunch.

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Department of Commerce
(Information system Management)

Date: 13.09.2022 **Duration: 1 hr** **Class: II-B. Com (ISM)**

***Subject Name & Code:*JAVA PROGRAMMING**

PART A (5 X 2 = 10 Marks)

(Answer any **FIVE** questions)

CO-1 (BL 1) 1. Define Variable.

CO-1 (BL 2) 2. Explain the Features of Java.

CO-1 (BL 1) 3. List of Operators in Java.

CO-1 (BL 1) 4. Name the type of looping Statements.

CO- 2 (BL 1) 5. Define Class.

CO -2 (BL 1) 6. Define Constructors

CO-2 (BL 2) 7.Describe Method Overloading.

PART B (1 x 5 = 5 Marks)

(Answer any **ONE** question)

CO-1 (BL 2) 8. Explain type casting with example.

CO-2 (BL 3) 9. Solve a java program using perimeter and area of a triangle.

PART C(1 x 10 = 10 Marks)

(Answer any **ONE** question)

CO- 1 (BL 2) 10. Discuss briefly on: java Tokens and Operators.

CO- 2 (BL 2) 11. Explain about class, objects, methods and constructors with example.

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Kattankulathur-603 203.
Department of Commerce
(Information System Management)

Date: 12.09.2022 **Duration: 1 hr** **Class: III-B.Com (ISM)**

Subject Name & Code: **Financial Management**

Section A (5 x 2 = 10)

(Answer any **FIVE** questions)

CO-1 BL-1 1. Define Financial Management.

CO-1 BL-2 2. Summarize the scope of Financial Management.

CO-2 BL-1 3. State the Patterns of Capital Structure.

CO-2 BL-2 4. Discuss theories of Capital Structure.

CO-2 BL-1 5. Recognize the formula for operating Leverage.

CO-2 BL-1 6. State Financial Leverage.

CO-2 BL-1 7. Define Leverage.

Section B (1 x 5 = 5)

(Answer any **ONE** question)

CO-1 BL-2 8. Explain the objectives of Financial Management.

CO-2 BL-3 9. A company expects a Net income of Rs.80,000. It has Rs.2,00,000. 8% Debentures. The equity capitalization rate of the company is 10%. Solve the value of the firm according to Net Income approach.

Section C (1 x 10 = 10)

(Answer any **ONE** question)

CO-2 BL-3 10. A Company 's capital structure consists of the following.

	Lakhs
Equity Shares of Rs.100 each	20
Retained earnings	10
9 % Preference shares	12
7 % Debentures	8
Total	**50**

The Company earns 12 % on its capital. The income tax rate is 50% . the company requires a sum of Rs. 25 Lakh to finance its expansion programme, for which following alternatives are available to it,

a) Issue of 20,000 equity shares at a premium of Rs.25 per share.
b) Issue of 10% preference shares.
c) Issue of 8% Debentures.

It is estimated that the P/E ratios in the cases of equity. Preference & Debentures financing would be 21.4, 17 &15.7 respectively. Apply capital structure.

CO-2 BL-3 11. Calculate the operating leverage, Financial leverage ad combined leverage for the following firms and interpret the results.

OUTPUT	P	Q	R
Output (Units)	3,00,000	75,000	5,00,000
Fixed Cost (Rs.)	3,50,000	7,00,000	75,000
Variable cost per unit (Rs.)	1	7.50	0.10
Interest Expenses	25,000	40,000	-
Unit selling price	3	25	0.50

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(Information System Management)

Date : 12.09.2022 Class : III - B.com (

Subject Name & code : Financial Management

Answer key.
Section A

(Answer any FIVE questions)

1. Define Financial Management.

According to Deepika and mayarani financial management is the activity of management which is concern with planning sequising and controlling of firm financial resource.

2. Summarize the scope of financial management

* Investment Decision.
* Financing Decision.
* Dividend Decision.
* Working Capital Decision.

3. State the pattern of capital structure.

Capital Structure :

EBIT . EPS analysis.

EBIT	xxx
(-) Interest	xxx
EBT	xxx
(-) Tax	xxx
EAT	xxx
(-) preference dividend share	xxx
Earning available to Shareholders	xxx

4. Discuss theories of capital structure.

I David Durand.

- Net Income Approach (NI)
- Net Operating Income Approach (NOI)

II Modigliani and Miller Approach (MM)

III Traditional Approach.

5. Recognize the formula for operating leverage.

Formula for operating leverage:

$$= \frac{\text{Contribution}}{\text{EBIT}}$$

6. State financial Leverage.

Financial leverage is the strategic endeavor of borrowing money to invest in asset is known as financial leverage.

7. Define Leverage.

James Horne "Employment of an asset or fund for which the firm pays fixed cost or return.

Section - B.

(Answer any ONE question)

8. Explain the objectives of financial manage-ent.

(1) Profit maximisation :

The business set up with the main aim to acheive huge profit. Hence, profit maximisation is an most important object in financial service. The manager is responsible to achieve optimal profit in short-run and long-run of the company.

(2) Wealth maximization :

Shareholders are the actual owner of the company. So they must focus on maximisation the wealth of shareholders.

(3) Proper utilization of finance :

Proper utilization of finance is an important object in financial management.

The financial manager must make optimal utilization of finance. He/she must use the finance profitable. He/she must not waste the finance of the company.

(4) Create goodwill:

They must try to create goodwill for company. It must improve image and reputation of the company.

(5) proper co-ordination:

There must be a proper understanding among various department.

1. A company expects a Net Income of Rs. 80000. It has Rs. 200000. 8% Debentures. The equity capitalization rate of the company is 10%. Solve the value of the firm according to Net Income approach.

EBIT	- 80000
(-) Interest	- 16000
EBT	64000
(-) Tax	-
EAT	64000

(1) $S = \frac{EAT}{Ke}$

$= \frac{64000}{10\%} = \frac{64000}{10} \times 100$

$= 6400000.$

(2) $V = S + D$

$= 6400000 + 200000$

$= 840000$

(3) $Ko = \frac{EBIT}{V} \times 100$

$= \frac{80000}{840000} \times 100$

$= 9.52\%$

Section C

(Answer any ONE question)

10. A company's capital structure consists of the following.

	Lakhs
Equity shares of Rs.100 each.	20
Retained earning.	10
9% preference shares	12
7% Debentures	8
Total	50

The company earn 12% on its capital. The income tax rate is 50%. The company requires a sum of Rs.25 lakhs to finance its expansion programme, for which following alternatives are available to it.

(a) Issue of 20000 equity shares at a premium of Rs.25 per share.

(b) Issue of 10% preference share.

(c) Issue of 8% Debentures.

It is estimated that the P/E ratio in the cases of equity. preference & Debentures financing would be 21, 4, 17 & 15, 7 respectively

Apply capital Structure.

	Exint 50×l×12%	Equity. 75×12%	P-S	Debt
EBIT	600000	900000	900000	9000
(-) Interest	56000	756000	56000	5600 25/8 20000
EBT	544000	844000	844000	64400
(-) Tax	272000	422000	422000	3480
EAT	272000	422000	422000	3280
(-) preference share	108000	108000	108000 25l×10/2 250000	1080
Equity	164000	314000	614000	2140
EPS	20000 8.2	40000 7.85	20000 3.2	200 10.7

Market price:

plan I : 7.85 × 21.4 = 1.67.99.

plan II : 3.2 × 17 = 54.40.

plan III : 10.7 × 15.7 = 167.99.

plan I :

Share

Exinting = $\frac{2000000}{10}$ = 20000.

New = $\frac{2500000}{100+25}$ = 20000

40000

plan: II :

Exiting $\frac{2000000}{100}$ 20000

20000

plan. III 2000000 20000

11. Calculate the operating leverage, financial leverage and combined leverage for the following firm and interpret the result.

OUTPUT	P	Q	R
Output (units)	300000	75000	500000
Fixed cost (Rs.)	350000	700000	75000
Variable cost per unit (Rs.)	1	7.50	0.10
Interest Expenses.	25000	40000	—
Unit Selling price.	3	25	0.50

particular	P	Q	R
Sales	900000	1875000	250000
(-) Variable cost	300000	562500	50000
Contribution	600000	1312500	200000
(-) fixed cost	350000	700000	75000
EBIT	250000	612500	125000
(-) Interest	25000	40000	—
EBT	225000	572500	125000

(1) Operating leverage.

$$\frac{\text{Contribution}}{\text{EBIT}} = \frac{600000}{250000} = 2.4 \text{ times.}$$

$$\frac{1312500}{612500} = 2.14 \text{ times.} \qquad \frac{200000}{125000} = 1.6 \text{ times.}$$

(2) Financial leverage.

$$\frac{\text{EBIT}}{\text{EBT}} = \frac{250000}{225000} = 1.1 \text{ times.}$$

$$= \frac{612500}{572500} = 1.06 \text{ times.} \qquad \frac{125000}{572500} = 0.21 \text{ time}$$

(3) Combined leverage.

$$\frac{\text{Contribution}}{\text{EBT}} = \frac{600000}{225000} = 2.6 \text{ times.}$$

$$= \frac{200000}{572500} = 0.34 \text{ tim}$$

$$\frac{1312500}{572500} = 2.29 \text{ times}$$

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I UNIT TEST, SEPTEMBER 2022

CLASS:III B. Com (ISM) **TIME:** 1 Hour

SUB : Logistics and Supply Chain Management **Max :** 25 Marks

DATE : 13.09.2022

PART A (5 X 2 = 10 Marks)

Answer any FIVE questions

CO-1	BL-1	1. Define the term logistics.
CO-1	BL-1	2. Statethe supply chain.
CO-1	BL-1	3. Define customer service.
CO-1	BL-1	4. State the value added services.
CO-1	BL-1	5. Define the reliability.
CO-1	BL-1	6. State any two characteristics of SCM.
CO-1	BL-2	7.Summarize the features of logistics.

PART B (1 X 5 = 5 Marks)

Answer any ONE questions

CO-1	BL-2	8.Discuss the objectives of business logistics.
CO-1	BL-2	9. Describe the importance of supply chain management.

PART C (1 X 10 = 10 Marks)

Answer any ONE questions

CO-1	BL-2	10. Explain the functions of logistics management.
CO-1	BL-2	11. Discussthe supply chain activities in India.

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PART-A.

Answer any five questions :-

1. Define the term logistics.

logistics is the process of planning and executing the efficient transportation and storage of goods from the point of origin to the point of consumption. The goal of logistic is to meet customer requirements in a timely, cost-effective manner.

2. State the Supply chain.

Supply chain is the management of the flow of goods and services. It include all processes that transform raw materials into final products.

3. Define Customer Service.

logistics Customer Service is a part of a firm's overall customer service offering, customer service elements that are specific to logistics operations including fullfillment, speed, quality and cost.

4. Statement the value added services.

We cover the whole spectrum of value added warehousing services, including labelling, serialization and Bar coding, MRP check, Quality check, process delivery Orders, packing. It can significantly improve your business's bottom line

5. Define the reliability.

Reliability is defined as the probability that a product, system or service will perform its intended function adequately for a specified period of time or will operate in a defined environment without failure.

6. State the two characteristics of SCM.

* Flexibility.
* Speed of delivery.

7. Summarize the features of logistics.

(1) Storage, warehousing and material handling.
(2) Packaging and unitisation.
(3) Inventory.
(4) Transport
(5) Information and control

PART-B.

Answer any one questions:-

8. Discuss the objectives of business logistics.

(1) Improve Supply chain efficiency:

logistics management leads to greater visibility into the supply chain and fastens the inbound and outbound activities. It is extremely benefical to reduce the overhead cost and allow delivery processes within the stipulated time.

(2) Inventory management:

Managing the inventory is an integral part of the smooth running of businesses. Identifying which and how much stock to order is useful to maintain the inventory levels and stisfy the end customers.

(3) Quality Assurance:

The quality should be maintained throughout all factors of the logistic Industry. companies should take thoughtful and always perform activities out

of a Supervisor's vision.

(4) Quick Response:

The main aim of logistics management is customer satisfaction. Solving the customer query and issues in shortest time frame is an effective way to enhance the logistic strategy.

(5) Fulfill Customer requirements:

It execute proper planning on transportation modes and inventory available to satisfy the customers. This leads to a smooth freight moving process and timely delivery of products or goods.

9. Describe the importance of supply chain management.

(1) Basic life necessites:

Through supply chain managements individuals access necessities such as food and clothing, as well as life-saving medicines and health care product.

(2) power and light:

People use electrical energy for homes and businesses for light, heat, and air conditioning.

(3) Infrastructure:

Interstate highway systems, railroads, ports and airports facilitate the exchange of goods between business and consumers.

(4) Jobs:

Supply chain management plays a critical role in job creation. Supply chain professionals work in areas such as transportation, warehousing, inventory management, packaging and logistics information.

PART-C

Answer any one question:

10. Explain the function of logistic management.

(1) Demand planning:

To guarantee customer order fulfilment, demand planning is an essential logistics function. By ordering merchandise

in the correct quantities and at the right price and mobilising suitable transport, customer demand is met and profits protected.

(2) Storage and materials:

Warehouse are responsible for the storage, care, retrieval, packaging and unitisation of merchandise. WMS optimise Storage capacities, equipment. Eg: retrieval speeds and warehousing processes.

(3) Inventory management:

It control the flow of goods in and out of warehouse. It dictates how much stock to hold and where to locate it using targeted data to predict customer demand.

(4) Transportation management:

It refers to the management, control, and optimization of all transportation processes along the supply chain. This speed up deliveries and keeps costs low.

control:

logistic is a complex operational procedure that requires a lot of precise information to be effective. forcasting demand, transportation times, and inventory.

11. Discuss the Supply chain activities in India.

(1) plan:

planning is deciding in advance what to do, how to do, when to do and who to do. It is known as planning.

(2) Source:

Sourcing is identifying vendors who will procure goods and services to meet actual demand in the most economical and efficient way. It can be perishable as well as non-perishable product.

(3) Make:

It refers to manufacturing the SCM process the company transforms raw materials by using machinery, laboratory

(4) Deliver:

It directly or indirectly integration with the consumers. It has a significant contribution to surge the brand image of the firm.

(5) Return:

It is a post-delivery customer support process that is associated with all kind of returned products. It is also known as: Reverse logistics'.

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I UNIT TEST, SEPTEMBER 2022

Department of Commerce (ISM)

CLASS: III B. Com (ISM) – 16/9/22. TIME: 1 Hour

SUB: Elements of Portfolio Management Max: 25 Marks

PART A – (5 X 2 = 10 Marks)

Answer any FIVE questions

1. What is Investment?
2. What is Portfolio Management?
3. What do you mean by the term Speculation?
4. Write a short note on Bonus Shares.
5. Explain the term Gambling.
6. List out any two rights of equity shareholders.
7. Define the term Debenture.

PART B – (1 X 5 = 5 Marks)

Answer any ONE questions

8. Explain the objectives of Portfolio.
9. Distinguish between investor and speculator.

PART C – (1 X 10 = 10 Marks)

Answer any ONE questions

10. Explain in detail about the role of Portfolio Manager.
11. Explain the different types of securities.

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12.10.2022 S.R.M Arts and Science College

Elements of Portfolio Management

I UNIT TEST ANSWER KEY

PART - A

1. What is Investment ?

Investment is the employment of the asset with the aim of earning income or capital appreciation. Investment has 2 attitudes namely time and risk. In the process of investment the present consumption is sacrificed to get return in the future.

2. What is Portfolio Management ?

Portfolio Management is the selection, Prioritalize, control of an organization Progra and Project in line with strategic objectives and capacity to deliver.

3. What do you mean by the term Speculation.

Speculation about taking up the business risk in the hope of achieving short-term gain.

Speculation essentially involves buying & selling activities with the expectation of making Profit from Price fluctuation.

4. Write a short note on Bonus Shares.

A bonus share is the distribution of shares in allocation to the cash dependent to the existing shareholders. The bonus issue can be made only which all Partly Paid shares are fully paid up shares.

5. Explain the term Gambling.

The Gambling is usually very short of investment is a game or a challenges. Gambling is different form of investment which is differ ~~to~~ from speculation and investment financial analysis does not reduce the risk Propation involved in Gambling.

6. List out any two rights of equity shareholders.

* Right to vote at the general body meeting of the company.
* Right to share in Profit in the form of divident.

7. Define the term Debenture.

The word 'debenture' itself is a derivation of the Latin word 'debere' which means to borrow or loan. Debentures are written instruments of debt that companies issue under their common seal. They are similar to a loan certificate.

PART-B

8. Explain the objectives of Portfolio.

The objectives of Portfolio management are as follows:

- Creating wealth through Capital appreciation
- Protecting your earnings from market volatility.

- Maximizing returns on investment (RoI)
- Offering flexibility within your investment Portfolio
- Improving the Proficiency of your investments
- Allocating available resources optimally
- Optimizing the risk.

9. Distinguish between investor and Speculator.

Basis for comparison	Investor	Speculator
1. Meaning	The Purchase of an asset with the hope of getting returns is called investment.	Speculation is an act of conducting risky financial transaction, on the hope of substantial Profit.
2. Time Horizon	Longer term	short term
3. Risk Involved	Moderate risk	High risk

4.	Intent to Profit	Changes on value	changes in prices.
5.	Funds	An investor uses his own funds.	A speculator uses borrowed funds.
6.	Income	Stable	Uncertain and Erratic.

PART - C

10. Explain in detail about the role of Portfolio Manager.

* Portfolio manager Plays an important role in deciding on the best investment plan.
* Portfolio manager is responsible for making an individual aware of various investment tools.
* A Portfolio manager keep himself with the latest features on the financial Market.

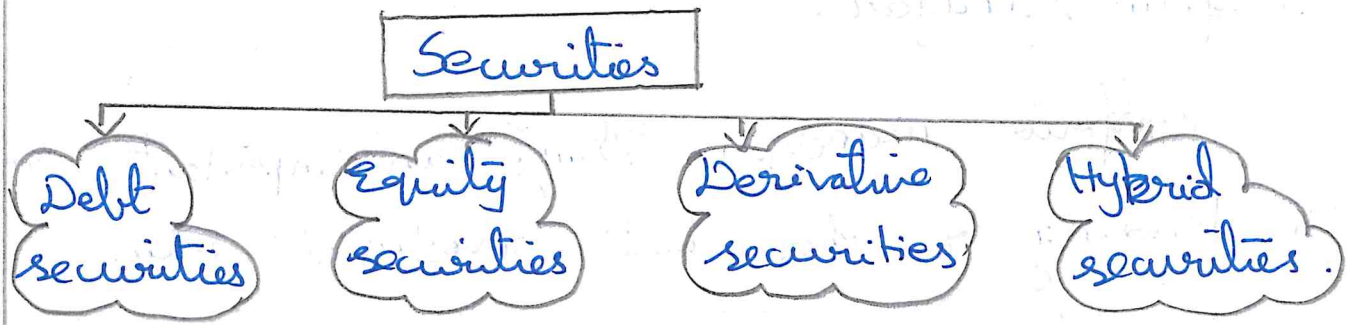
*X Portfolio manager needs to be a good decision maker to finalize the best financial Plan to invest with.

*X Portfolio manager must design to make investment solution for an individual which gurentee maximum return and benefits.

~~PART-C~~

11. Explain the different types of securities.

The following are the different types of securities are as follows;



1) Debt securities:

Debt securities, or fixed-income securities, respresent money that is borrowed and must be repaid with terms outlining the amount of the borrowed funds, interest rate, and maturity ~~date~~ date.

In other words, debt securities are debt instruments, such as bonds or a certificate of deposit (CD) that can be traded between parties.

2) Equity Securities:

Equity securities represent ownership interest held by shareholders in a company. In other words, it is an investment in an organization's equity stock to become a shareholders of the organization.

3) Derivative Securities:

Derivative securities are financial instruments whose value depends on basic variables. The variables can be assets, such as stocks, bonds, currencies, interest rates, market indices, and goods. The main purpose of using derivative is to consider and minimize risk.

There are four main types of derivative securities:

1) Future
2) Forwards
3) Options
4) Swaps

4) Hybrid Securities :

Hybrid securities, as the name suggests, is a type of security that combines characteristics of both debt and equity securities. Many banks and organizations turn to hybrid securities to borrow money from investors.

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Department of Commerce

(Information System Management)

Date: 28.09.2022 **Duration: 1 hr** **Class: I-B.Com (ISM)**

Subject Name & Code: **Financial Accounting**

Section A (5 x 2 = 10)

(Answer any **FIVE** questions)

CO-1 BL-1 1. Define Final Account.

CO-1 BL-1 2. State work in progress.

CO-1 BL-2 3. Discuss Sales Return.

CO-1 BL-1 4. State Current asset with examples

CO-1 BL-1 5. Record the adjustment entry for Accrued Income

CO-1 BL-1 6. State the Receipts and payment account

CO-1 BL-1 7. Discuss the Subscription.

Section B (1 x 5 = 5)

(Answer any **ONE** question)

CO-1 BL-1 8. a) Identify the following details relating to Subscriptions of Coimbatore Sports Club. Calculate the Subscriptions income for the year ending 31st Dec 90
Subscription received as per Receipt And Payments Account for the year ending 31.12.90

b) Subscription outstanding as on 31.12.89 is Rs 2000

c) Subscription outstanding as on 31.12.90 is Rs 4000

d) Subscription received in advance as on 31.12.89 Rs 3000

e) Subscription received in advance as on 31.12.90 Rs 2000

CO-1 BL-1 9. Calculate Net Profit from the following

	Rs
Purchase (200 units)	10000
Freight and Carriage	1200
Rent and Advertising	600
Sales (150 units)	10800

Section C

(1 x 10 = 10)

(Answer any ONE question)

CO-1 BL-3 10. Prepare a Trading & P&L a/c for the year ended 31st Dec 95 % a B/S as on the Date from the following Trial Balance of Mr Akilan

Drawings	45000	Capital	160000
Goodwill	90000	Bills Payable	35000
Buildings	60000	Creditors	70000
Machinery	40000	Purchase Return	2650
Bills Receivable	6000	Sales	218000
Opening Stock	40000		
Purchase	51000		
Wages	26000		
Carriage Outwards	500		
Carriage Inwards	1000		
Salaries	35000		
Rent	3000		
Discount	1100		
Repairs	2300		
Bank	25000		
Cash	1600		
Debtors	45000		
Bad Debts	1200		
Sales Returns	2000		
Furniture	6000		
Advertisement	3500		
General Expenses	450		
	485650		**485650**

Information:

1. Closing stock was Rs. 35000
2. Depreciate Machinery and furniture by 10%
3. Outstanding wages Rs 1500
4. Prepaid Advertisement Rs 500
5. Create 5% on debtors for bad debts as provision

CO-1 BL-3 11. Differentiate Receipt and Payment Accounts and Income and Expenses Account.

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Department of Commerce

(Information System Management)

Date : 28.09.2022 Key Answers Class : I - B.COM (IS)

Section - A

1. Define final Account.

The Accounting for revenues, expenses, Assets and liabilities as that is commonly carried on in the General offices of business is known as financial Accounting.

2. State work in progress.

The term work in process is a production and supply - chain management term describing partically finished goods awaiting completion.

3. Discuss sales return.

This is a Debit Balance, showing the total amount of goods returned by the costomers. Sales returns should be subtracted from the totel sales to find net sales which are shown on credit side of trading account

4. State current asset with examples.

current assets are those assets which are to be converted into cash within one year or during the normal operating cycle of the business. eg: cash, bank, marketable securities, Debtors, Bills receivable.

5. Record the Adjustment entry for Accrued incom

	Particulars	Debit	credit
	Accured Income Dr	xxx	
	To Income A/c		xxx

6. State the receipts and payment Account.

* The receipts and payment Account is a summary of cash and bank transacti of not-for-profit organisation prepared at the end of each financial year.

7. Discuss the subscription.

* It is usually collected every month from all the ordinary members. It is a primary source of income of a not-for-profit organisation. eg. subscription for tennis, brilliands etc..,

Section - B

8. a. Identify the following details relating to subscriptions of coimbatore sports club. calculat the subscriptions income for the year ending 31st Dec 90 subscription received as per receipt and payments Account for the year ending 31.12.90 .(10,000)

b. Subscription outstanding as on 31.12.89 is ₹ 2000

c. subscription o/s as on 31.12.90 ₹ 4000.

D. subscription o/s as on 31.12.89 is ₹ 3000

E. subscription received in advanced as on 31.12.90 is ₹ 2000

Particulars	₹
Subscription during the year	10,000
(-) subscription o/s as on 31-12-89	2,000
	8,000
(+) Subscription o/s as on 31-12-90	4000
	12,000
(+) subscription received in Advance on 31-12-89	3000
	15,000
(-) subscription received in Advance on 31-12-90	2000
	13,000

9. calculate Net profit from the following.

	Rs
Purchase (200 units)	10,000
Freight and carriege	1,200
Rent and Advertising	600
Sales (150 units)	10,800

Trading A/c

Particulars	₹	Particulars	₹
To opening stock	-	By sales	10800
To purchase	10,000	By closing stock (50 units)	2800
To fright and carrige	1,200		
To Gross profit	2,400		
	13,600		13,600
To rent & advertising	600	By Gross profit b/d	2400
To net profit c/d	1800		
	2400		2400

Closing stock = Purchase + fright

= 10000 + 1200

= $\frac{10200}{200} \times 50$

10. Prepare a trading & P&L A/c for the year endec 31st Dec 95% a B/s as on the Date from the following trial balance of Mr. Akilan.

Drawings	45000	Capital	160000
Goodwill	90000	Bills payable	35000
Buildings	60000	Creditors	70001
Machinery	40000	Purchase return	2650
Bills receivable	6000	Sales.	21800
opening stock	40000		
Purchases	51000		
Wages	26000		
Carraige outwards	500		
Carraige inwards	1000		
Salaries	35000		
Rent	3060		
Discount	1100		
Repairs	2300		
Bank	25000		
Cash	1600		
Debtors	45000		
Bad debts	1200		
Sales returns	2000		
Furniture	6000		
Advertisement	3500		
General expenses	450		
	485650		48565

Information :

1. closing stock was Rs. 35000
2. Depreciate Machinery and furniture

3. outstanding wages Rs 1500
4. Prepaid Advertisement Rs 500
5. create 5% on debtors for bad debts as provision.

Trading A/c

To opening stock		40,000	By sales	2,18,000	
To purchase	51,000		(-) sales returns	2000	
(-) purchase return	2650				2,16,0
		48350			
			By closing Stock		350
To wages	26000				
(+) O/s	1500				
		27500			
To carriage inwards		1000			
To Gross profit		134150			
		2,51,000			2,51,0

Profit and loss A/C

To carriage outwards		500	By Gross profit	134150
To salaries		35000		
To rent		3000		
To Discount		1100		
To repairs		2300		
To Bed debts		1200		
To Depreciation				
To Machinary		40000		
To furniture		6000		
To Advertisement	3500			
(-) prepaid Adv	500	3000		
General expenses		450		
				134150

Balance sheet

Liabilities			Assets		
Capital	1,60,000		Buildings		60,00
4) Net profit	80,750		Furniture	6000	
	2,40,750		(-) Depreciation 10%	600	5400
(-) Drawings	45000				
		195750	Goodwill		9000
			Machinery	40000	
			(-) Depreciation 10%	4000	3600
Bills payable		35000			
O/s wages		1500	Cash		1600
			Bank		25000
Creditors		70000	Prepaid Adv		50
			Bills receivable		6000
			Debtors	45000	
			(-) 5% bed debts	2250	4275
			Stock		35000
		302250			3022

11. Differentiate receipt and payment Accounts and Income and expenses Account.

Receipts and payments A/c	Income and expenditure A/c
* It is a real Account	* It is a nominal Account.
* It contains summary of actual receipts and payments of a particular period.	* It contains revenue income and expenses of a particular period.
* It includes capital as well as revenue items	* It includes only revenue items.
* It starts with opening cash and bank balance and ends with closing cash and bank balance	* There is no opening balance but it ends with surplus or deficit for the year.
* It shows receipt and payments of the previous year, current year and the subsequent year if cash is received in current year itself.	* It shows only income and expenditure of the current year.

* It is prepard in lieu of Cash Book	* It is prepard in lieu of profit and loss Account.
* since all the accounts, personal, real and nominal are recorded in this Account. It is not necessary to prepare balance	*Balance sheet must be prepared in order to Account for the personal and real Accounts.
No Adjustments are required at the end of the year	* Adjustments are requi to find the true surplus or deficit at the end of the year.
* It is prepared on the basis of cash system of Accounting.	* It is prepared on the basis of mercantile system of Accounting.

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DEPARTMENT OF COMMERCE(ISM)
I UNIT TEST, SEPTEMBER -2022

CLASS: I B.Com (ISM) **TIME: 1 HR**

SUB : BUSINESS ECONOMICS MARKS: 25

DATE : 29.09.2022

PART A – (5 X 2 = 10 Marks)

Answer any FIVE questions

CO1 (B1) 1. Define Business Economics.
CO1 (B1) 2. State the wealth definition of Economics.
CO1 (B2) 3. Explain any two definitions of Business Economics.
CO1 (B2) 4. Explain any two characteristics of Business Economics.
CO1 (B6) 5.Write a note on sub-division in Economics.
CO2 (B1) 6. Define demand.
CO2 (B1) 7. Name the different types of price elasticity of demand.

PART B – (1 X 5 = 5 Marks)

Answer any ONE questions

CO1 (B2) 8. Explain the characteristics of business economics.
CO2 (B2) 9. Explain in the Income Elasticity of Demand.

PART C – (1 X 10 = 10 Marks)

Answer any ONE questions

CO1 (B2) 10.Discuss the nature and scope of Business Economics.
CO2 (B1) 11. Define Elasticity of Demand. Discuss the factors are determined of demand.

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DEPARTMENT OF COMMERCE [ISM]

1ST UNIT TEST, SEPTEMBER-2022

PART-A

1. Define Business Economics.

Business economics is a field of applied economics that studies the financial, organizational, market-related, and environmental issues faced by corporations. Business economics encompasses subjects such as the concept of scarcity, product factors, distribution, and consumption.

2.State the wealth definition of Economics.

Wealth is an accumulation of valuable economic resources that can be measured in terms of either real goods or money value. Net worth is the most common measure of wealth, determined by taking the total market value of all physical and intangible assets owned, then subtracting all debts.

3.Explain any two definitions of business economics.

Wealth Definition – Adam Smith

The wealth definition was given by Adam Smith. According to this definition, economics is termed as the "science of wealth", that is, the economy of a nation depends on the wealth generated through the goods and services.

Definition of Economics – Alfred Marshall

According to Alfred Marshall, economics is defined as the "means to ends". Here, the means are the goods and services that are available. The ends refer to the needs and requirements by people that are satisfied through the means. This definition considered economics as a study of societal needs and means.

4.Explain any two characteristics of business.

→Micro in Nature:

Business economics is micro-economics in nature. This is due to the study of business economics mainly at the level of the firm .

→ Normative in Nature:

Business economics is also called normative economics which prescribes standards or norms for policy making. Business economics is prescriptive rather than descriptive in nature.

5.Write a note on sub-division in economics.

→Consumption

Human wants coming under consumption is the starting point of economic activity. In this section the characteristics of human wants based on the behaviour of the consumer, the diminishing marginal utility and consumer's surplus are dealt with.

→Production

Production is the process of transformation of inputs into output. This division covers the characteristics and role of the factors of production namely Land, Labour, Capital and Organization and also the relationship between inputs and output.

→Exchange

Exchange is concerned with price determination in different market forms. This division covers trade and commerce. Consumption is possible only if the produced commodity is placed in the hands of the consumer.

→Distribution

Production is the result of the coordination of factors of production. Since a commodity is produced with the efforts of land, labour, capital and organization, the produced wealth has to be distributed among the cooperating factors.

6.Define Demand.

Demand is a principle of economics that captures the consumer's desire to buy the product or service. The demand is calculated as the price the consumers are willing to pay for the product or service.

7.Name the different types of price elasticity of demand.

→ Inelastic Supply.

→Relatively Inelastic Supply.

→Relatively Elastic Supply.

→Perfectly Elastic Supply.

PART-B

8.Explain the characteristics of business economics.

→ Micro in Nature:

Business economics is micro-economics in nature. This is due to the study of business economics mainly at the level of the firm.

→ Basis of Theory of Markets and Private Enterprises:

Business economics largely uses the theory of markets and private enterprise. It uses the theory of the firm and resource allocation of private enterprise economy.

→ Pragmatic in Approach:

Business economics is pragmatic in its approach. It does not involve itself with the theoretical controversies of economics. Yet it does not relegate the realities of business decision-making to the background by bringing in abstract assumptions.

→ Normative in Nature:

Business economics is also called normative economics which prescribes standards or norms for policy making. Business economics is prescriptive rather than descriptive in nature.

→Macro Analysis:

Macro economics which deals with the principles of economic behaviour for the economy as a whole is also useful for business economics. A business unit operates within some economic environment which is in turn shaped by the behaviour of the economy as a whole.

9.Explain in the income Elasticity of demand.

→Income Elasticity of demand:

Income elasticity of demand refers to the sensitivity of the quantity demanded for a certain good to a change in the real income of consumers who buy this good.

The formula for calculating income elasticity of demand is the percent change in quantity demanded divided by the percent change in income. With income elasticity of demand, you can tell if a particular good represents a necessity or a luxury.

→Types of Income Elasticity of Demand

There are five types of income elasticity of demand:

*High: A rise in income comes with bigger increases in the quantity demanded.

*Unitary: The rise in income is proportionate to the increase in the quantity demanded.

*Low: A jump in income is less than proportionate to the increase in the quantity demanded.

*Zero: The quantity bought/demanded is the same even if income changes

*Negative: An increase in income comes with a decrease in the quantity demanded.

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SRM Arts and Science College
Kattankulathur
Department of Commerce(ISM)
Internal Examination – September 2022

INTERNET OF THINGS

Date: 30.10.2022 Marks: 25
Class: I B.Com ISM

PART A (5x2=10)

Answer any FIVE questions

CO-1 BL-1 1.Define 'Internet'

CO-1 BL-1 2.What is IOT.

CO-1 BL-2 3.Illustrate on DNS.

CO-1 BL-1 4.What is Router.

CO-1 BL-1 5. Define Client Server Model.

CO-1 BL-1 6.List the mode of Transmission.

CO-1 BL-1 7.How the Information Travel across the Internet.

PART B(1x5=5)

Answer any ONE question

CO-1 BL-4 8.Examine the TCP/IP Model.

CO-1 BL-6 9.Discuss the mode of Transmission.

PART C(1x10=10)

Answer any ONE question

CO-1 BL-2 10.Explain the OSI Reference Model.

CO-1 BL-6 11.Elaborate the Files on Internet.

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USM220846

Name: S.A. Amirtha varshini

Unit Test - I

IOT - Internet of Things

Part A

1. Internet stands for Inter connected Networks, that is a network system that connects millions of web servers.

2. Internet of Things refers to interconnection of systems through internet of computing devices embedded in everydaut objects enable them to send and receive the data or information.

3. Domain Name System is directory service that provide a mapping between the name of a host on the network and its numerical address.

4. A Router is a networking device that forwards data packets between computer networks.

5. A client computer connects to a server computer an which the information resides, the client depends on the server to deliver information.

6. Mode of Transmission :-
   - Simplex Mode
   - Half - Duplex Mode
   - Full - Duplex Mode

7. The internet works by chopping data or information into chunks called packets. Each packet then moves through the networks in a series of hops.

   Data travels across the internet in packets. Each packet can carry a maximum of 1,500 bytes. Around these packets is a wrapper with a header and a footer.

Part B

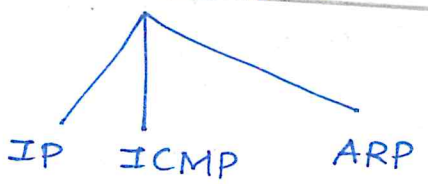
8. TCP/IP model has 4 Layers..

- Network Access Layer
- Internet Layer
- Host - to - Host Layer
- Application Layer

Network Access Layer :-

The combination of Data Link Layer and physical Layer of the OSI model. It looks out for hardware addressing and the protocols present in this layer allows for the physical transmission of data.

Internet Layer :-



Host - to - Host Layer :-

It is responsible for end - to - end communication and error - free delivery of data It shields the upper - layer applications from the complexities of data. The two main protocols present in this layer are :

- TCP
- UDP

Application Layer :-

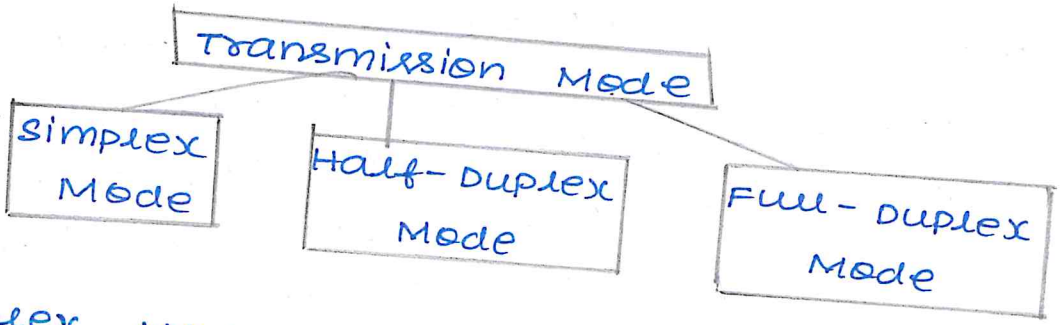
The top three Layers of the OSI model : Application, presentation and session Layer.

TCP/IP Model
Application Layer
Transport Layer
Internet Layer
Network Access Layer

OSI Model
Application Layer
Presentation Layer
Session Layer
Transport Layer
Network Layer
Data link Layer
Physical Layer

9. Transmission mode means transferring of data between two devices. It is also known as communication mode.

- Simplex Mode
- Half - Duplex Mode
- Full - Duplex Mode



Simplex Mode :-

The communication is unidirectional, as on a one-way street. Only one of the two devices on a link can transmit, the other can only receive.

Eg: keyboard and traditional monitors.

Half - Duplex Mode :

Each station can both transmit and receive, but not at the same time. When one device is sending, the other can only receive and vice versa. The half duplex mode is used in cases where there is no need for communication in both direction at the same time.

eg: walkie - talkie

Full - Duplex Mode :

Both stations can transmit and receive simultaneously.

eg: Telephone Network

Part C

10. The Open Systems Interconnection model (OSI model) is a conceptual model that characterises and standardises the communication functions of a telecommunication or computing system without regard to its underlying internal structure and technology.

7. Application
6. Presentation
5. Session
4. Transport
3. Network
2. Data Link
1. Physical

The 7 Layers of the OSI Model

Physical Layer

The lowest layer of the OSI Model is concerned with electrically or optically transmitting raw unstructured data bits across the network from the physical layer of the sending device to the Physical layer of the receiving device.

Data Link Layer

At the data link layer, directly connected nodes are used to perform node-to node data transfer when data is packaged into frames.

Network Layer

The network layer is responsible for receiving frames from the data link layer, and delivering them to their intended destinations among based on the addresses contained inside the frame.

Transport Layer

The transport layer manages the delivery and error checking of data packets.

Session Layer

The session layer controls the conversation between different computer.

Presentation Layer

The presentation layer formats or translates data for the application layer based on the syntax or semantics that the application

11.

- AVI - Audio/video format

Standard Audio video format supported on the windows platform.

- CSS - cascading style sheet

CSS files are a tool in the repertoire of webmasters that take care of how their websites look.

- DOC - Microsoft word document

Microsoft word is the most popular word processing software in the world.

- EXE - Execute file format

If you download a program that you need to install, it will likely come as an exe file.

- GIF - Graphics Interchange Format

The most common image format on the Internet.

- HTML - Hyper Text Markup Language file

Most pages you create for a website will be HTML files.

- JPG / . JPEG - Joint photographic Experts Group fi

Another very common image file format, mainly used for photos.

- MIDI / . MID - Musical Instrument Digital Interface

Midis are sequenced music files made on keyboards.

- MP3 - MPEG Layer 3 Sound file

singlehandedly caused a revolution.

- MPEG1 · MPG - Motion Picture Experts Group file

one of the standards for streaming movies files.

- MOV/·QT - Quick Time MOVIE

The Quick Time format was designed by Apple and originated on the Mac, but has made the transition to the PC and is hugely popular.

- PDF - Portable Document Format

The portable Document text Format is a file format developed by Adobe in 1993 to present documents, including text formatting and image in a manner independent of application software hardware and operating system.

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Kattankulthur-603 203.
Department of Information Systems and Management

II- UNIT EXAMINATION OCTOBER – 2022 (Odd semester)

TIME TABLE

All the students are hereby informed that II Unit Examination will commence from 31.10.2022 to 04.11.2022. Duration of the Examination is One hour **(12.00 PM to 1.00 PM)** for, I, II & III-B.Com (ISM) Students. It is advised to attend all the exams without fail.

CLASS / DATE	31/10/2022	01/11/2022	02/11/2022	03/11/2022	04/11/2022
I- B.COM ISM	Language	English	Financial Accounting	Business Economics	Internet Of Things
II B.COM ISM	Banking Theory Law & Practice	Data structure	Business Statistics	Java Theory	Computerized Accounting
III B.COM ISM	Financial Management	Logistics and Supply Chain Management	Spreadsheet Accounting	Business Analytics	Elements of Portfolio Management

Internal Exam Committee.

1) Dr.B.Don Bosco
2) Dr.R.Malarvizhi
3) Mr. G.Inbasagaran
4) Mr. S. ElayaMurugan
5) Ms.K.Balasree

Question Pattern for UG

1. 5 out of 7 (5x2=10)
2. 1 out of 2 (1x5=5)
3. 1 out of 2 (1x10=10)

Total = 25 Marks

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DEPARTMENT OF COMMERCE

(Information Systems and Management)

II- Unit Examination- October /November 2022Seating Arrangements

(31.10.2022 to 04.11.2022)

	Roll/ Register No.	Class	No of Students
Room No : 405	USM220801- USM220818	I B.COM (ISM)	18
	422100617 - 422100634	II B.COM (ISM)	18
	422000466 - 422000463	III B.COM (ISM)	18
	Total		**54**

	Roll/ Register No.	Class	No of Students
Room No : 406	USM220819- USM220836	I B.COM (ISM)	18
	422100635 - 422100652	II B.COM (ISM)	18
	422000464 - 422000481	III B.COM (ISM)	18
	Total		**54**

	Roll/ Register No.	Class	No of Students
Room No : 305	USM220837- USM220856	I B.COM (ISM)	20
	422100653 - 422100671	II B.COM (ISM)	19
	422000482 - 422000500	III B.COM (ISM)	18
	Total		**57**

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DEPARTMENT OF COMMERCE (INFORMATION SYSTEM MANAGEMENT)
II UNIT EXAMINATION October/November 2022
STAFF INVIGILATION DUTY

DATE	ROOM NO	STAFF NAME	STAFF SIGNATURE
31.10.2022	305	Mr.S.Elaya Murugan	
	405	Ms.K.Balasree	
	406	Dr.R.Malarvizhi	
01.11.2022	305	Dr.K.Janagaraj	
	405	Ms.K.Balasree	
	406	Mr.Inbasakaran	
03.11.2022	305	Mr.P.Nehru	
	405	Mr.Inbasakaran	
	406	Ms.K.Balasree	
04.11.2022	405	Mr.Inbasagran	
	406	Dr.R.Malarvizhi	
10.11.2022	405	Dr.B.Donbosco	
	406	Ms.K.Balasree	

Head of the Department

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Department of Commerce(ISM)
Kattankulathur
II-Unit Examination – November 2022

INTERNET OF THINGS

Date: 04.11.2022
Class: I B.Com ISM

Marks: 25

PART A (5x2=10)
Answer any FIVE questions

CO-1	BL-2	1.Define 'Internet Service Providers'
CO-1	BL-2	2.What is Dial connection.
CO-1	BL-2	3.Illustrate on ISDN.
CO-1	BL-2	4.What is WIFI.
CO-1	BL-2	5.Define the Bluetooth.
CO-1	BL-2	6.Compare the difference betweenWi-Fi and hotspot.
CO-1	BL-2	7.What is spam folder.

PART B (1x5=5)
Answer any ONE question

CO-2	BL-4	8.Examine the MODEM.
CO-2	BL-6	9.Discuss aboutSatellite connections.

PART C (1x10=10)
Answerany ONE question

CO-2	BL-2	10.Explain the communication about internet in email.
CO-2	BL-6	11.Elaborate chat and Instant messaging.

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INTERNET OF THINGS

Part - A

1). Internet Service Provider [ISP] is a Company offering access to internet. They offer various Services:

* Internet Access
* Domain name registration
* Dial-up access
* Leased line access.

2). Dial-up Connection uses telephone line to Connect PC to the internet. It requires a modem to setup dial-up connection. This modem works as an interface between PC and the telephone line.

3). ISDN is acronym of Integraded Service Digital Network. It establishes the connection using the phone lines which carry digital signal instead of analog signal.

There are two techinques

1). Basic Rate Interface (BRI)

2). Primary Rate Interface (PRI).

4). Wireless Internet Connection makes use of radio frequency bands to connect to the internet and offers a very high speed. The wireless internet connection can be obtained by either Wifi

5). Bluetooth is a network technology that comes mobiles devices wirelessly over a short range to form a personal area network (PAN).

6).

	Wifi	Hotspot
1).	Wifi is a wireless Communication technology that is used for LAN	Whereas the hotspot Provides internet to wireless devices by using wifi.
2).	There is no hotspot without wifi	Whereas a hotspot is Created using wifi.
3).	Wifi is used between wireless devices and an access point for inter-Connection.	While the hotspot is created using an access point device that is Connected to the router.

7). Spam is a form of email which is used to send to different email accounts and in general contains advertising about any product or services. But the real problem is when they contain malwares that can damage the user's data.

Part - B

8). Modem

Modem is short for "Modulator - Demodulator". It is a hardware component that allows a computer or another device, such as a router or switch, to connect to the Internet.

Types of Modems

1). Directional Capacity : half duplex modem and full duplex modem.

2). Connection to the line : 2-wire modem and 4-wire modem.

3). Transmission mode: asynchronous modem and synchronous modem

Half duplex and full duplex Modems.

Half duplex

1). A half duplex modem permits transmission in one direction at a time.

2]. If a carrier is detected on the line by the modem, I gives an indication of the incoming carrier to the DTE through a control signal of its digital interface.

3]. As long as they Camel IS being received the modem does not give permission to the DTE to transist data.

Full duplex

* A full duplex modem allows simultaneous transmission in both directions.

* Therefore, these are two carrier on the line, one outgoing and the other incoming. Wire and 4- wire Modems.

* In a 4- wire connection, one pair of wires or is used for the outgoing carrier and the other pair is used for incoming carrier.

2 Wire Modem

* 2 Wire modems use the same pair of Wires for outgoing and incoming carries.

* A leased 2 - wire~~connection~~ modems, half duplex mode of transmission that uses the same frequency for the incoming and outgoing carriers can be easily implemented.

* For full duplex mode of operation, it is necessary to have two transmission channels, one for transmit direction and the other for receive direction.

Asynchronous modems

* Asynchronous modems can handle data bytes with start and stop bits.

* There is no separate timing signal or clock between the modem and the DTE.

* The internal timing pulses are synchronized repeatedly to the leading edge of the start pulse

Synchronous Modem

* Synchronous modems can handle a continues stream of data bits but requires a clock signal.

* The data bits are always synchronized to the clock signal.

* There are separate clocks for the data bits being transmitted and received.

9). ## Satellite Connections

Satellite Internet Connection offers high speed connections to the internet. There are two types. one way connection or two way connection. In one way connection, we can download and upload the data but if we want to upload, we need a dialup access through ISP over telephone line.

Soviet Union had launched the worldd's first artificial satellite named, sputnik 1 in 1957 Nearly after 18 years India also launched the artificial satellite named, Aryabhata in 1975.

Needs of satellite Communication

* Ground wave progation - Ground wave Propagation is suitable for frequencies up to 30MHz. This method of Communication makes use of the troposphere conditions of the earth

* Sky wave propagation - The suitable bandwidth for this type of Communication is boardly between 30-40 MHz and it makes use of the ionosphere properties of the earth.

Advantages

* Area of coverage is more that of terrestrial systems
* Each and every corner of the earth can be covered
* Transmission cost is independent of coverage area
* More bandwith and broadcasting possibilies

disadvantages

* Launching of satellites into orbits is a costly process.
* Propagation delay of satellite systems is more than that of conventional terrestrial systems.
* Difficult to provide repairing activites if any problem occurs in a satellite system
* Free space loss is more
* There can be congestion of frequencies.

10). Email

Electronic mail or email is one of the key Parts of e- revolution which is specially designed for communication purpose. Once you have an email account, you can start sending electronic messages to anyone if you have the recipient's email address. The format of an email address is " username @ symbol domain name name (yahoo.com, gmail.com, etc).

E - mail Address

E-mail is generally of the form user name @domainname. for example, webmaster @ tutorialspoint .com is an e-mail address where webmaster is username and tutorialspoint.com is domain name

* The username and the domain name are separated by @ (at) symbol

* E-mail address are not case sensitive

* Spaces are not allowed in e-mail addressed

E-mail Message Components.

E-mail message comprises of different components. E-mail Header, greeting, text, and signature. These components are described in email Header

E-mail Header

The first five lines of an E-mail message is called E-mail header.

* From
* Date
* To
* Subject
* cc
* Bcc

From :

The From field indicates the sender's address (i.e) who sent the e-mail data.

Date

The Date field indicates the date when the e-mail was sent.

To

The to field indicates the recipient's address [i.e] to whom the e-mail is sent

Subject

The subject field indicates the purpose of e-mail. It should be precise and to the point.

Cc

cc stands of carbon copy of e-mail. It should be precise and to the point.

CC

CC stands for carbon copy. It includes those recipient addresses when we want to keep informed but not exactly the intended recipient.

Bcc

BCC stands for Blind Carbon Copy. It is used when we do not want one or more of the recipients to known that someone else was copied on the message.

Advantages:

* Reliable

Many of the mail systems notify the sender if e-mail message was undeliverable.

* Convenience

There is no requirement of stationery and stamps One does not have to go to post office. But all these things are not required for sending or receiving an mail.

Speed

E-mail is very fast. However, the speed also depends upon the underlying network

Inexpensive

The cost of sending e-mail is very low.

Printable

It is easy to obtain a a hardcopy of an e-mail. Also an electronic copy of an e-mail can also be saved for records.

Global

E-mail can be sent and received by a person sitting across the globle.

Generality

It is also possible to send graphics, Programs and sounds with an e-mail.

Disadvantages

Forgery

E-mail dosen't prevent from forgery, that is someone impersonating the sender, since sender is usually not authentical in anyway.

Overload.

Convenience of E-mail may result in a flood of mail.

Misdirection

It is possible that you may send email to an unintended recipient.

Junk

Junk emails are undesirable and inappropriate emails. Junk emails are somtimes refferred to as spam.

No response

It may be frustrating when the recipient does not read the e-mail and respond on a regular basis.

11). ## CHAT

Online Conversation in which you are immediatly able to send messages back and forth to another is called chat. Chatting is a Communication over the internet that offers a real time transmission of text messages from the sender to a receiver.

Risks from Chatting

Viruses

Chatting can be attacked from emails attachments phishing or instant message. This can result to the hacking of a user computer or a network.

Malicious Software

Attackers can use that chat room to redirect the genuine user to a fake webpage to steal their credentials.

Hacking that comes from Hacked Chat Servers

This hacking can come when the server of the game has been compromised because of its vulnerability as a result this can put in danger all the users that are connected to this chatting server.

Internet Relay chat [IRC]

IRC is a form of real time internet chat or synchronous conferencing. It is mainly used for group communication in discussion forums called channels also allows one-to-one Communication in discussion via private message.

Video Conference

A video conference is a telecommunication technology, which permits two or more people in different locations to interact via mutual video or audio transmission simultaneously. It can also be used to share documents, Computer displayed information, whiteboard, etc.

Voice over Telephony [VOIP]

VOIP stands for voice over IP, where IP refers to internet protocol which is a base for all internet communications. Voice quality can still differ from call to call but is often equal to and can even beat the traditional calls.

Instant Messaging

Instant messaging is a process of transferring real - time messages between users. It facilities Private chat room atmosphere. Instant messaging is real time mutual Communication between persons via internet.

Remote access

Internet permits computer users to connect to other computer across the world and to store information effortlessly. This can be done with or without any security, authencation and encryption techologies depending on the requirements which encourages work home culture.

Collabration

Low cost and rapid sharing of ideas, knowledge and skills has made collaborative work easy. Email is also an easy way to communicate. Collaboration helps voice and video chat between team members and to work with shared set of documents.

File sharing

* A file or document can be e-mailed to anyone as an attachment.

* It can be uploaded to website or FTP server, for users to download content

* It can be put into a shared location or onto a cloud for instant use by colleagues.

Streaming media

Many existing radio and television Presents provide internet feeds of their live audio and video streams. An internet connected device device, such as a computer or something more specific can be used to access on line media in much the same way, as television or radio receiver.

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II UNIT TEST, OCTOBER2022

CLASS: II B. Com (ISM) TIME: 1 Hour

SUB: Banking Theory Law & Practice Max: 25 Marks

Date : 31.10.2022

PART A – (5 X 2 = 10 Marks)

Answer any FIVE questions

1. Define e- banking.
2. Who is a minor?
3. Define endorsement.
4. What is crossing?
5. State any four special types of customers in bank account.
6. What is fixed deposit receipt?
7. What is electronic fund transfer?

PART B – (1 X 5 = 5 Marks)

Answer any ONE questions

8. Distinguish between saving bank account and current account.
9. Explain the drawbacks of e- banking.

PART C – (1 X 10 = 10 Marks)

Answer any ONE questions

10. What is negotiable instrument? Explain its types.
11. Explain the differenttypesof endorsement.

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II UNIT TEST, OCTOBER/NOVEMBER 2022

ANSWER KEY

CLASS: II B. Com (ISM) TIME: 1 Hour

SUB: Banking Theory Law & Practice Max: 25 Marks

PART A – (5 X 2 = 10 Marks)

CO3 BL1 1. Define e- banking.

Electronic banking is a form of banking in which funds are transferred through an exchange of electronic signals rather than through an exchange of cash, checks, or other types of paper documents. It is simply the use of electronic means to transfer funds directly from one account to another, rather than by cheque or cash.

CO4 BL1 2. Who is a minor?

Minor is a person who has not completed the age of 18 years. If a guardian is appointed by the court to look after his person or property, he will attain majority only at the completion of 21 years.

CO5 BL 1 3. Define endorsement.

Endorsement of a negotiable instrument refers to the act of writing a person's name on the back of instrument for the purpose of negotiation. It is an amendment or special clause to a document or contract, an authorizing signature, or a publicdeclaration of support. Specific types include insurance, signature, and license endorsements.

CO 4 BL 1 4. What is crossing?

Crossing is an instruction given to the paying banker to pay the amount of the cheque through a banker only and not directly to the person presenting it at the counter." The Negotiable Instruments Act, 1881, sets out in Section 123 – 131 the provisions concerning the crossing of cheques.

CO 4 BL 1 5. State any four special types of customers in bank account.

Primary function, banker invites the public to open an account with the bank. Opening of an account with a bank is creation of a special contract the following are "Special Types of Customers" as follows:

- Minor
- Illiterate
- Joint account
- Joint Hindu Family

CO 4 BL 1 6.What is fixed deposit receipt?

A Fixed Deposit Receipt (FDR) is nothing but a document provided by the bank after the applicant procures a fixed deposit scheme from their bank. This document contains details such as the individual's name, age, address, details of the scheme chosen by them such as deposit amount, tenure and interest rate applicable on the deposit and so on.

CO 3 BL 17.What is electronic fund transfer?

Electronic funds transfer (EFT) is the electronic transfer of money from one bank account to another, either within a single financial institution or across multiple institutions, via computer-based systems, without the direct intervention of bank staff.

PART B – (1 X 5 = 5 Marks)

CO 4 BL2 8. Distinguish between saving bank account and current account.

Saving bank account

Savings account as the name suggests, is for saving your money for a long term. Here are some of the most prominent features of a savings account:

- In this account, there is a fixed interest earned on that you deposit.
- The minimum balance in savings account is lesser compared to current account.

Current account

Current account is usually an account opened when there would be frequent transactions involved. Some of the features include:

- Current account is for making quick transactions.
- They come with a myriad of facilities like overdrafts, no limit on withdrawals or deposits and more.

	Current Account	**Savings Account**
Interest	No Interest earned	Earn Interest on your savings
No. of Transactions	Unlimited transactions	Limited number of transactions
Purpose	Used for business	Build emergency funds
Required Balance	High minimum required Balance	Low minimum required balance
Normally used for	Used for paying bills and business transactions	Used for salary accounts
Suitable for	Business People	Individuals

CO 3 BL29.Explain the drawbacks of e- banking.

Drawbacks of e- banking.

E-banking has various advantages which improves the banking system but there are disadvantages of using internet banking. These are as follows:

1. Security issues

Internet banking is completely insecure as there are many problems related to the website and data can be hacked by the hackers. It can leads to financial loss to the users. The financial information can also be stolen that can also create financial loss.

2. Lack of direct contact between customer and banking officer

Online banking requires effective customer service for handling issues faced by the user. But lack of customer support creates disappointment among the customers. There are some online payments which may not be reflected in the system due to technical issues. It also creates insecurity among the customers. Thus the lack of support from customer service executive is a barrier in online banking.

3. Transaction problem

During online banking there are various issues faced by the user such as transferred payment is not reflected, payment failed, and other issues due to technical support.

4. Long procedure to access e-banking

In some countries, government banks are providing internet banking by filling the internet banking form then after approval you can access security password to log in. An individual need to download the App of specific banking then all credentials needs to be filled for login successfully.

5. Training and development

The banks need to conduct training and development program for employees for providing quality online services which enhance the customer experience. It requires huge investment to train them for providing effective services.

PART C – (1 X 10 = 10 Marks)

CO 4 BL1, BL2 10.What is negotiable instrument? Explain its types.

A negotiable instrument is a document guaranteeing the payment of a specific amount of money, either on demand, or at a set time, whose payer is usually named on the document.

- **Cheques**

Cheques are perhaps the most common negotiable instrument example. This is an instrument in writing with a specific payment amount. Upon receipt, the payer's financial institution pays out these funds to the bearer, either in cash or to a chosen bank account. Cheques are used to pay many different types of bills, from loans to university fees and rent. They're being phased out in favour of online banking transactions, but cheques still provide a helpful paper trail for businesses.

- **Bills of exchange**

Used in transactions related to both goods and services, bills of exchange are legally binding documents. They instruct one party to pay a predetermined sum to a secondary party. The payer signs the bill of exchange, creating a written contract of payment. When issued by a financial institution, a bill of exchange is often called a bank draft. When issued by an individual, it's called a trade draft.

- **Promissory notes**

When a promissory note is issued, it shows the amount owed together with the date of payment and interest rate. Like other negotiable instruments, they are written documents showing the promise of payment between a payer and payee. The document contains all relevant information, including interest rate, principal amount, date of issue, and payer signature. The benefit of a promissory note is that it enables businesses to obtain financing from sources outside of official financial institutions.

- **Money order**

Money orders offer a quick and efficient payment method. They can be issued by a financial institution or other entity. You can pay for a money order in cash to specify its value before sending it to the payee. It's then exchanged for cash at the other end. The main difference between money orders and cheques is that they usually come with a limit on issued value. They also contain less personal information than a cheque, as no personal bank account details are necessary.

CO 5 BL211 .Explain the differenttypesof endorsement.

Endorsement of a negotiable instrument refers to the act of writing a person's name on the back of instrument for the purpose of negotiation. It is an amendment or special clause to a document or contract, an authorizing signature, or a publicdeclaration of support. Specific types include insurance, signature, and license endorsements.

There are six types of endorsement. These are applicable for endorsement in banking and various types of endorsement cheques:

- Blank or General Endorsement.
- Full Endorsement or Special Endorsement.
- Conditional Endorsement.
- Restrictive Endorsement.
- Partial Endorsement.
- Facultative Endorsement.

In the following section, we are going to discuss each endorsement in detail.

Blank or General Endorsement

An endorsement is supposed to be blank or general endorsement when the endorser puts his unmistakable just on the instrument and doesn't compose the name of anybody to whom or to whose request the installment is to be made.

Full Endorsement or Special Endorsement

A special Endorsement or full Endorsement is when the endorser, notwithstanding his mark, additionally notices the name of the individual to whom or to whose request the installment is to be made. There is a heading added by Endorsement to the individual indicated called the endorsee of the instrument who presently turns into its payee qualified to sue for the cash due on the instrument.

Conditional Endorsement

The restrictive endorsement is an arrangement that produces results on the occurrence of an expressed occasion, or not something else. Segment 52 of the Negotiable Instrument Act 1881 gives the endorser of a debatable instrument may, by express words in the Endorsement, reject his own risk subsequently, or make such obligation or the privilege of the endorsee to get the sum due consequently rely on the occurrence of a predetermined occasion, albeit such occasion may never occur. Where an endorser so prohibits his risk and a short time later turns into the holder of the instrument, all intermediates endorsers are obligated to him.

Restrictive Endorsement

Restrictive Endorsement tries to end the chief qualities of a Negotiable Instrument and seals its further debatability. This may sound somewhat unordinary, yet the endorsee is especially inside his privileges on the off chance that he so signs that its resulting move is limited. This forestalls the danger of unapproved individuals acquiring installment through misrepresentation or falsification and losing their cash.

Partial Endorsement

An endorsement is supposed to be a partial endorsement when the endorser indicates to move to the endorsee, just an aspect of the sum payable. In straightforward terms, support which permits moving to the endorsee an aspect of the sum payable is known as halfway underwriting.

Facultative Endorsement

Facultative Endorsement is an underwriting where the endorser defers some privilege to which he is entitled. For instance, the endorsee is subject to pull out of disrespect to the endorser, and typically inability to pull out will vindicate the endorser from his risk.

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Department of Commerce (ISM)
II-Unit Examination – November 2022
DATA STRUCTURE

Date: 01.11.2022 Marks: 25
Class: II B.Com ISM

PART A (5x2=10)

Answer any FIVE questions

CO-2	BL-1	1.Define 'multiple stack'
CO-3	BL-1	2.What are the types of Linked List.
CO-3	BL-1	3.Tell the Dynamic Storage Management
CO-3	BL-1	4.Define Garbage collection and compaction.
CO-4	BL-1	5.What is trees.
CO-4	BL-1	6.Define 'Binary Trees'.
CO-5	BL-1	7.Tell the graphs.

PART B (1x5=5)

Answer any ONE question

CO-2	BL-3	8.Solvean algorithm for Infix to postfix conversion.
CO-3	BL-2	9.Determine the procedure to Polynomial addition

PART C (1x10=10)

Answerany ONE question

CO-3	BL-6	10.Discussthe types of linked list.
CO-4	BL-5	11.Explain in detail about Binary tree traversal.

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Department of commerce (CISM)

II - unit Examination - November 2022

Data Structure

Part - A

1. Define 'multiple Stack

A single stack sometimes non-sufficient to store a large amount of data. To overcome this problem, we can use multiple stack. For this, we have used a single array, having one more than one stack.

2. What are the types of Linked list.

(i) Singly linked list

(ii) Doubly linked list

(iii) Circular linked list

3. Tell the Dynamic Storage Management

Dynamic memory management involves use of Pointers and four standard library function namely Malloc, calloc, realloc and free.

4. Define Garbage collection and Compaction.

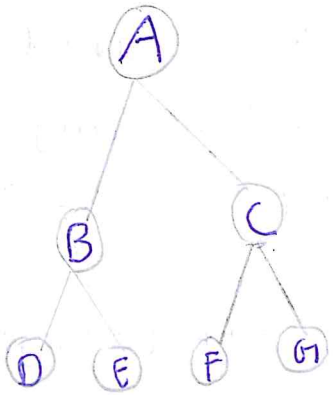
Garbage collection is a term used in computer programming to describe of finding and deleting object which are longer being references by other objects.

5. what is trees.

Tree is a non-linear data structure in which the elements are organised in a non-linear manner.

6. Define Binary Tree

A Binary tree which is special form of a tree which is atmost two childs left and right. The following diagram shows a binary tree.



(7) Tell the graphs

A graph is a non-linear data structure consisting of vertices and edges. more formally a graph is composed of a set of vertices (V) and a set of edges (E). The graph is denoted by G(E, V).

Part-B

8. Solvean algorithm for Infix to Postfix conversion.

Algorithm:

Step 1: Start

Step 2: Add a left Parentheses "(" and right Parentheses ")" to the begining and end of the equation respectively.

Step 3: Scan the equation from left to right.

Step 4: If a operand is starting move the operand to Postfix expression.

Step 5: If the left Parentheses is encountered push into a stack.

Step 6: If a operator is encountered Push the operator into a stack.

Step 7: If a right Parentheses is encountered Pop all the operator from stack and remove the left Parentheses from stack.

Step 8: Repeat the above steps until the last right Parentheses is encountered.

Step 9: Stop.

Ex: (A + B)

Symbol	Stack	Postfix
(	(	
A		A
+	(+	A
B	(+	A B
)		A B +

9. Determine the procedure to Polynomial addition

Adding two Polynomial using linked list:

Given two Polynomial number represent by a linked list, write a functions that

add these list means add the co-efficients zio have same variable Powers.

Definition:

A Polynomial (Px) is expression in the variable x which is in the form $(ax^n + bx^{n-1} + \ldots$ $\ldots jx + k)$ where a, b, ---- j, k, all the category of Real numbers and 'n' is non-negative integer.

Ex: $10x^2 + 26x$

Here 10 and 26 are co-efficient and 2, 1 is its exponential value.

Input

1st number = $5x1^2 + 4x11 + 2x10$

2nd number = $5x1^1 + 5x10$

output: $5x1^2 + 9x11 + 7x10$.

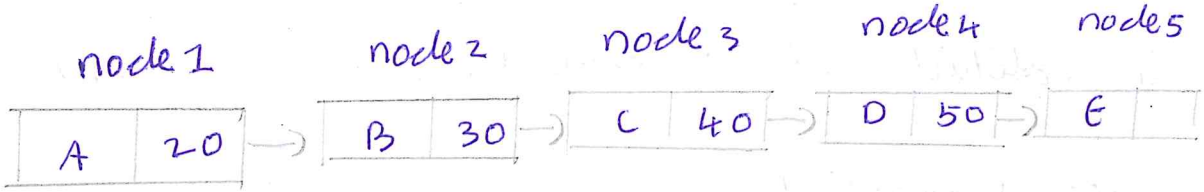
Part-C

10. Discuss the types of linked list.

- Types of linked list:
  - (i) Singly linked list
  - (ii) Doubly linked list
  - (iii) Circular linked list

(i) Singly linked list

Singly linked list is a linear data structure in which the node of created the dynamically. Dynamically node, the list which contains two field the first field is used to data and second field used to store the address of the next node.

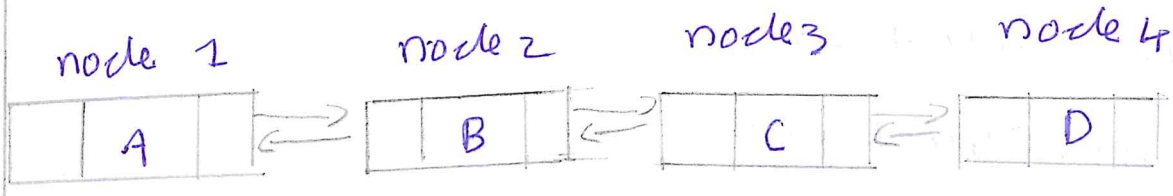


(ii) Doubly linked list:

In singly linked list we can travel in one direction but in same application we need to travers both the direction, this can

be possible in doubly linked list. Doubly linked list contains two linked list field and one data field.

The diagram showed Doubly linked list.



In Doubly linked list we have two Pointers called LPTR and RPTR.

(ii) Circular linked list:

Circular linked list can be modifing singly linked list, so the last linked field of the last node points to first node in the list.

11. Explain in detail about Binary tree traversal.

Binary tree traversal:

These operation tree continously used in binary tree this is used to visit a each node in a tree currently, once the tree traversal starts from root node.

Algorithm:

Step 1: Start

Step 2: Pointer = Root

Step 3: if (Ptr ≠ null)
visit Root
pre order (Ptr, L)
pre order (Ptr, R)

Step 4: end if

Step 5: Stop.

(iii) Post order traversal:

In this traversal first visit left and right subtree and root node.

Algorithm:

Step 1: Start

Step 2: Pointer = Root

Step 3: if (Ptr ≠ NULL
Postorder (Ptr, L)
postorder (Ptr, R)
visit root

Step 4: end if

Step 5: Stop

There are types of traversal:

(i) Inorder
(ii) Preorder
(iii) Postorder

(i) Inorder:

In this traversal first visit left sub tree then visit a root node and visit a ~~stag~~ right sub tree.

Algorithm:

Step1: Start
Step2: Pointer = root
Step3: if (Ptr ≠ Null)
Inorder (Ptr, L)
visit root
Inorder (Ptr, R)
Step 4: end if
Step 5: Stop

(ii) Preorder traversal:

In this traversal first visit root node and visit left subtree and then visit right subtree.

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Department of Commerce (ISM)
II-Unit Examination – November 2022
JAVA PROGRAMMING

Date: 03.11.2022 Marks: 25
Class: II B.Com ISM

Section-A (5x2=10)
Answer any FIVE questions

1. Define Variable.
2. What is meant by method overriding.
3. Define Class.
4. What is meant by multithreading.
5. Define Array with Example.
6. Define Constructors.
7. Define Inheritance.

Section- B (1x5=5)
Answer any ONE question

8. Write short notes on: Applet Life Cycle.
9. Define Packages and give example about creating a package.

Section- C (1x10=10)
Answer any ONE question

10. Explain briefly about Class, Method, Object Inheritance and Polymorphism with example.
11. Write a Java program for creating threads using the Thread class.

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II INTERNAL EXAMINATION-2022
JAVA PROGRAMMING

MARKS: 25 **YEAR: II**
DATE:

2 Marks

1. CO: 1 BL1: Define Variable.

   Variables are containers for storing data values. In Java, there are different types of variables, for example: String - stores text, such as "Hello". String values are surrounded by double quotes. int - stores integers (whole numbers), without decimals, such as 123 or -12.

2.CO 2: What is meant by method overriding?

   Method overriding occurs when a subclass (child class) has the same method as the parent class. In other words, method overriding occurs when a subclass provides a particular implementation of a method declared by one of its parent classes.

3.CO 2: BL 1: Define Class.

   A class **is** a basic building block. It can be defined as template that describes the data and behaviour associated with the class instantiation. Instantiating is a class is to create an object (variable) of that class that can be used to access the member variables and methods of the class.

4. CO 3: What is meant by multithreading?

   Multithreading refers to a process of executing two or more threads simultaneously for maximum utilization of the CPU. A thread in Java is a lightweight process *r*equiring fewer resources to create and share the process resources.

5. CO 2: Define Array with Example.

   Arrays are used to store multiple values in a single variable, instead of declaring separate variables for each value.

   To declare an array, define the variable type with **square brackets**:

6. CO 2: Define Constructors.

   A constructor is a block of codes similar to the method. It is called when an instance of the class is created. At the time of calling constructor, memory for the object is allocated in the memory.

5 marks

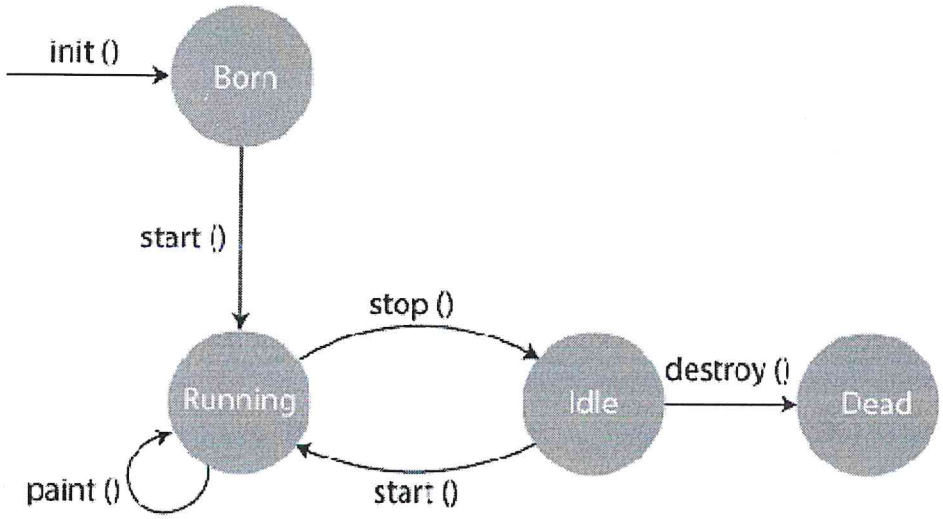
7. CO 4: Write short notes on: Applet Life Cycle.

Applet is a special type of program embedded in the web page to generate dynamic content. Applet is a class in Java.

The applet life cycle can be defined as the process of how the object is created, started, stopped, and destroyed during the entire execution of its application. It basically has five core methods namely init(), start(), stop(), paint() and destroy().These methods are invoked by the browser to execute.

Along with the browser, the applet also works on the client side, thus having less processing time.

Methods of Applet Life Cycle



- **init():** The init() method is the first method to run that initializes the applet. It can be invoked only once at the time of initialization. The web browser creates the initialized objects, i.e., the web browser (after checking the security settings) runs the init() method within the applet.
- **start():** The start() method contains the actual code of the applet and starts the applet. It is invoked immediately after the init() method is invoked. Every time the browser is loaded or refreshed, the start() method is invoked. It is also invoked whenever the applet is maximized, restored, or moving from one tab to another in the browser. It is in an inactive state until the init() method is invoked.
- **stop():** The stop() method stops the execution of the applet. The stop () method is invoked whenever the applet is stopped, minimized, or moving from one tab to another in the browser, the stop() method is invoked. When we go back to that page, the start() method is invoked again.
- **destroy():** The destroy() method destroys the applet after its work is done. It is invoked when the applet window is closed or when the tab containing the webpage is

closed. It removes the applet object from memory and is executed only once. We cannot start the applet once it is destroyed.

- **paint():** The paint() method belongs to the Graphics class in Java. It is used to draw shapes like circle, square, trapezium, etc., in the applet. It is executed after the start() method and when the browser or applet windows are resized.

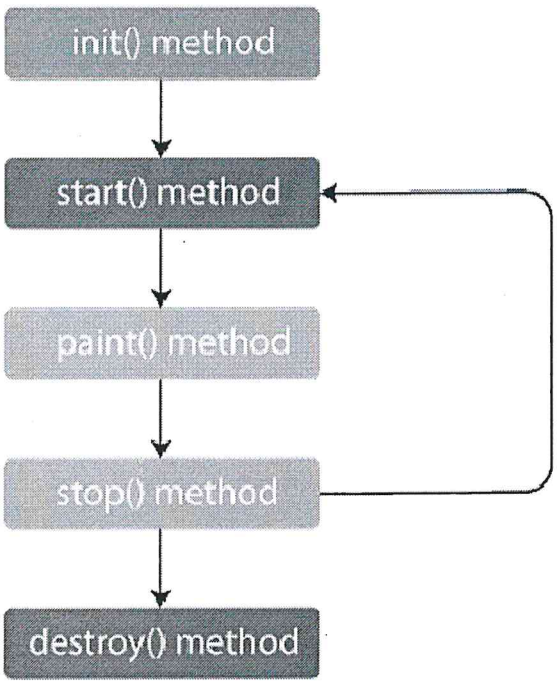
Sequence of method execution when an applet is executed:

1. init()
2. start()
3. paint()

Sequence of method execution when an applet is executed:

1. stop()
2. destroy()

Flow of Applet Life Cycle



8. CO 3: BL 1: Define Packages and give example about creating a package.

Package in Java is a mechanism to encapsulate a group of classes, sub-packages, and interfaces. All we need to do is put related classes into packages. After that, we can simply write an import class from existing packages and use it in our program. A package is contains a group of related classes where some classes are accessible are exposed and others are kept for internal purposes. We can reuse existing classes from the packages as many times as we need them in our program. Package names and directory structure are closely related.

There are two types of packages in java:

1. User-defined Package (Create Your Own Package's)
2. Built-in packages are packages from the java application programming interface that are the packages from Java API for example such as **swing, util, net, io, AWT, lang, javax**, etc.

Example for Importing a Package:

Java Program to Import a package

```
// Importing java utility package
import java.util.*;

// Main Class
class GFG {

  // Main driver method
  public static void main(String[] args)
  {

    // Scanner to take input from the user object
    Scanner myObj = new Scanner(System.in);
    String userName;
```

```
        // Display message
        // Enter Your Name And Press Enter
        System.out.println("Enter You Name");

        // Reading the integer age entered using
        // nextInt() method
        userName = myObj.nextLine();

        // Print and display
        System.out.println("Your Name IS : " + userName);
    }
}
```

10 marks

9. CO 2: Explain briefly about Class, Method, Object Inheritance and Polymorphism with example.

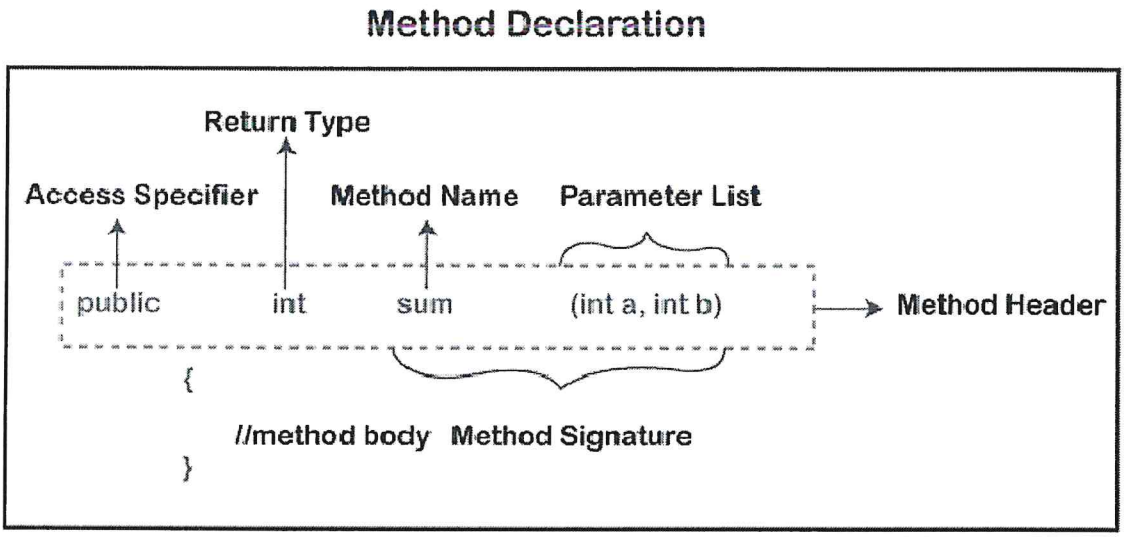
Class and Object

An entity that has state and behaviour is known as an object e.g., chair, bike, marker, pen, table, car, etc. It can be physical or logical (tangible and intangible). The example of an intangible object is the banking system.

- **State:** represents the data (value) of an object.
- **Behavior:** represents the behavior (functionality) of an object such as deposit, withdraw, etc.
- **Identity:** An object identity is typically implemented via a unique ID. The value of the ID is not visible to the external user. However, it is used internally by the JVM to identify each object uniquely.

Method is a way to perform some task. Similarly, the **method in Java** is a collection of instructions that performs a specific task. It provides the reusability of code. We can also easily modify code using **methods**. In this section, we will learn **what is a method in Java, types of methods, method declaration,** and **how to call a method in Java**.

Method Declaration



Inheritance

Inheritance is a mechanism in which one object acquires all the properties and behaviors of a parent object. It is an important part of OOPs (Object Oriented programming system).

The idea behind inheritance in Java is that you can create new classes that are built upon existing classes. When you inherit from an existing class, you can reuse methods and fields of the parent class. Moreover, you can add new methods and fields in your current class also.

Inheritance represents the **IS-A relationship** which is also known as a *parent-child* relationship.

Polymorphism is a concept by which we can perform a *single action in different ways*. Polymorphism is derived from 2 Greek words: poly and morphs. The word "poly" means many and "morphs" means forms. So polymorphism means many forms.

There are two types of polymorphism in Java: compile-time polymorphism and runtime polymorphism. We can perform polymorphism in java by method overloading and method overriding.

If you overload a static method in Java, it is the example of compile time polymorphism. Here, we will focus on runtime polymorphism in java.

10. CO 3: Write a Java program for creating threads using the Thread class.

There are two ways to create a thread:

1. By extending Thread class
2. By implementing Runnable interface.

Thread class:

Thread class provide constructors and methods to create and perform operations on a thread. Thread class extends Object class and implements Runnable interface.

Commonly used Constructors of Thread class:

- Thread()
- Thread(String name)
- Thread(Runnable r)
- Thread(Runnable r,String name)

Commonly used methods of Thread class:

1. **public void run():** is used to perform action for a thread.
2. **public void start():** starts the execution of the thread.JVM calls the run() method on the thread.
3. **public void sleep(long miliseconds):** Causes the currently executing thread to sleep (temporarily cease execution) for the specified number of milliseconds.
4. **public void join():** waits for a thread to die.
5. **public void join(long miliseconds):** waits for a thread to die for the specified miliseconds.
6. **public int getPriority():** returns the priority of the thread.
7. **public int setPriority(int priority):** changes the priority of the thread.
8. **public String getName():** returns the name of the thread.
9. **public void setName(String name):** changes the name of the thread.
10. **public Thread currentThread():** returns the reference of currently executing thread.
11. **public int getId():** returns the id of the thread.
12. **public Thread.State getState():** returns the state of the thread.
13. **public boolean isAlive():** tests if the thread is alive.

14. **public void yield():** causes the currently executing thread object to temporarily pause and allow other threads to execute.
15. **public void suspend():** is used to suspend the thread(depricated).
16. **public void resume():** is used to resume the suspended thread(depricated).
17. **public void stop():** is used to stop the thread(depricated).
18. **public boolean isDaemon():** tests if the thread is a daemon thread.
19. **public void setDaemon(boolean b):** marks the thread as daemon or user thread.
20. **public void interrupt():** interrupts the thread.
21. **public boolean isInterrupted():** tests if the thread has been interrupted.
22. **public static boolean interrupted():** tests if the current thread has been interrupted.

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II UNIT TEST, OCTOBER/NOVEMBER 2022

CLASS: III- B. Com (ISM) TIME: 1 Hour

SUB: Financial Management Max: 25 Marks

Date : 31.10.2022

PART A – (5 X 2 = 10 Marks)

Answer any FIVE questions

CO-3 BL-1 1.Define cost of debt.

CO-3 BL-1 2.State cost of capital.

CO-3 BL-1 3.Define preference shares.

CO-4 BL-1 4.State Walter model of dividend.

CO-4 BL-1 5.Define Stock divided.

CO-5 BL-2 6.Discuss the operating cycle.

CO-5 BL-1 7. Define working capital.

PART B – (1 X 5 = 5 Marks)

Answer any ONE questions

CO-3 BL-2 8.Explain elements of cost of capital and write the formulas.

CO-3 BL-3 9.Srinivasa Ltd., issued 10,000 , 10% Debentures at Rs.100 each. The debentures are redeemable after 10 years at a premium of 5%. If the tax rate is 50% calculate the cost of debt before tax and after tax.

PART C – (1 X 10 = 10 Marks)

Answer any ONE questions

CO-5 BL-2 10.Explain determinants of working capital requirements.

CO-3 BL-3 11.Slove WACC using a) Book value & B) Market value.

Source of capital	Book value (Rs.)	Market Value (Rs.)	Cost (%)
14% Preference capital	6,00,000	6,90,000	14%
Equity Capital	15,00,000	22,50,000	17%
16% Debt	9,00,000	8,10,000	8%

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Financial management

II – UNIT EXAM (NOVEMBER 2022)

ANSWER KEY

PART – A

1. Define cost of debt.
   Interest rate that a company pays on its debts, such as bonds and loans. The cost of debt can refer to the before-tax cost of debt, which is the company's cost of debt before taking taxes into account, or the after-tax cost of debt.
2. State cost of capital.
   Cost of capital is the minimum rate of return or profit a company must earn before generating value.
3. Define preference shares.
   A share which entitles the holder to a fixed dividend , whose payment takes priority over that of ordinary share dividends.
4. State walter model of dividend.
   The dividend policy is a precursor of the value of a company.as company pays dividend depending on the earnings.
5. Define stock dividend.
   A dividend payment to shareholders that is made in shares instead of cash.dividend paid to common stock owners from the profits of the company.
6. Discuss the operating cycle.
   The time it takes a company to buy goods,sell them and receive cash from the sales of said goods.
7. Define working capital.
   Working capital is the money available to meet your current , short term obligations.

PART – B

1. Explain elements of cost of capital and write the formula.

- Cost of debt:

Returns expected by the potential investor of debt securities of a firm.

Formula:

$KD = I/NP*[1-T]*100$

- Cost of preference share:

A share which entitles the holder to a fixed dividend , whose payment takes priority over that of ordinary share dividends.

Formula :

$$KP=\frac{D+RV-NP/N}{RV+NP/2}*100$$

- Cost of equity:

The return that a company requires for an investment or projects or the return that an individual requires for an equity investment

Formula:

$KE=D/NP+G*100$

- Cost of retained earning:

The cost to a corporation of funds that it has generated internally.

Formula :

$KR=KE*(1-IT)*(1-6)*100.$

2. Srinivasa ltd issues 10000, 10% debentures at rs.100 each. The debentures are redeemable after 10 years a premium of 5 %. If the tax rate is 50% .calculate the cost of debt before tax and after tax.

Interest =100000

Net proceeds:

Face value	1000000
(add)	
Premium10%	100000
	1100000
Discount	—
	1100000
Issue expenses	—
Net proceeds	1100000

PART – C

1. Explain determinants of working capital requirements.

- **Nature and Size of Business:**

The requirement of working capital depends on the nature and size of business manufacturing concerns require larger amounts of working capital in comparison to trading concerns.

- **Position of Business Cycle:**

Working capital requirement will be higher during times of boom compared to the lean periods. It can be said that the volume of working capital is directly related with the volume of production.

- **Production Policy:**

If the production takes a longer period, there is greater need of working capital compared to shorter period of production.

- **Market Conditions:**

If there is a high degree of competition in the market, large inventory is essential to sell goods. Thus, it requires high amount of working capital.

- **Seasonal Business:**

In case of seasonal business, working capital requirements of a firm during the production season will be more.

- **Dividend Policy:**

Dividend policy also affects working capital. Payments of dividend causes outflow of cash while retained profits act as source of working capital.

- **Credit Policy:**

If the firm enjoys a lesser credit period, it has to purchase raw materials in cash and working capital requirements will be greater.

- **Tax Level:**

Working capital requirements also depend on the rates of taxes and advance tax provisions.

2. Solve WACC using a) bookvalue b)market value.

Source of capital	Book value	Market value	Cost%
14% preference capital	600000	690000	14%
Equity capital	1500000	2250000	17%
16% debt	900000	810000	8%

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DEPARTMENT OF COMMERCE (ISM)
II UNIT TEST NOVERMBER 2022

LOGISTICS & SUPPLY CHAIN MANAGEMENT

CLASS: III B.Com(ISM) TIME: 1 Hour

Date : 01/11/2022 Max: 25 Marks

PART -A **(5 X 2 = 10 Marks)**

Answer any FIVE questions

1. What do you understand by supply chain management.

2 Define warehousing.

3 Write a note on transportation in logistics .

4 What do you understand by order processing in logistics.

5 Define transportation network.

6 Write a short note on forecasting the demand in logistics.

7. Define customer service.

PART -B **(1 X 5 = 5 Marks)**

Answer any ONE questions

8. Distinguish between warehousing and distribution centre.

9.Narrate the competitive advantages of logistics in business.

PART –C **(1 X 10 = 10 Marks)**

Answer any ONE questions

10.Describe the impact of transportation cost in logistic operations

11.Explain the role of integrated IT solutions for logistics and supply chain management.

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1. What do you understand by Supply chain management.

SCM is management of the flow of goods, data, and finances related to a product or services, from the procurement of raw materials to the delivery of the product at its final destination.

2. define warehousing.

Storing physical inventory for sale or distribution. Warehouses are used by all different types of business that need to temporarily store products in bulk either shipping them to other locations or individually to end consumers.

3. Write a note on transportation in logistics.

Transportation in logistics are Shipments by truck, ship, train and plane it also known as road, maritime, rail and air shipment.

part-c.

10. Impact of Transportation cost on logistic operations.

1. Market characteristics.

Amount or degree of competition in your market

Distance to market, how far your product needs to travel.

government regulation: such as dangerous goods requirements, over-dimensional restrictions, or weight limitations.

2. product characteristics.

Density:

low density products tend to cost more to transport per pound. These are bulky, like furniture, that may not weight

Stowability:

How well can your product fill available space in a transport vehicle.

Ease to handling:

Are your products uniform in size? are they secured to the pallet so its easy for forklift operators to work with them?

3. volume and frequency

Volume:

* Rate leverage
* lower pick up and drop off

Cost

* Higher carrier revenue
* volume

Frequency:

* Rate leverage
* Better planning and improved performance
* Improved labour and equipment usage,

consolidation and cross docking:

4. consolidation and cross docking are done really well by carriers, or logistics but importers don't tend to do it well.

So, in order to see real gains, work closely with your carrier or logistics partner.

5. Appointments:

It may seem very appealing to have appointments with your truckers, i.e The driver will get there at 9 am. appointments mean a lot of waiting time without revenue

11. The role of Integrated IT Solutions for logistics and Supply chain management.

1. Integrated and coordinated Supply chain:

A Supply chain can work efficiently when it is properly integrated and coordinated. It is performing this important task by bringing in multiple technologies and combining them to optimize the Supply chain.

2- Increased productivity

A Smooth flow of Information new technologies, and effective communication Increase the productivity of all entities in the Supply chain.

3- Cost Reduction.

IT permits the optimum Utilization of assets and resources. previous data is used to study the trends.

The role of IT becomes more prominent as it motivates all parties to use their respective resources.

4. product improvement

IT is consisting of tools and applications which can be used to attain early awareness. In a market where customers always want something new, the product will either have to evolve or else it will go out of demand.

5. Supply chain visibility:

Consequently, Information builds the whole supply chain managers. how the information flows from one collaborator to the other and the effect it has on others is used by the managers. in creating strategic decisions.

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Department of Commerce (ISM)
II - UNIT EXAMINATION OCT/NOVEMBER 2022

CLASS: I- B. Com (ISM) TIME: 1 Hour

SUB: Business Economics Max: 25 Marks

Date: 03.11.2022

Section - A (5 X 2 = 10 Marks)

Answer any FIVE question

CO-2	BL-1	1.Define Demand.
CO-2	BL-1	2.State Giffen goods.
CO-2	BL-2	3.Explain Forecasting.
CO-3	BL-1	4.Define the term Marginal utility.
CO-4	BL-1	5.State break-even point.
CO-4	BL-1	6.List Long run cost curve.
CO-5	BL-1	7.Define Transfer pricing.

Section - B (1 X 5 = 5 Marks)

Answer any ONE question

CO-2	BL-2	8.Explain Methods of Demand Forecasting.
CO-5	BL-2	9.Summarize various Pricing Techniques.

Section - C (1 X 10 = 10 Marks)

Answer any ONE question

CO-2	BL-2	10.Describe the types of Elasticity of demand.
CO-4	BL-2	11.Discuss the classification of law of returns to scale.

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DEPARTMENT OF COMMERCE (ISM)

II-UNIT EXAMINATION OCT/NOVEMBER 2022

CLASS: I-B.COM (ISM)

SUB:BUSINESS ECONOMICS

ANSWER KEY

SECTION -A

1.Define demand.

Ans:- according to prof. benham: "the demand for anything at a given price is the amount of it which will be brought per unit of time at that price".

2.state giffen goods.

Ans:- it is necessarily an inferior good with very high negative income elasticity of demand. The good is consumed by low paid wage earners who spend a large proportion of their income to buy it. Example- jowar and bajra.the demand curve is backward sloping or upward sloping.

3.explain forecasting.

Ans:- demand forecasting refers to the prediction or estimation of a future situation under given constraints.

4. define the term marginal utility.

Ans:- marginal utility means the addition made to the total utility by consuming one more unit [additional unit] of a commodity.

5. state break-even point.

Ans:- according to Horngren, " the break even point is the point of activity where total revenues and total expenses are equal. It is the point of zero profit".

6. list long run cost curve.

Ans:- in the long run, there are three costs:

1. Long-run total cost
2. Long-run average cost
3. Long-run marginal cost

7. define transfer pricing.

Ans:- Transfer pricing refers to the rules and methods for pricing transactions within and between enterprises under common ownership or control.

SECTION-B

8. explain methods of demand forecasting.

Ans:- 1. Survey methods:-

In this method, the desires of the consumers and the opinions of experts by interviewing them. Short- term forecasting depends heavily on the survey methods.

The new products require the use of survey methods only. In the absence of past information or historical data for the new products, the survey methods alone would help.

2. statistical methods:-

These methods use the past data as a guide for knowing the level of future demand. Long- term forecasting makes use of this method.

The method of forecasting is not the same for all products. It is possible to forecast the demand for established products by using any method, but for the new products it is not so.

9. summarize various pricing techniques.

Ans:- *Premium pricing:* high price is used as a defining criterion. Such pricing strategies work in segments and industries where a strong competitive advantage exists for the company. Example: Porche in cars and Gillette in blades.

Penetration pricing: price is set artificially low to gain market share quickly. This is done when a new product is being launched. It is understood that prices will be raised once the promotion period is over and market share objectives are achieved. Example: Mobile phone rates in India; housing loans etc.

Economy pricing: no-frills price. Margins are wafer thin; overheads like marketing and advertising costs are very low. Targets the mass market and high market share. Example: Friendly wash detergents; Nirma; local tea producers.

Skimming strategy: high price is charged for a product till such time as competitors allow after which prices can be dropped. The idea is to recover maximum money before the product or segment attracts more competitors who will lower profits for all concerned. Example: the earliest prices for mobile phones, VCRs and other electronic items where a few players ruled attracted lower cost Asian players.

SECTION- C

10. describe the types of elasticity of demand.

Ans:- 1. Perfectly elastic demand:-

Perfectly elastic demand is said to happen when a little change in price leads to an infinite change in quantity demanded. A small rise in price on the part of the seller reduces the demand to zero. in such a case, the shape of the demand curve will be horizontal straight line.

2. perfectly inelastic demand:-

Perfectly inelastic demand is opposite to perfectly elastic demand. Under the perfectly inelastic demand, irrespective of any rise or fall in price of a commodity, the quantity demanded remains the same. The elasticity of demand in this case will be equal to zero.

3.unitary elastic demand:-

A given proportionate change in price level brings about an equal proportionate change in quantity demanded. The numerical value of unitary elastic demand is exactly one i.e., ed=1. Marshall calls it unit elastic. This demand curve is called rectangular hyperbola.

4.relatively elastic demand:-

It refers to a situation in which a small change in price leads to a big change in quantity demanded.in such a case elasticity of demand is said to be more than one. The slop will be gentle.

5.relatively inelastic demand:-

This is with reference to situations where a larger change in price will result in smaller change in the quantity demanded. In this case E<1. Hence it is called as inelastic demand. The demand curve will be steeper.

11. discuss the classification of law of returns to scale.

Ans:-i) stage I-Increasing Returns to scale: It occurs when increase in output is more than proportional to an increase in inputs. If labour and capital are the only two inputs and they are increased by 10% then output increases by more than 10%. If labour and capital are doubled, output more than doubles.

ii) stage II-constant returns to scale: it occurs when increase in output is proportional to an increase in inputs. If labour and capital are increased by 10% then output also increases by 10%. If labour and capital are doubled,output also doubles. Constant returns implies constant costs and constant costs are due to constant economies of scale. That is, if an increase in te capacity of the firm has no effect on the long run average cost of production.

iii) stage III- decreasing returns to scale: it occurs when increase in output is less than proportional to an increase in inputs.

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II-Unit Examination – November 2022

Subject: Portfolio Management Class: III- B. Com ISM
Date: 04.11.2022 Marks: 25

Section- A

Answer any FIVE questions (5x2=10)

1. What do you mean by time value of money?
2. What is wealth management?
3. State the importance of Time preference of money(TPM).
4. What is discounting techniques?
5. What is compounding techniques?
6. What is Risk?
7. What is portfolio analysis?

Section- B

Answer any ONE question (1x5=5)

8. Discuss the various steps involved in Portfolio Development.
9. Explain the SEBI regulations relating to Portfolio Operations.

Section- C

Answer any ONE question (1x10=10)

10. Explain the portfolio investment process?
11. Discuss the objectives of Time value of money.

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Portfolio unit exam answer key (November 2022)

Section A

1. What do you mean by time value of money ?

The time value of money (TVM) is the concept that a sum of money is worth more now than the same sum will be at a future date due to its earnings potential in the interim. The time value of money is a core principle of finance. A sum of money in the hand has greater value than the same sum to be paid in the future.

2. What is wealth management ?

Wealth management is an investment advisory service that combines other financial services to address the needs of affluent clients. A wealth management advisor is a high-level professional who manages an affluent client's wealth holistically, typically for one set fee.

3. State the importance of Time preference of money(TPM)

4. What is discounting techniques ?

Discounting is the process of determining the present value of a payment or a stream of payments that is to be received in the future. Given the time value of money, a dollar is worth more today than it would be worth tomorrow. Discounting is the primary factor used in pricing a stream of tomorrow's cash flows.

5. What is compounding techniques ?

Compounding technique. It is a process of calculating future value using present investment. It determines money gained by an investment. It is also called as present value. Compound interest rate.

6. What is risk ?

All investments involve some degree of risk. In finance, risk refers to the degree of uncertainty and/or potential financial loss inherent in an investment decision

7. What is portfolio analysis ?

Portfolio analysis is an examination of the components included in a mix of products with the purpose of making decisions that are expected to improve overall return.

Section B

8. Discuss the various steps involved in portfolio development

9. Explain the SEBI regulations relating to portfolio operations

Section C

10. Explain portfolio investment process ?

Portfolio investment process is an important step to meet the needs and convenience of investors. The **portfolio investment process** involves the following steps:

Planning of portfolio.

Implementation of portfolio plan.

Monitoring the performance of portfolio

1. Planning of Portfolio

Planning is the most important element in a proper portfolio management. The success of the portfolio management will depend upon the careful planning. While making the plan, due consideration will be given to the investor's financial capability and current capital market situation. After

taking into consideration a set of investment and speculative policies will be prepared in the written form. It is called as statement of investment policy. The document must contain (1) The portfolio objective (2) Applicable strategies (3) Investment and speculative constraints.

2. Implementation of Portfolio Plan

In the implementation stage, three decisions to be made, if the percentage holdings of various assets classes are currently different from the desired holdings as in the SIP, the portfolio should be re-balances to the desired SAA (Strategic Asset Allocation). If the statement of investment policy requires a pure investment strategy, this is the only thing, which is done in the implementation stage.

3. Monitoring the Performance of Portfolio

Portfolio performance monitoring is a continuous and on going assessment of present investment portfolio and the portfolio manger shall incorporate the latest development which occurred in capital market. The portfolio manager should take into consideration of investor's preferences, capital market condition and expectations. Monitoring the portfolio performance is up-grading activity in asset composition to take the advantage of economic, industry and market conditions. The market conditions are depending upon the Government policy. Any change in Government policy would reflect the stock market, which in turn affects the portfolio.

11. Discuss the objectives of time value of money.

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DEPARTMENT OF COMMERCE (ISM)
I UNIT TEST- FEBRUARY 2023

ADVANCED FINANCIAL ACCOUNTING

CLASS: I- BCOM ISM TIME: 1 Hour
DATE : 01.03.2023 Max: 25 Marks

PART A (2X 5 = 10)

Answer any 5 Questions

CO-1 BL-1 1. What are Branch accounts?
CO-1 BL-6 2. Write a short note on 'Stock And Debtors System'.
CO-1 BL-1 3.State two Objects Of Maintaining Branch Accounts.
CO-1 BL-6 4. Write short notes on Goods In Transit.
CO-3 BL-1 5. Define the term Partnership.
CO-3 BL-1 6. What is Revaluation Account?
CO-3 BL-1 7.What is Sacrificing Ratio?

PART B (1X 5 = 5)

Answer any ONE Question

CO-1 BL-3 8. From the following particulars, prepare branch account in the book of Head Office.

	Rs.
Stock on 1-1-2013	11,400
Goods sent to branch	1,09,000
Cash sent to branch for salaries	8,600
Rent	7,200
Other expenses	2,200
Cash sent by the branch	1,72,600
Stock on 31-12-2013	7,600
Cash in hand on 31-12-2013	100

CO-1 BL-3 9. From the following particulars relating to Madurai branch, prepare Branch Accounting . The books of Head office for the year ended 31st March2004.

	Rs.
Opening stock	30,000
Opening debtors	12,000
Opening petty cash	200
Goods sent to branch	50,000
Goods returned to H.O	600
Sales at branch cash	30,000
Credit sales	42,000
Sales return at branch	300
Bad debts written off	300
Branch expenses paid by H.O	3,000
Petty cash sent to branch	500
Closing petty cash	300
Closing stock	12,500

PART C (1X 10 = 10)

Answer any ONE Question

CO-3 BL-3 10. X and Y were in partnership sharing profits and losses in the ratio of 3 : 2. Their balance sheet on 31.12.2011 was as follows:

Liabilities	**Rs.**	**Assets**	**Rs.**	**Rs.**
CapitaL A/C		Plant and machinery		20000
X	50000	Land and Buildings		25000
Y	45000	Furniture		6000
Creditors	25000	Stock		15000
		Debtors	30000	
		Less : Provision	2000	
				28000
		Cash		26000
	120000			**120000**

They want to take Z into partnership subject to the following terms;

I) Z pays Rs.25000 as capital for 1/4th share in the business.

II)Plant and machinery be increased by 20% and Land and Buildings be reduced to Rs.20000

III) An item of Rs.2000 included in Sundry creditors is not likely to be claimed.

IV)Certain investment amounting to Rs. 13000(not included in the above balance sheet) should be brought into account.

V) Provision for doubtful debts is increased to Rs.3000.

Prepare necessary adjustment and balance sheet after admission of new partner Z.

CO-3 BL-3 11.A and B are partners in firm. They share profits and losses in the ratio of 3:1. Their balance sheet is as follows:

Liabilities		**Rs.**	**Assets**	**Rs.**
Capital	A	80,000	Buildings	1,00,000
	B	40,000	Plant	25,000
Reserve		40,000	Stock	40,000
Creditors		60,000	Debtor	70,000
Bills payable		20,000	Cash	5,000
		2,40,000		**2,40,000**

C is admitted into partnership for 1/5th share of the business on the following terms.

a) Building is revalued at Rs.1,20,000
b) Plant is depreciated to 80%
c) Provision for bad debts is made at 5%
d) Stock is revalued at Rs.30,000
e) C should bring in Rs. 20000 as capital.

Prepare the necessary ledger accounts and Balance Sheet of the new firm.

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I UNIT TEST - FEBRUARY 2023

CLASS: I B.Com ISM | TIME: 1 Hour

SUB: OOPS in C++ | Max: 25 Marks

DATE: 02.03.2023

PART A – (5 X 2 = 10 Marks)

Answer any FIVE questions

CO-1 BL-1 1.What is 'object - oriented programming?

CO-1 BL-1 2.Tell any two types of OOP'S languages.

CO-2 BL-1 3.What ae keywords? Can keywords be used as Identifiers?

CO-2 BL-1 4.Define Identifiers.

CO-1 BL-1 5.Define the term constant.

CO-2 BL-1 6.What is variable?

CO-1 BL-1 7.What is model? And it types?

PART B – (1 X 5 = 5 Marks)

Answer any ONE question

CO-1 BL-5 8.Outline any five promising areas in OOP applications used.

CO-1 BL-5 9.Explain the different data types.

PART C – (1 X 10 = 10 Marks)

Answer any ONE question

CO-1 BL-5 10.Explain the basic concepts of object oriented programming.

CO-2 BL-6 11.Discuss the various operators in C++.

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I UNIT TEST - February 2023

CLASS: III B.Com ISM TIME: 1 Hour

SUB: Software Project Management Max: 25 Marks

Date : 27.02.2023

PART A – (5 X 2 = 10 Marks)

Answer any FIVE questions

CO-1 BL-1 1.What is a project?

CO-1 BL-2 2.Compare the software projects versus other types of Project.

CO-1 BL-1 3.What is management control?

CO-1 BL-1 4.Define the stake holders.

CO-1 BL-1 5.What are requirement specification?

CO-1 BL-2 6.Illustrate the project planning?

CO-1 BL-1 7.What is review?

PART B – (1 X 5 = 5 Marks)

Answer any ONE question

CO-1 BL-5 8.Explain the information and control in Organizations.

CO-1 BL-6 9.Discuss the cash flow forecasting.

PART C – (1 X 10 = 10 Marks)

Answer any ONE questions

CO-1 BL-6 10.Elaborate the cost-benefit analysis.

CO-1 BL-6 11.Discuss the step wise: an overview of project Planning.

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I UNIT TEST - FEBRUARY 2023

Department of Commerce (ISM)

CLASS: I- B.Com ISM TIME: 1 Hour

SUB: Indian Economy Max: 25 Marks

DATE: 03.03.2023

SECTION-A **5X2=10**

Answer Any Five Questions

CO-1 BL-1 1.What is Meant by Economic Development

CO-1 BL-1 2.What is National Income?

CO-2 BL-1 3.What are the three concept of unemployment

CO-2 BL-2 4.Explain Poverty line.

CO-2 BL-6 5.Write a short note on GNP, NNP, PT?

CO-2 BL-1 6.Define the term Inequalities.

CO-2 BL-1 7.What is Disguised Unemployment?

SECTION-B **5X1=5**

Answer Any One Question

CO-1 BL-1 8.What are the difference between growth and Development.

CO-2 BL-6 9.Write a note of Nehru Rozgar Yojana.

SECTION-C **10X1=10**

Answer Any One Question

CO-1 BL-4 10.Analysis the different problems of Indian economy.

CO-2 BL-2 11.Discuss Bhagawathi Committee on Unemployment.

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DEPARTMENT OF COMMERCE (ISM)
I UNIT TEST, FEBRUARY 2023
MANAGEMENT INFORMATION SYSTEM

CLASS: II BCOM ISM | TIME: 1 Hour

DATE: 27.02.2023 | Max: 25 Marks

PART A – (5 X 2 = 10 Marks)

Answer any FIVE questions

CO-1	BL-1	1.Define MIS.
CO-1	BL-1	2.State Information.
CO-1	BL-1	3. State Planning.
CO-2	BL-1	4.Define Database Design.
CO-1	BL-1	5.List out Evolution of MIS.
CO-1	BL-2	6.Discuss Information Over flow.
CO-2	BL-2	7.Classify the types of DBMS.

PART B – (1 X 5 = 5 Marks)

Answer any ONE question

CO-2	BL-2	8.Describe about Creation and Control in DBMS.
CO-2	BL-2	9.Explain about Recent Trends in DBMS.

PART C – (1 X 10 = 10 Marks)

Answer any ONE questions

CO-2	BL-2	10.Explain briefly about Database design.
CO-1	BL-2	11.Discuss the components of Management Information System.

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Department of Commerce (ISM)

I UNIT EXAMINATION, FEBUARY 2023

PRINCIPLES OF MANAGEMENT

Date: 28.02.2023 **Max Marks: 25**

Class: II B. Com (ISM) **Duration: 1Hr**

Section – A (5x2=10)

Answer Any FIVE Questions:

CO-1 BL-1 1.Define Management.

CO-1 BL-1 2.Define Management is an Art.

CO-1 BL-1 3.Define the Term Controlling.

CO-1 BL-1 4.Define top level management.

CO-1 BL-1 5.What do you understand by management as a Profession.

CO-2 BL-4 6.Mention any two points of difference between Administration and Management.

CO-2 BL-1 7.Define Planning.

Section – B (1x5=5)

Answer Any ONE Question:

CO-1 BL-1 8.Enumerate the various functions of Management.

CO-2 BL-1 9.What are the Stages involved in Planning.

Section – C (1x10=10)

Answer Any ONE Question:

CO-1 BL-1 10. Explain the characteristics of the Management.

CO-2 BL-2 11. Describe the classification of plans according to time.

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Department of Commerce (ISM)

Class: II - B.Com (ISM) Date: 01.03.2023

Sub: FINANCIAL SERVICES Time: 1 hour Max. Marks : 25 Marks

Part-A **5*2=10**

Answer any five of the following:

CO-1 BL-1 1.What do you mean by Financial Services?

CO-1 BL-2 2.Give any two financial services.

CO-1 BL-1 3.State the components of financial system.

CO-1 BL-1 4.What is financial markets?

CO-2 BL-2 5. Give the meaning of merchant banking.

CO-2 BL-1 6.What is Issue Management?

CO-2 BL-2 7. Explain Underwriter.

Part-B **1*5=5**

Answer any one of the following:

CO-1 BL-2 8. Explain the importance of financial services in India.

CO-2 BL-2 9. Discuss the conditions laid down by the SEBI for Merchant Bankers.

Part-C **1*10=10**

Answer any one of the following:

CO-1 BL-2 10. Describe the various types of financial Services.

CO-2 BL-2 11. Explain the functions of Merchant bankers.

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DEPARTMENT OF COMMERCE (ISM)
I UNIT TEST- FEBRUARY 2023

SUBJECT: PYTHON PROGRAMMING

CLASS: II- BCOM ISM TIME: 1 Hour

DATE : 02.03.2023 Max: 25 Marks

PART A (2X 5 = 10)

Answer any 5 Questions

CO-1 BL-1 1.Define Variable?

CO-1 BL-6 2.Write a python program: sum of two numbers with user input.

CO-1 BL-1 3.What is an Interpreter?

CO-1 BL-1 4.Define Class and Objects?

CO-1 BL 1- 5.List the Types of Comment Lines in Python.

CO-1 BL 1- 6.Name the Data Types in python with Example.

CO-1 BL-1 7.Define List.

PART B (1X 5 = 5)

Answer any ONE Question

CO-1 BL-1 8.Explain about Operators with Example.

CO-1 BL-2 9.Describe about Modules.

PART C – C (1X10=10)

Answer any ONE Question

CO- BL-2 10.Describe in detail about List and their Methods with Example.

CO-1 BL-1 11.Explain in detail about Tokens with Example.

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I UNIT TEST, FEBRUARY - 2023
FINANCIAL SERVICES

CLASS: II B. Com (ISM) TIME: 1 Hour

DATE: 01.03.2023 Max: 25 Marks

PART A – (5 X 2 = 10 Marks)
Answer any FIVE questions

1. CO 1 BL 1 What is Factoring?
2. CO 1 BL 1 Define merchant banking
3. CO 2 BL 1 What is issue management?
4. CO 1 BL 1 What is Leasing?
5. CO 2 BL 1 What is new issues market?
6. CO 1 BL 1 List out the players of financial services
7. CO 2 BL 1 What is private placement?

PART B – (1 X 5 = 5 Marks)
Answer any ONE question

8. CO 1 BL 2 Explain the various importance of financial services?
9. CO 2 BL 2 Difference between the new issue market and secondary market.

PART C – (1 X 10 = 10 Marks)
Answer any ONE questions

10. CO 1 BL 2 Describe the various functions of financial service
11. CO 2 BL 4 Explain the various functions of merchant banking.

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Department of Commerce (ISM)

Class: III B.Com (ISM) Date: 28.02.2023
Sub: Management Accounting Time: 1 hour

Part-A **5*2=10**

Answer any five of the following:

CO-1 BL-1 1.Define Management Accounting.
CO-1 BL-1 2 .State the Accounting.
CO-1 BL-2 3.Summarise the scope of Management Accounting.
CO1 BL-1 4. Discuss the Cost Accounting
CO2 BL-1 5. Examine the Financial Statement.
CO2 BL-2 6. Classify the types of Analysis.
CO2 BL-1 7. State the Trend Percentage.

Part-B **1*5=5**

Answer any one of the following:

CO1 BL-2 8.Explain the Objectives of Management Accounting.

CO-2 BL-3 9.Following is the profit and loss account of S ltd for the year ended 31.12.85 and 31.12.86.You are required to solve common size statement.

Profit and Loss Account

Particulars	1985 (Rs.)	1986 (Rs.)	Particulars	1985 (Rs.)	1986 (Rs.)
To Cost Of Goods sold	300	375	By Net Sales	400	500
To Operating expenses: Administration Expenses	10	10			
Selling expenses	15	20			
Net Profit	75	95			
	400	**500**		**400**	**500**

Part_C **1*10=10**

Answer any one of the following:

CO1 B2 10.Difference Between Financial Accounting and Management Accounting.

CO2 B3 11. From the following P&L a/c for the year ended 31st Dec 2004 & 2005 your required to calculate a comparative income statement for the year 2004 & 2005.

Particulars	2004 (Rs.)	2005 (Rs.)	Particulars	2004 (Rs.)	2005 (Rs.)
To cost of goods sold	600	750	By Net sales	800	1000
To Administration Expenses	20	20			
To selling Expenses	30	40			
To Net Profit	150	190			
	800	**1000**		**800**	**1000**

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I UNIT TEST, FEBRUARY 2023

ENTREPRENEURIAL DEVELOPMENT

Date: 01.03.2023 **Max.Marks:25**

Class: III B.COM (ISM) **Duration: 1 Hr**

Part – A

Answer any **FIVE** questions. **(5x1=5)**

1. CO1 BL1: 1. Who is an Entrepreneur?
2. CO1 BL1: 2. Define the term Entrepreneurship?
3. CO1 BL1: 3. Who is a Social Entrepreneur?.
4. CO2 BL2: 4. Explain the term Idea generation?
5. CO1 BL1: 5. Who is a Woman Entrepreneur?
6. CO2 BL1: 6. What is Focus groups?
7. CO2 BL1: 7. What is Brain storming?

Part – B

Answer any **TWO** questions. **(2x5=10)**

CO1 BL2: 1. Discuss the characteristics of Entrepreneur?

CO3 BL1: 2.Explain the steps in selection of New Business Opportunities?

Part – C

Answer any **ONE** question. **(1x10=10)**

CO1 BL6: 1. Discuss the factors influencing Entrepreneurship?

CO2 BL5: 2.Elucidate the Techniques of Business Idea Generation?

******** ALL THE BEST*********

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Department of Commerce (ISM)

Class: III - B.Com (ISM) Date: 02.03.2023

Sub: WEB TECHNOLOGY Time: 1 hour

Max. Marks : 25 Marks

PART A - (5X 2 = 10 MARKS)

Answer any 5 Questions

CO-1 BL-1 1.Give the expansion of HTML

CO-1 BL-1 2.What is a form?

CO-1 BL-1 3 .How will you create tables in HTML?

CO-1 BL-2 4. Differentiate between HTML, CSS and Java Script.

CO-1 BL-1 5. Define Variables in Java Script.

CO-1 BL-1 6. Define Table in HTML.

CO-1 BL-6 7. Discuss about the advantages of javascript.

PART B – (1X5=5)

Answer any ONE Questions

CO-1 BL-6 8.Write the Tags in HTML with their use.

CO-1 BL-6 9.Write a HTML program Ordered and Unordered List with Example

PART C – (1x10=10)

Answer any ONE Questions

CO-1 BL-6 10.Write the Applications and Advantages of HTML and Java Script.

CO -1 BL-6 11.Write a program using personal Bio-data in HTML.

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I Unit Examination, February 2023

Object-Oriented Programming using C++

Class: I B.Com(ISM) **Duration: 1 Hr** **Max Marks: 25**

PART A

1. **What is Object-Oriented Programming?**

Object-oriented programming (OOP) is a programming paradigm based upon objects (having both data and methods) that aims to incorporate the advantages of modularity and reusability. Objects, which are usually instances of classes, are used to interact with one another to design applications and computer programs.

2. **Tell any two types of OOPS languages?**

Some examples of object-oriented programming languages are C++, Java, Smalltalk, Delphi, C#, Perl, Python, Ruby, and PHP.

3. **What are keywords? Can keywords used as identifiers?**

Keywords **are reserved words** which have fixed meaning, and its meaning cannot be changed. The meaning and working of these keywords are already known to the compiler. C++ has more numbers of keyword than C, and those extra ones have special working capabilities.There are 32 of these

4. **What are identifiers?**

Identifiers are names given to different entries such as variables, structures, and functions. Also, identifier names should have to be unique because these entities are used in the execution of the program

5. **Define term constant**

Constants are like a variable, except that their value **never changes during execution once defined.**

There are two other different ways to define constants in C++. These are:

- By using const keyword
- By using #define preprocessor

Declaration of a constant:

```
const [data_type] [constant_name]=[value];
  int a=20;
```

6. **What is variable?**

A variable is a meaningful name of data storage location in computer memory. When using a variable you refer to memory address of computer.

Syntax to declare a variable[data_type] [variable_name];

7. **What is model? And its types?**

Models in C++ One of the most common ways to integrate C++ and QML is through models. A model provides data to a view such as ListViews , GridView , PathViews , and other views which take a model and create an instance of a delegate for each entry in the model

PART B

8. **Outline any five promising areas in OOPS applications used?**

- **Application Software Development** - C++ programming has been used in developing almost all the major Operating Systems like Windows, Mac OSX and Linux. Apart from the operating systems, the core part of many browsers like Mozilla Firefox and Chrome has been written using C++. C++ also has been used in developing the most popular database system called MySQL.
- **Programming Languages Development** - C++ has been used extensively in developing new programming languages like C#, Java, JavaScript, Perl, UNIX's C Shell, PHP and Python, and Verilog etc.
- **Computation Programming** - C++ is the best friends of scientists because of fast speed and computational efficiencies.
- **Games Development** - C++ is extremely fast which allows programmers to do procedural programming for CPU intensive functions and provides greater control over hardware, because of which it has been widely used in development of gaming engines.
- **Embedded System** - C++ is being heavily used in developing Medical and Engineering Applications like software's for MRI machines, high-end CAD/CAM systems etc.

9. **Explain different data types?**

C++ offers the programmer a rich assortment of built-in as well as user defined data types. Following table lists down seven basic C++ data types –

Type	Keyword

Boolean	bool
Character	char
Integer	int
Floating point	float
Double floating point	double
Valueless	void
Wide character	wchar_t

PART C

10. Explain the basic concept of object oriented programming?

Object oriented programming is a type of programming which uses objects and classes its functioning. The object oriented programming is based on real world entities like inheritance, polymorphism, data hiding, etc.

Some basic concepts of object oriented programming are –

- CLASS
- OBJECTS
- ENCAPSULATION
- POLYMORPHISM
- INHERITANCE
- ABSTRACTION

Class – A class is a data-type that has its own members i.e. data members and member functions. It is the blueprint for an object in object oriented programming language. It is the basic building block of object oriented programming in c++. The members of a class are accessed in programming language by creating an instance of the class.

Some important properties of class are –

- **Class** is a user-defined data-type.
- A class contains members like data members and member functions.
- **Data members** are variables of the class.
- **Member functions** are the methods that are used to manipulate data members.

- Data members define the properties of the class whereas the member functions define the behaviour of the class.

Syntax

```
class class_name {
  data_type data_name;
  return_type method_name(parameters);
}
```

Object – An object is an instance of a class. It is an entity with characteristics and behaviour that are used in the object oriented programming. An object is the entity that is created to allocate memory. A class when defined does not have memory chunk itself which will be allocated as soon as objects are created.

Syntax

```
class_name object_name;
```

Encapsulation In object oriented programming, encapsulation is the concept of wrapping together of data and information in a single unit. A formale defination of encapsulation would be: encapsulation is binding togather the data and related function that can manipulate the data.

Due to the concept of encapsulation in object oriented programming another very important concept is possible, it is data abstraction or Data Hiding. it is possible as encapsulating hides the data at show only the information that is required to be displayed.

Polymorphism The name defines polymorphism is multiple forms. which means polymorphism is the ability of object oriented programming to do some work using multiple forms. The behaviour of the method is dependent on the type or the situation in which the method is called polymorphism.

In c++ programming language, polymorphism is achieved using two ways. They are operator overloading and function overloading.

Operator overloading In operator overloading and operator can have multiple behaviour in different instances of usage.

Function overloading Functions with the same name that can do multiple types based on some condition.

Inheritance it is the capability of a class to inherit or derive properties or characteristics other class. it is very important and object oriented program as it allows reusability i.e. using a method defined in another class by using inheritance. The class that derives properties from other class is known as child class or subclass and the class from which the properties are inherited is base class or parent class.

C plus plus programming language supports the following types of inheritance

- single inheritance
- multiple inheritance
- multi level inheritance
- Hierarchical inheritance

- hybrid inheritance

Abstraction Data abstraction or Data Hiding is the concept of hiding data and showing only relevant data to the final user. It is also an important part object oriented programing.

let's take real life example to understand concept better, when we ride a bike we only know that pressing the brake will stop the bike and rotating the throttle will accelerate but you don't know how it works and it is also not think we should know that's why this is done from the same as a concept data abstraction.

In C plus plus programming language write two ways using which we can accomplish data abstraction –

- using class
- using header file

11. Discuss the various operators in C++?

Operator

C++ operator is a symbol that is used to perform mathematical or logical manipulations.

- Arithmetic Operators
- Increment and Decrement Operators
- Relational Operators
- Logical Operators
- Bitwise Operators
- Assignment Operators
- Misc Operators

1. Arithmetic Operators

	Operator	Description
2		
.Incr emen t and Decre ment Oper ators	+	Addition
	-	Subtraction
	*	Multiplication
	/	Division

Operator	Description
++	Increment

--	Decrement

3. Relational Operators

Operator	Description
==	Is equal to
!=	Is not equal to
>	Greater than
<	Less
>=	Greater than or equal to
<=	Less than or equal to

4. Logical Operators

Operator	Description
&&	And operator. Performs logical conjunction of two expressions.(if both expressions evaluate to True, result is True. If either expression evaluates to False, the result is False)
||	Or operator. Performs a logical disjunction on two expressions.(if either or both expressions evaluate to True, the result is True)
!	Not operator. Performs logical negation on an expression.

5. Bitwise Operators

Operator	Description
<<	Binary Left Shift Operator

Operator	Description
!=	Is not equal to
>>	Binary Right Shift Operator
~	Binary One's Complement Operator
&	Binary AND Operator
^	Binary XO0052 Operator
|	Binary OR Operator

6. Assignment Operators

Operator	Description
=	Assign
+=	Increments, then assign
-=	Decrements, then assign
*=	Multiplies, then assign
/=	Divides, then assign
%=	Modulus, then assigns
<<=	Left shift and assigns
>>=	Right shift and assigns

Operator	Description
&=	Bitwise AND assigns
^=	Bitwise exclusive OR and assigns
|=	Bitwise inclusive OR and assigns

7. Misc Operators

Operator	Description
,	Comma operator
sizeOf()	Returns the size of a memory location.
&	Returns the address of a memory location.
*	Pointer to a variable.
? :	Conditional Expression

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DEPARTMENT OF COMMERCE (ISM)
I UNIT TEST, FEBRUARY 2023
MANAGEMENT INFORMANTION SYSTEM

CLASS: II BCOM ISM **TIME: 1 HOUR**

PART-A

CO-1 BL-1 1.Define MIS.

MIS is the use of information technology, people, and business processes to record, store and process data to produce information that decision makers can use to make day to day decisions. The full form of MIS is Management Information Systems. The purpose of MIS is to extract data from varied sources and derive insights that drive business growth.

CO-1 BL-1 2.State Information.

Information is stimuli that has meaning in some context for its receiver. When information is entered into and stored in a computer, it is generally referred to as data. After processing -- such as formatting and printing -- output data can again be perceived as information. When information is compiled or used to better understand something or to do something, it becomes knowledge.

CO-1 BL-1 3.State Planning.

Planning is the fundamental management function, which involves **deciding beforehand**, what is to be done, when is it to be done, how it is to be done and who is going to do it. It is an **intellectual process** which **lays down** an **organisation's objectives and develops various courses of action**, by which the organisation can achieve those objectives.

CO-1 BL-1 4.Define Database Design.

Database design is the organization of data according to a database model. The designer determines what data must be stored and how the data elements interrelate. With this information, they can begin to fit the data to the database model

CO-1 BL-1 5. List out Evolution of MIS.

1950-1960: Electronic Data Processing (EDP)

1960-1970: Management Information Systems (MIS)

1970-1980: Decision Support Systems (DSS

1980-1990: Executive Information Systems (EIS

1990-2000: Enterprise Resource Management (ERP) Systems

CO-1 BL-1 6.Discuss Information Over flow.

Information overload is a state of being overwhelmed by the amount of data presented for one's attention or processing. **The term is used to refer not only to situations involving too much data for a given decision but also the constant inundation of data from many sources that is characteristic of modern life.**

CO-1 BL-1 7.Classify the types of DBMS

Relational database.
Object oriented database.
Hierarchical database.
Network database

PART-B

CO-2 BL-2 8.Decribe about Creation and Control in DBMS.

control

Database control refers to the task of enforcing regulations so as to provide correct data to authentic users and applications of a database. In order that correct data is available to users, all data should conform to the integrity constraints defined in the database. Besides, data should be screened away from unauthorized users so as to maintain security and privacy of the database. Database control is one of the primary tasks of the database administrator (DBA).

The three dimensions of database control are –

- Authentication
- Access rights
- Integrity constraints

Creation:

A database is a collection of related data that is stored off a computer and organized in a manner that enables information to be retrieved as needed. Many types of business and people use a database to organize information about their company, or work

CO-2 BL-2 9.Explain about Recent Trends in DBMS.

- **Cloud-based DBMS**
- **Automation and DBMS**
- **Augmented DBMS**
- **Increased security**
- **In-memory databases**
- **Graph databases**
- **Open source DBMSs**
- **Databases-as-a-service**

These trends are based, to a large extent, on businesses wanting to provide access to their products and services over the internet, with the goal of maintaining (or increasing) profits during the pandemic.

Cloud-based DBMS

The Gartner report *The Future of the DBMS Market Is Cloud* predicts the use of cloud-based DBMSs will increase. The market for Database Management systems is being driven increasingly by cloud services, and no longer by on-premise systems. Certainly, there are large organizations still using on-premises DBMS solutions, however, they are combining it with a cloud-based DBMS and using a "hybrid" approach.

Database Management Trends & Automated Services

Automated services can help streamline the process of Database Management. An automated DBMS can help significantly in sifting through the massive amounts of data generated by eCommerce, mobile applications, customer relationship management, and social media. As a consequence, organizations are experiencing enormous surges in the amounts of data being stored. These massive amounts of data can be used to the business' advantage, providing useful insights about their customers and products.

Augmented Data Management (ADM)

Augmented Data Management uses machine learning and artificial intelligence to automate Data Management tasks, such as spotting anomalies within large amounts of data and resolving Data Quality issues.

Data Security (and Avoiding Data Breaches)

There have been several high-profile data breaches in the last year. For example, LinkedIn was breached in June 2021, resulting in 700 million users having their information sold online. In September, the retailer Neiman Marcus was breached, with 4.8 million customers being affected. In October of 2021, it was announced the information of 1.5 billion Facebook users was put up for sale in a hacker's forum. And those are just a few of the hundreds of data breaches taking place in 2021. In the state of Washington, the number of known breaches went up from 220 last year to 280 in 2021.

In-Memory Databases

In-memory databases are gaining popularity because they respond faster than traditional systems. An in-memory database (IMDB) eliminates the disk drive, and instead stores data in the computer's main memory – its random access memory or RAM. This tactic reduces response times.

The Graph Database

Graph databases provide an excellent way to establish and research relationships in a quick and easy way. They use nodes and edges to form data relationships (nodes represent entities, and edges represent their relationships). Graph databases are designed to assign the relationship between data entities with the same importance the data receives. The design results in only the data which is needed being accessed, while unnecessary data remains untouched, making data retrieval more efficient.

Open Source Databases

Ten years ago, "open source" Database Management systems were not as commonly used as they are now. They are now used by 7% of the market. Open source technologies generally evolve and develop quickly, and this includes databases. Open source technologies are typically designed to minimize the barriers of adoption, and are extremely attractive to apps developers working with cloud-native platforms.

The Database-as-a-Service

Generally speaking, in the past databases were not designed to work with microservices. Databases were normally monolithic. Monolithic architecture is the traditional way of developing applications. Monolithic software is developed as a single, indivisible unit. Monolithic applications typically lack modularity and use one large code base.

Database Management Trends and Evolution

Until recently, DBMSs have been considered consistent, trustworthy structures that offered reliability without drama. However, with the pandemic acting as an accelerant, databases are evolving to process data more efficiently, while simultaneously becoming more intelligent. To access this evolution, and embrace the economic benefits offered by the cloud, businesses are increasingly shifting to cloud databases.

PART-C

CO-2 BL-2 10.Explain briefly about Database design.

A good database design is, therefore, one that:

- Divides your information into subject-based tables to reduce redundant data.
- Provides Access with the information it requires to join the information in the tables together as needed.
- Helps support and ensure the accuracy and integrity of your information.
- Accommodates your data processing and reporting needs

The design process

The design process consists of the following steps:

- **Determine the purpose of your database**

  This helps prepare you for the remaining steps.

- **Find and organize the information required**

  Gather all of the types of information you might want to record in the database, such as product name and order number.

- **Divide the information into tables**

  Divide your information items into major entities or subjects, such as Products or Orders. Each subject then becomes a table.

- **Turn information items into columns**

  Decide what information you want to store in each table. Each item becomes a field, and is displayed as a column in the table. For example, an Employees table might include fields such as Last Name and Hire Date.

- **Specify primary keys**

  Choose each table's primary key. The primary key is a column that is used to uniquely identify each row. An example might be Product ID or Order ID.

- **Set up the table relationships**

  Look at each table and decide how the data in one table is related to the data in other tables. Add fields to tables or create new tables to clarify the relationships, as necessary.

- **Refine your design**

  Analyze your design for errors. Create the tables and add a few records of sample data. See if you can get the results you want from your tables. Make adjustments to the design, as needed.

- **Apply the normalization rules**

  Apply the data normalization rules to see if your tables are structured correctly. Make adjustments to the tables, as needed.

CO-1 BL-1 11.Discuss the components of Management Information System.

The major components of a typical MIS long-form (Management Information System) are:

- **People** – people who use the information system
- **Data** – the data that the information system records
- **Business Procedures** – procedures put in place on how to record, store and analyze data
- **Hardware** – these include servers, workstations, networking equipment, printers, etc.
- **Software** – these are programs used to handle the data. These include programs such as spreadsheet programs, database software, etc.

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KATTANKULATHUR 603 203

I Unit Examination, February 2023

PRINCIPLES OF MANAGEMENT

Date: 28.02.2023 **Max Marks: 25**
Class: II B.Com(ISM)
Duration: 1 Hr

Section-A

Answer any FIVE Questions:

1. **Define Management**

   Management is the administration of organizations, whether they are a business, a nonprofit organization, or a government body. It is the art and science of managing resources of the business.

2. **Define Management is an Art**

   It is called an art because managing requires certain skills which are personal possessions of managers. Science provides knowledge & art deals with the application of knowledge and skills. A manager to be successful in his profession must acquire the knowledge of science & the art of applying it.

3. **Define the term controlling.**

   Controlling is the process of comparing the actual performance with the standards set by the company to ensure that all the activities are happening according to the plan and if any deviations are found, then corrective action needs to be taken.

4. **Define top level management**

   The top level of an organization's management consists of the Board of Directors, Managing Director, Chairman, Chief Executive Officer, Chief Operating Officer, Vice-President, President, General Manager, and other Senior Executives.

5. **What do you mean by Management as a Profession**

   The definition of management states that it is the act of coordinating and administrating a workforce to achieve a target. This includes building strategies and manoeuvring the workforce accordingly to optimize its potential.

6. **Mention any two points of difference between Administration and Management**

   Administration represents creating plans and actions to achieve the objectives of the company. Management is the process of implementing these plans to achieve the final goal. Administrative functions are legislative in nature, whereas managerial functions are executive in nature.

7. **Define Planning.**

Planning is the process of thinking regarding the activities required to achieve a desired goal. Planning is based on foresight, the fundamental capacity for mental time travel. The evolution of forethought, the capacity to think ahead, is considered to have been a prime mover in human evolution.

Section-B

Answer any ONE Question:

8. Enumerate the various functions of Management

At the most fundamental level, management is a discipline that consists of a set of five general functions: planning, organizing, staffing, leading and controlling

Planning : It is the process of thinking regarding the activities required to achieve a desired goal. Planning is based on foresight, the fundamental capacity for mental time travel. The evolution of forethought, the capacity to think ahead, is considered to have been a prime mover in human evolution.

Organizing: Organizating or organising is the establishment of effective authority relationships among selected works, persons and work places in order for the group to work together efficiently, or the process of dividing work into sections and departments.

Staffing: Staffing refers to the continuous process of finding, selecting evaluating and developing a working relationship with current or future employees. The main goal of staffing is to fill the various roles within the company with suitable candidates.

Leading: Leading involves the social and informal sources of influence that you use to inspire action taken by others. If managers are effective leaders, their subordinates will be enthusiastic about exerting effort to attain organizational objectives.

Controlling: Controlling is a primary goal-oriented function of management in an organization. It is a process of comparing the actual performance with the set standards of the company to ensure that activities are performed according to the plans and if not then taking corrective action.

9. What an the Stages involved in Planning.

The Planning Cycle has eight steps, as outlined below.

- Analyze Your Situation. First, clarify what you need to do. ...
- Identify the Aim of Your Plan. ...
- Explore Your Options. ...
- Select the Best Option. ...
- Detailed Planning. ...
- Evaluate the Plan and Its Impact. ...
- Implement Change. ...
- Close the Plan and Review.

Section – C

Answer Any ONE Question:

10. Explain the characteristics of the Management.

Management is Universal

No organisation can function without a management department. It is not an alternative that an organisation can do without, for running a business with different teams of employees. At the entrepreneurship level, too, starting a business alone requires proper management of processes. The basic principles of management or Fayolism are always applicable. Every organisation must use them to the fullest. Management skills are not only transferable from one manager to another in the same organisation, but also to a different organisation. That's why a list of analytical and administrative management skills is developed and practised commonly across companies of all sizes.

Management is both Science and Art

Universal scientific principles are applied to various situations. And processes such as command, mentorship, delegation, etc., are used based on accepted rules and logic. As a science, management is also based on a cause-and-effect analysis. You can take the example of the fishbone/cause and effect diagram in the 7 QC tools. This diagram,commonly used in Six Sigma, looks into finding the root causes and chart out which of the causes are responsible for an effect. Just as validity and experimentation are important processes that separate science from other disciplines, management uses them. As a manager, you can test a situation, and based on evidence-based results, you can make decisions. As an art, management requires practical knowledge. Using intuition and creativity, a manager can help provide directions to an entire team.

Management is an Intangible Force

It is intangible in that it cannot be seen but felt. It is a thought-related process. The result of good or bad management can be seen through results. Management is better identified as an authority within an organisation. It helps in achieving organisational goals within a well-defined structure that can take actions when objectives are not met. When objectives are met by employees, it shows the management of an organisation is efficient.

Management is a Dynamic Function

It has to be a dynamic function because external factors, such as social, political, environmental, legal, and technological, keep changing. It is important for an organisation's management to adapt to situations as and when they arise. Take for example, the pandemic and industry 4.0. Companies that did not rely on cloud technologies and remote work before had to adapt to them. By not adapting to abrupt changes, many companies had lay-offs and eventually had to shut shop. The ones which did adapt, had good management that gave importance to this function.

Management is a Group Activity

It is a group activity that relies on coordination among leaders, managers, and team members.It was, in fact, the father of management thinking, Peter Drucker, who proposed that management is a group activity. There are five ways how management can be defined as an activity.

- Decision-making – Identifying issues, finding solutions, and implementing them.
- Information – Gathering reports to understand the state of the organisation in terms of finance, human resources, etc.
- People management – Coordination, delegation, supervision, controlling, etc.
- Processes and Materials – Everything required to complete goals and produce goods from raw materials
- Direction – Providing direction as to how the goals should be achieved

11. Describe the classification of plans according to time.

Three major types of plans can help managers achieve their organization's goals: strategic, tactical, and operational. Operational plans lead to the achievement of tactical plans, which in turn lead to the attainment of strategic plans. In addition to these three types of plans, managers should also develop a contingency plan in case their original plans fail.

Operational plans

The specific results expected from departments, work groups, and individuals are the operational goals. These goals are precise and measurable. "Process 150 sales applications each week" or "Publish 20 books this quarter" are examples of operational goals.

An operational plan is one that a manager uses to accomplish his or her job responsibilities. Supervisors, team leaders, and facilitators develop operational plans to support tactical plans (see the next section). Operational plans can be a single-use plan or an ongoing plan.

- Single-use plans apply to activities that do not recur or repeat. A one-time occurrence, such as a special sales program, is a single-use plan because it deals with the who, what, where, how, and how much of an activity. A budget is also a single-use plan because it predicts sources and amounts of income and how much they are used for a specific project.
- Continuing or ongoing plans are usually made once and retain their value over a period of years while undergoing periodic revisions and updates. The following are examples of ongoing plans:
- A policy provides a broad guideline for managers to follow when dealing with important areas of decision making. Policies are general statements that explain how a manager should attempt to handle routine management responsibilities. Typical human resources policies, for example, address such matters as employee hiring, terminations, performance appraisals, pay increases, and discipline.
- A procedure is a set of step-by-step directions that explains how activities or tasks are to be carried out. Most organizations have procedures for purchasing supplies and equipment, for example. This procedure usually begins with a supervisor completing a purchasing requisition. The requisition is then sent to the next level of management for approval. The approved requisition is forwarded to the purchasing department.

Depending on the amount of the request, the purchasing department may place an order, or they may need to secure quotations and/or bids for several vendors before placing the order. By defining the steps to be taken and the order in which they are to be done, procedures provide a standardized way of responding to a repetitive problem.

- A rule is an explicit statement that tells an employee what he or she can and cannot do. Rules are "do" and "don't" statements put into place to promote the safety of employees and the uniform treatment and behavior of employees. For example, rules about tardiness and absenteeism permit supervisors to make discipline decisions rapidly and with a high degree of fairness.

Tactical plans

A tactical plan is concerned with what the lower level units within each division must do, how they must do it, and who is in charge at each level. Tactics are the means needed to activate a strategy and make it work.Tactical plans are concerned with shorter time frames and narrower scopes than are strategic plans. These plans usually span one year or less because they are considered short-term goals. Long-term goals, on the other hand, can take several years or more to accomplish. Normally, it is the middle manager's responsibility to take the broad strategic plan and identify specific tactical actions.A strategic plan is an outline of steps designed with the goals of the entire organization as a whole in mind, rather than with the goals of specific divisions or departments. Strategic planning begins with an organization's mission.Strategic plans look ahead over the next two, three, five, or even more years to move the organization from where it currently is to where it wants to be. Requiring multilevel involvement, these plans demand harmony among all levels of management within the organization. Top-level management develops the directional objectives for the entire organization, while lower levels of management develop compatible objectives and plans to achieve them. Top management's strategic plan for the entire organization becomes the framework and sets dimensions for the lower level planning.

Contingency plans

Intelligent and successful management depends upon a constant pursuit of adaptation, flexibility, and mastery of changing conditions. Strong management requires a "keeping all options open" approach at all times — that's where contingency planning comes in.Contingency planning involves identifying alternative courses of action that can be implemented if and when the original plan proves inadequate because of changing circumstances.Keep in mind that events beyond a manager's control may cause even the most carefully prepared alternative future scenarios to go awry. Unexpected problems and events frequently occur. When they do, managers may need to change their plans. Anticipating change during the planning process is best in case things don't go as expected. Management can then develop alternatives to the existing plan and ready them for use when and if circumstances make these alternatives appropriate.

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DEPARTMENT OF COMMERCE (ISM)
I UNIT TEST, FEBRUARY - 2023
FINANCIAL SERVICES

CLASS: II B. Com (ISM) TIME: 1 Hour

PART A – (5 X 2 = 10 Marks)
Answer any FIVE questions

1. CO 1 BL 1 What is Factoring?
   Factoring is a type of finance in which a business would sell its accounts receivable (invoices) to a third party to meet its short-term liquidity needs. Under the transaction between both parties, the factor would pay the amount due on the invoices minus its commission or fees.
2. CO 1 BL 1 Define merchant banking
   Merchant banking is a professional service provided by the merchant banks to their customers considering their financial needs, for adequate consideration in the form of fee.
3. CO 2 BL 1 What is issue management?
   Management of issues refers to effective marketing of corporate securities viz., equity shares, preference shares and debentures or bonds by offering them to public.
4. CO 1 BL 1 What is Leasing?
   A finance lease or capital lease is a financial product, in which a leasing company gives operating control of an asset to a business for an agreed period.
5. CO 2 BL 1 What is new issues market?
   The primary market, also known as the new issue market, is that segment of the capital market where securities are issued to investors for the first time.
6. CO 1 BL 1 List out the players of financial services
   The financial services sector provides financial services to people and corporations. This segment of the economy is made up of a variety of financial firms including banks, investment houses, lenders, finance companies, real estate brokers, and insurance companies.
7. CO 2 BL 1 What is private placement?
   A private placement is a sale of stock shares or bonds to pre-selected investors and institutions rather than publicly on the open market.

PART B – (1 X 5 = 5 Marks)
Answer any ONE question

8. CO 1 BL 2 Explain the various importance of financial services?

Importance of Financial Services

- Vibrant Capital Market.
- Expands activities of financial markets.
- Benefits of Government.
- Economic Development.
- Economic Growth.
- Ensures Greater Yield.
- Maximizes Returns.
- Minimizes Risks.

- Promotes Savings.
- Promotes Investments.
- Balanced Regional Development.
- Promotion of Domestic & Foreign Trade.

9. CO 2 BL 2 Difference between the new issue market and secondary market.

Basis	Primary Market	Secondary Market
Meaning	A market in which securities are sold for the first time is known as a Primary Market.	A market in which the sale and purchase of newly issued securities and second-hand securities are made is known as a Secondary Market.
Types of Securities	In the primary market, the sale of new securities takes place.	In the secondary market, the sale and purchase of existing or second-hand securities take place.
Issued by	In the primary market, the securities are directly issued by companies.	In the secondary market, the securities are transferred between the investors only.
Capital Formation	A primary market directly contributes to the capital of a company as it involves the transfer of funds from surplus units to deficit units.	A secondary market indirectly contributes to the capital of a company as it involves an exchange of funds between surplus units only.
Entry	The companies enter a primary market for raising capital for their operations.	The securities of listed companies only are bought and sold in this market.
Geographical Location	There is no fixed geographical location of a primary market. Every bank, institution, foreign investor, etc., contribute to this market.	There is a fixed geographical location of a secondary market and it also has fixed working hours.
Price	The price of securities in a primary market is fixed by the management of the company issuing them.	The price of securities in a secondary market is fixed by the demand and supply of the stock exchange market.

PART C – (1 X 10 = 10 Marks)
Answer any ONE questions

10. CO 1 BL 2 Describe the various functions of financial service
Promoting investment

Financial services create more demand for products and the producer to meet the demand from the consumer goes for more investment. Then the financial services come to the rescue of the investor like the merchant banker through new issued marketing by enabling the producer to raise capital. The stock market helps to mobilize more funds by the investor

Promoting savings

Financial services like mutual funds provide ample opportunity for different types of savings. Different types of investment options are available for the convenience of the pensioners as well as the aged people so that they can be ensured of a reasonable return on the investment without a lot of risks.

Minimizing the risks

Risk factors of both the financial services as well as producers are minimized by the presence of insurance companies. Different types of risks are covered here. It not only offers protection from the fluctuating business conditions but also the risks caused by natural calamities.

Maximizing the Returns

Financial services enable businessmen to maximize their returns. This is possible because of the availability of credit at a reasonable rate. Producers can avail of different types of credit facilities to acquire the assets.

Ensures greater Yield

There is a difference between return and yield. Yield attracts more producers to enter the market and increase their production so that they can meet the demands of the consumer.

Economic growth

The development of the sectors is essential to develop the economy. The financial services ensure equal distribution of the funds to all the three sectors named primary, secondary, and tertiary. Because of this, the activities are spread over in a balanced manner in all the three sectors.

Economic development

Financial services enable consumers to obtain various kinds of products and services by which they can improve their living standards. Purchasing a car or house or other essentials and also the luxurious items is made possible through the hire purchase, leasing, and housing finance companies.

The benefit to the Government

Financial services enable the government to raise short-term and long-term funds to meet both revenue and capital expenditures. The government raises short term funds through the money market and by issuing the Treasury Bills. These are purchased by the commercial banks from out of their depositors' money.

Expands activities of Financial Institutions

The financial services enable financial institutions to raise finance and get an opportunity to disburse their funds most profitably.

Capital Market

One of the barometers of a country's economy is the presence of a vibrant capital market. If there are hectic activities in the capital market, then it is an indication of the presence of any positive economic condition.

Promotion of Domestic and Foreign Trade

The financial services ensure the promotion of domestic and foreign trade. The factoring and for-failing companies promote the sale of goods in the domestic market and the export of goods in the foreign market. Banking and insurance services further help to step up these kinds of promotional activities.

Balanced Regional development

The government observes the growth of the economy and regions that remain economically backward are given fiscal and monetary benefits through taxation and cheaper credit promoting more investment.

11. CO 2 BL 4 Explain the various functions of merchant banking.

1)Portfolio Management:

Merchant banks provide consultancy service to institutional investors on investment decisions. They trade in exchange/securities on behalf of their clients and also manage their portfolio.

2)Raising funds for clients:

Merchant bank help their client/ business firm to raise capital from domestic and international market by issuing securities the capital raised merchant banks helps business firm in expansion of their business activities.

3)Broker in Stock Exchange:

Merchant banks act as broker for their client in stock exchange. They conduct research on equity shares for their client and also purchase and sell the share on behalf of them. They also play the role of advisor for, example, they advice their client their clients about which shares to buy, when to buy, how much to buy and when to sell.

4)Managing Public Issue of Companies:

Merchant bank manage the public issue of companies. They provide following services:

- Merchant bank advice companies at the time of public issue
- Merchant banks advice the size and price of public issue
- Merchant bank helps companies in managing the process of application and allotment of securities
- Merchant banks helps companies at the time of filing ipo in stock exchange
- Merchant banks help in appointing underwriters and brokers at time of issue.
- Acting the capacity of the manager to the issue

5)Services to Public Sector Units:

Merchant banks offer different services to public sector units. They provide the facilities to raise long-term capital, marketing of securities and arranging long-term finance from term lending institutions.

6)Money Market Operation:

Merchant bankers deal with underwriters and also deal with short-term financial/stock market instruments, such as:

1. Government Bonds.
2. Commercial paper issued by large corporate firms.
3. Treasury bills issued by the Government.

12/12/23

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12/12/23

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Department of Commerce (Information Systems & Management)

Subject: PYTHON PROGRAMMING

Time : 1 hour **Max.Marks : 25 marks**

Class : II BCOM ISM

PART A - (5X 2 = 10 MARKS)

Answer any 5 Questions

1. Define Variable?

   A Python variable is a symbolic name that is a reference or pointer to an object. Once an object is assigned to a variable, you can refer to the object by that name. But the data itself is still contained within the object.

   For example: >>> n = 300.

2. Write a python program: sum of two numbers with user input.

   ```
   x = input("Type a number: ")
   y = input("Type another number: ")
   sum = int(x) + int(y)
   print("The sum is: ", sum)
   ```

   Output:

   Type a number:

   Type another number:

   The sum is: 7

3. What is an Interpreter?

   A python interpreter is a computer program that converts each high-level program statement into machine code. An interpreter translates the command that you write out into code that the computer can understand.

4. Define Class and Objects?

   Python is an object oriented programming language. Almost everything in Python is an object, with its properties and methods. A Class is like an object constructor, or a "blueprint" for creating objects.

5. Types of Comment Lines in Python.

   # and ‘’’

6. Types of data Types with Example.

   Int,float,double,char,str,Boolean,List,Tuples,sets and dictionary.

7. Define List.

   Lists are used to store multiple items in a single variable. Lists are one of 4 built-in data types in Python used to store collections of data, the other 3 are Tuple, Set, and Dictionary, all with different qualities and usage.

PART B – 0

8. Explain about Operators with Example.

Types of Operators in Python

1. Arithmetic Operators
2. Comparison Operators
3. Logical Operators
4. Bitwise Operators
5. Assignment Operators
6. Identity Operators and Membership Operators

Arithmetic Operator

Operator	Description	Syntax
+	Addition: adds two operands	x + y
–	Subtraction: subtracts two operands	x – y
*	Multiplication: multiplies two operands	x * y
/	Division (float): divides the first operand by the second	x / y
//	Division (floor): divides the first operand by the second	x // y
%	Modulus: returns the remainder when the first operand is divided by the second	x % y
**	Power: Returns first raised to power second	x ** y

Comparison Operators in Python

In Python Comparison of Relational operators compares the values. It either returns True or False according to the condition.

Operator	Description	Syntax
>	Greater than: True if the left operand is greater than the right	x > y
<	Less than: True if the left operand is less than the right	x < y
==	Equal to: True if both operands are equal	x == y
!=	Not equal to – True if operands are not equal	x != y
>=	Greater than or equal to True if the left operand is greater than or equal to the right	x >= y
<=	Less than or equal to True if the left operand is less than or equal to the right	x <= y

Logical Operators in Python

Python Logical operators perform Logical AND, Logical OR, and Logical NOT operations. It is used to combine conditional statements.

Operator	Description	Syntax
and	Logical AND: True if both the operands are true	x and y
or	Logical OR: True if either of the operands is true	x or y
not	Logical NOT: True if the operand is false	not x

Bitwise Operators in Python

Python Bitwise operators act on bits and perform bit-by-bit operations. These are used to operate on binary numbers.

Operator	Description	Syntax
&	Bitwise AND	x & y

Operator	Description	Syntax
|	Bitwise OR	x | y
~	Bitwise NOT	~x
^	Bitwise XOR	x ^ y
>>	Bitwise right shift	x>>
<<	Bitwise left shift	x<<

9. Describe about Modules.

Modular programming is the practice of segmenting a single, complicated coding task into multiple, simpler, easier-to-manage sub-tasks. We call these subtasks modules. Therefore, we can build a bigger program by assembling different modules that act like building blocks.

Modularizing our code in a big application has a lot of benefits.

Simplification: A module often concentrates on one comparatively small area of the overall problem instead of the full task. We will have a more manageable design problem to think about if we are only concentrating on one module. Program development is now simpler and much less vulnerable to mistakes.

Flexibility: Modules are frequently used to establish conceptual separations between various problem areas. It is less likely that changes to one module would influence other portions of the program if modules are constructed in a fashion that reduces interconnectedness. (We might even be capable of editing a module despite being familiar with the program beyond it.) It increases the likelihood that a group of numerous developers will be able to collaborate on a big project.

Reusability: Functions created in a particular module may be readily accessed by different sections of the assignment (through a suitably established api). As a result, duplicate code is no longer necessary.

Scope: Modules often declare a distinct namespace to prevent identifier clashes in various parts of a program.

In Python, modularization of the code is encouraged through the use of functions, modules, and packages

Example 1:

```
import example_module
```

Identifiers

The names assigned to any variable, class, function, list, method, etc., for their recognition are known as identifiers. Python has certain guidelines for naming identifiers and is a case-sensitive programming language. To create an identifier, follow these guidelines: -

- Python is case-sensitive, as was already mentioned. So, when defining identifiers, the case is important. Thus, the terms "python" and "Python" are not interchangeable.
- A capital alphabet (A-Z), a small alphabet (a-z), or an underscore (_) precedes the word "identifier." No other character can be used as the starting point.
- Digits are also allowed to be a member of the identifier, along with the letters and underscores, but they cannot be the initial character.
- Any additional special symbols or whitespace must be avoided when creating an identity.
- A keyword cannot be an identifier.

Code

```
# Python program to show how to create identifiers
 # Here, String and s are identifiers
String = 'Hello'
s = "Javatpoint"
print(String)
print(s)
# These are also identifiers having digit and underscore
String1 = "World"
String_1 = "!!"
 print(String1)  print(String_1)
```

Output:

```
Hello
Javatpoint
World
!!
```

Literals or Values

The constant values or data objects utilized in a source program are known as literals. Various types of literal are supported by Python, including:

String Literals: The Python string literals are represented by text enclosed in solo, double, or triple quotations. Examples include "Computer Programming," "sigma," etc. Multi-line phrases can also be written using triple quotations.

```
result = example_module.square( 4 )
print( "By using the module square of number is: ", result )
```

Example 2:

```
from math import e, tau
print( "The value of tau constant is: ", tau )
print( "The value of the euler's number is: ", e )
```

PART C – ()

10. Describe in detail about List and their Methods with Example.

List

Lists are used to store multiple items in a single variable.

Lists are one of 4 built-in data types in Python used to store collections of data, the other 3 are Tuple, Set, and Dictionary, all with different qualities and usage.

Method	Description
append()	Adds an element at the end of the list
clear()	Removes all the elements from the list
copy()	Returns a copy of the list
count()	Returns the number of elements with the specified value
extend()	Add the elements of a list (or any iterable), to the end of the current list
index()	Returns the index of the first element with the specified value

Code

```
# Python program to show how to create string literals
 # Examples of string literals
string = 'Hello'
s = "World"
A = '''Python is a
   high-level and
   general purpose language'''
print(string)
print(s)
print(A)
```

Output:

```
Hello
World
Python is a
        High-level and
General purpose language
```

Character Literals: Another string literal is called the character literal, which encloses the letter in single or double quotes.

Numeric Literals: These are literals that have been written as numbers. Python supports the following three numerical literals:

- **Integer Literal:** Contains 0 as well as positive and negative values. There are no fractional pieces included. In addition, literals in binary, decimal, octal, and hexadecimal are permitted.
- **Float Literal:** It contains real numbers in the positive and negative ranges. Fractional portions are also a part of it.
- **Complex Literal:** This contains the numerals a+bi, where a stands for the fundamental component and b for the complex component.

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DEPARTMENT OF COMMERCE (ISM)

CLASS: III B.COM (ISM)

SUB: MANAGEMENT ACCOUNTING **TIME: 1 HRS**

PART-A

ANSWER ANY FIVE OF THE FOLLOWING:

CO-1 BL-1 1. Define Management Accounting.

Managerial accounting, also called management accounting, is a method of accounting that creates statements, reports, and documents that help management in making better decisions related to their business' performance. Managerial accounting is primarily used for internal purposes.

CO-1 BL-1 2. State the Accounting.

Accounting, which is often just called "accounting," is the process of measuring, processing, and sharing financial and other information about businesses and corporations.

CO-1 BL-2 3. Summarise the scope of management accounting.

1. **Cost Accounting**
2. **Financial Accounting**
3. **Budget and Forecast**
4. **Interpretation of Data**
5. **Financial Management**
6. **Management Reporting**
7. **Financial Statement Analysis**
8. **Inflation Accounting**

CO-1 BL-1 4.Discuss the Cost Accounting.

Cost accounting is **a process of assigning costs to cost objects that typically include a company's products, services, and any other activities that involve the company.** Cost accounting is helpful because it can identify where a company is spending its money, how much it earns, and where money is being lost.

CO-2 BL-1 5.Examine the Financial Statement.

Financial statements are **written records that convey the business activities and the financial performance of a company.** Financial statements are often audited by government agencies, accountants, firms, etc. to ensure accuracy and for tax, financing, or investing purposes.

CO-2 BL-2 6.Classify the types of Analysis.

Vertical analysis, Horizontal analysis, Leverage analysis, Growth rates, Profitability analysis, Liquidity analysis, Efficiency analysis, Cash flow, Rates of return, Valuation analysis, Scenario and Sensitivity analysis, and Variance analysis

CO-2 BL-1 7.State the Trend Percentage.

Trend percentages, also referred to as index numbers, **help you to compare financial information over time to a base year or period.** You can calculate trend percentages by: Selecting a base year or period. Assigning a weight of 100 per cent to the amounts appearing on the base-year financial statements.

Trend Percentage = **((Current Period Value - Base Period Value) / Base Period Value) * 100.**

PART –B

ANSWER ANY ONE OF THE FOLLOWING:

CO-1 BL-2 8.Explain the objectives of Management Accounting.

1. Decision Making
2. Planning
3. Controlling business operations
4. Organizing
5. Understanding financial data
6. Identifying business problem areas
7. Strategic Management

Decision Making

This is the most important benefit of the process of management accounting. In fact, it is the main purpose of it. In this form of accounting, we use techniques from all fields like costing, economics, statistics, etc.

It provides us with charts, tables, forecasts and various such analysis that makes the process of decision making easier and more justified.

Read Costing – An Aid to Management here in detail

Planning

Managerial accounting does not have any strict timelines like financial accounting. It is, in fact, a continuous and ongoing process.

So financial and other information is presented to the management at regular intervals like weekly, monthly or sometimes even daily.

Hence managers can use this analysis and data to plan the activities of the organization. For example, if the recent data shows a dip in the sales for a certain region, then the sales manager can advise his team and plan some action to rectify the situation.

Identifying Business Problem Areas

If some product is not performing well, or some department is running into unexpected losses, etc. managerial accounting can help us identify the underlying cause.

Actually, if the management is diligent and their data and reports are frequent, they can identify the problem very early on. This will allow the management to get ahead of the problem.

Strategic Management

Concept of management accounting is not mandatory by any law. So it can have its own structure according to the company's requirements. So if the company feels certain areas need more in-depth analysis or investigation it can do so freely.

This allows them to focus on some core areas. The information presented to them allows them to make strategic management decisions.

Like if the company wishes to launch a new product line, or discontinue an existing one, management accounting will play a huge part in this strategy.

CO-2 BL-3 9.Following is the profit and loss account of S LTD for the year ended 31.12.85 and 31.12.86. You are required to solve common size statement.

Profit and Loss Account

Particular	**1985 (Rs.)**	**1986 (Rs.)**	**Particular**	**1985 (Rs.)**	**1986 (Rs.)**
To cost of goods sold	300	375	By net sales	400	500
To operating expenses: Administration Expenses	10	10			
Selling expenses	15	20			
Net profit	75	95			
	400	**500**		**400**	**500**

Particular	1987	%	1988	%
Assets				
Cur. ass				
Stock	65	13	75	12.5

PART- C

ANSWER ANY ONE OF THE FOLLOWING:

CO-1 B2 10. Difference between Financial accounting and Management accounting.

	Financial Accounting	Management Accounting
Objectives	The main objectives of financial accounting are to disclose the end results of the business, and the financial condition of the business on a particular date.	The main objective of managerial accounting is to help management by providing information that is used to plan, set goals and evaluate these goals.
Audience	Financial accounting produces information that is used by external parties, such as shareholders and lenders.	Managerial accounting produces information that is used within an organization, by managers and employees.
Optional?	It is legally required to prepare financial accounting reports and share them with investors.	Managerial accounting reports are not legally required.
Segment reporting	Pertains to the entire organization. Certain figures may be broken out for materially significant business units.	Pertains to individual departments in addition to the entire organization.
Focus	Financial accounting focuses on history;	Managerial accounting focuses

Financial Accounting	Management Accounting	
	reports on the prior quarter or year.	on the present and forecasts for the future.
Format	Financial accounts are reported in a specific format, so that different organizations can be easily compared.	Format is informal and is on a per department/company basis as needed.
Rules	Rules in financial accounting are prescribed by standards such as GAAP or IFRS. There are legal requirements for companies to follow financial accounting standards.	Managerial accounting reports are only used internally within the organization; so they are not subject to the legal requirements that financial accounts are.
Reporting frequency and duration	Defined - annually, semi-annually, quarterly, yearly.	As needed - daily, weekly, monthly.
Information	Monetary, verifiable information.	Monetary and company goal driven information.

CO-2 B3 11.From the following P&L a/c for the year ended 31st dec 2004 & 2005 your required to calculate a comparative income statement for the year 2004& 2005.

Particular	1985 (Rs.)	1986 (Rs.)	Particular	1985 (Rs.)	1986 (Rs.)
To cost of goods sold	600	750	By net sales	800	1000
Administration Expenses	20	20			
Selling	30	40			

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Department of Commerce (ISM)
I UNIT TEST, FEBRUARY 2023
ENTREPRENEURIAL DEVELOPMENT
ANSWER KEY

Part – A

Answer any **FIVE** questions.**(5x1=5)**

1. **Who is an Entrepreneur?**

An entrepreneur is someone who starts and operates a new business venture, typically taking on financial risks in the hopes of earning a profit or fulfilling a need in the marketplace. Entrepreneurs are characterized by their innovative thinking, creative problem-solving skills, and their willingness to take calculated risks in pursuit of their goals.

2. **Define the term Entrepreneurship?**

Entrepreneurship is the process of creating, developing, and managing a new business venture in order to achieve a specific goal or set of goals, such as financial success or social impact. This process typically involves identifying a need or opportunity in the marketplace, developing a plan to address that need or opportunity, securing the necessary resources (such as funding, talent, and materials), and launching and growing the business.

3. **Who is a Social Entrepreneur?**

A social entrepreneur is an individual who starts and runs a business venture with the primary goal of addressing a social problem or need. Unlike traditional entrepreneurs, who may focus primarily on generating profit, social entrepreneurs aim to create positive social or environmental impact through their business activities.

4. **Explain the term Idea generation?**

Idea generation is the process of coming up with new and innovative ideas for a specific purpose or goal. In the context of entrepreneurship, idea generation is often focused on identifying new business opportunities, developing innovative products or services, or finding better ways to solve problems.

5. **Who is a Woman Entrepreneur?**

A woman entrepreneur is a female individual who starts and operates her own business venture, often with the goal of achieving financial and personal independence. Women entrepreneurs are characterized by their innovative thinking, creative problem-solving skills, and their willingness to take calculated risks in pursuit of their goals.

6. **What is Focus groups?**

A focus group is a type of research method used to gather qualitative data and insights from a small group of individuals who share common characteristics or experiences. Focus groups typically involve a trained facilitator who leads a group discussion among a carefully selected group of participants, with the goal of exploring their attitudes, beliefs, opinions, and experiences related to a particular topic or product.

7. **What is Brain storming?**

Brainstorming is a creative problem-solving technique that involves generating a large number of ideas in a short period of time, without evaluating or judging them. It is a popular technique used in a variety of contexts, including business, education, and creative fields.

The goal of brainstorming is to encourage free thinking and open communication, in order to generate a wide range of potential solutions or ideas. During a brainstorming session, participants are encouraged to share their ideas without criticism or judgment from others, and to build on each other's ideas to create new and innovative solutions.

Part – B

Answer any **TWO** questions.

1. Discuss the characteristics of Entrepreneur?

Entrepreneurs are individuals who start and operate their own businesses, taking on financial and personal risks in order to pursue their goals and create value in the world. While there is no one-size-fits-all definition of what it means to be an entrepreneur, there are several common characteristics that many successful entrepreneurs share:

Visionary thinking: Entrepreneurs have a strong vision for the future, and are able to see opportunities where others might see challenges or obstacles. They are able to identify unmet needs or underserved markets, and develop innovative solutions to address them.

Risk-taking: Entrepreneurs are willing to take calculated risks in order to achieve their goals. They understand that starting a new business involves financial and personal risks, but are willing to take these risks in pursuit of their vision.

Resilience: Entrepreneurs face many challenges and setbacks along the way, but are able to bounce back from these setbacks and keep moving forward. They are able to adapt to changing circumstances, and are not deterred by failure.

Passion: Entrepreneurs are driven by a deep passion for what they do, and are motivated by a desire to make a positive impact in the world. They are willing to work long hours and make sacrifices in order to pursue their goals.

Creativity: Entrepreneurs are creative problem-solvers, able to think outside the box and come up with new and innovative solutions to complex problems.

Persistence: Entrepreneurs are persistent and tenacious, able to overcome obstacles and push through challenges in order to achieve their goals.

Strong work ethic: Entrepreneurs are highly motivated and hard-working, willing to put in the time and effort necessary to succeed.

Overall, successful entrepreneurs possess a unique combination of vision, risk-taking, resilience, passion, creativity, persistence, and strong work ethic. While these characteristics are not always innate, they can be developed and cultivated over time through education, training, and practical experience.

2.Explain the steps in selection of New Business Opportunities?

Selecting new business opportunities is a critical step in the entrepreneurial process. There are several steps involved in the selection of new business opportunities, which are outlined below:

Idea generation: The first step in the process is to generate a range of potential business ideas. This can be done through brainstorming sessions, market research, or by identifying unmet needs in the marketplace.

Screening: Once a range of potential ideas has been generated, the next step is to screen them based on a set of criteria. This may include factors such as market size, competition, feasibility, and potential profitability.

Feasibility analysis: For the most promising ideas, a feasibility analysis should be conducted to determine whether the idea is technically and economically feasible. This analysis should take into account factors such as market demand, product design, production costs, and distribution channels.

Market analysis: A detailed analysis of the market should be conducted to determine the size of the market, the level of competition, and the potential demand for the product or service.

Competitive analysis: An analysis of the competition should be conducted to identify potential competitors, their strengths and weaknesses, and how the new business will differentiate itself in the marketplace.

Financial analysis: A financial analysis should be conducted to determine the potential costs and revenue streams associated with the new business opportunity. This analysis should take into account factors such as startup costs, ongoing expenses, pricing, and projected revenue.

Risk assessment: A risk assessment should be conducted to identify potential risks and challenges associated with the new business opportunity. This may include risks such as legal, regulatory, and operational risks, as well as potential threats from competitors or changing market conditions.

Decision-making: Based on the above analysis, a decision should be made whether to pursue the new business opportunity or not. This decision should take into account all of the factors outlined above, as well as the entrepreneur's personal goals, skills, and resources.

Overall, selecting a new business opportunity is a complex process that requires careful analysis and evaluation of a range of factors. By following these steps, entrepreneurs can increase their chances of success and identify opportunities that align with their skills, resources, and goals.

Part – C

Answer any **ONE** question **(1x10=10)**

1. **Discuss the factors influencing Entrepreneurship?**

Entrepreneurship is influenced by a wide range of factors that can impact an individual's ability and willingness to start and run a successful business. Some of the key factors that influence entrepreneurship include:

Economic conditions: The overall state of the economy can have a significant impact on entrepreneurship. In a strong economy with low unemployment and high consumer confidence, there may be more opportunities for entrepreneurs to start and grow successful businesses. Conversely, in a weak economy with high unemployment and low consumer confidence, entrepreneurship may be more challenging due to reduced access to capital and decreased demand for products and services.

Technology: Advances in technology can create new opportunities for entrepreneurs by enabling the development of new products and services, and by making it easier to reach customers and operate a business. The rise of the internet, social media, and mobile devices, for example, has created new business models and opportunities for entrepreneurs in fields such as e-commerce, social media marketing, and app development.

Social and cultural factors: Social and cultural factors such as attitudes toward risk-taking, the availability of role models and mentors, and the level of support for entrepreneurship within a community can all impact an individual's decision to pursue entrepreneurship. In some cultures, entrepreneurship may be highly valued and celebrated, while in others it may be viewed with skepticism or even disapproval.

Education and training: Education and training can play an important role in fostering entrepreneurship by providing individuals with the skills and knowledge needed to start and run a successful business. Entrepreneurial education programs, such as business incubators and accelerators, can provide training and mentorship to help entrepreneurs develop their ideas and bring them to market.

Government policies: Government policies and regulations can have a significant impact on entrepreneurship. Policies that support entrepreneurship, such as tax incentives, access to capital, and streamlined regulatory processes, can help to create a favourable environment for entrepreneurs to start and grow businesses.

Personal factors: Finally, personal factors such as an individual's skills, experience, and personal motivation can all play a role in their decision to pursue entrepreneurship. Successful entrepreneurs often possess a combination of skills and traits, including creativity, risk-taking, perseverance, and a passion for their work.

Overall, entrepreneurship is influenced by a complex set of factors that can impact an individual's decision to start and grow a business. By understanding these factors, entrepreneurs can better navigate the challenges and opportunities of entrepreneurship and increase their chances of success.

2.Elucidate the Techniques of Business Idea Generation?

Generating new business ideas is a critical step in the entrepreneurial process. There are several techniques that entrepreneurs can use to generate new business ideas, including:

Brainstorming: Brainstorming is a technique that involves generating a large number of ideas in a short period of time. This can be done individually or in a group setting, and can involve free-associating ideas based on a particular theme or problem.

Observation: Observing the world around you can be a powerful source of inspiration for new business ideas. By observing consumer behavior, market trends, and emerging technologies, entrepreneurs can identify unmet needs and gaps in the marketplace that can be addressed with a new product or service.

Problem-solving: Identifying problems or pain points in the marketplace can be a starting point for generating new business ideas. By identifying a problem or unmet need, entrepreneurs can develop solutions that meet the needs of consumers and create value in the marketplace.

Idea mapping: Idea mapping is a visual technique that involves mapping out different ideas and concepts on a piece of paper or whiteboard. This technique can help to identify connections between different ideas and generate new ideas based on those connections.

Customer feedback: Engaging with customers and gathering feedback can be a powerful source of inspiration for new business ideas. By listening to customer needs and feedback, entrepreneurs can identify opportunities to develop new products or services that meet those needs.

Competitor analysis: Studying competitors can provide insights into gaps in the marketplace and opportunities for new business ideas. By analyzing the strengths and weaknesses of competitors, entrepreneurs can identify opportunities to differentiate themselves in the marketplace and develop new products or services that meet unmet needs.

Overall, there are many techniques that entrepreneurs can use to generate new business ideas. By using a combination of these techniques and staying open to new opportunities and ideas, entrepreneurs can identify and pursue opportunities that align with their skills, resources, and goals.

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Department of Commerce (ISM)

Subject: WEB TECHNOLOGY

Time :1 hour **Max.Marks : 25 marks**

Class : III BCOM ISM

PART A - (5X 2 = 10 MARKS)

Answer any 5 Questions

1. Give the expansion of HTML

HyperText Markup Language (HTML) is a set of standards used to tag the elements of a hypertext document. It is the standard protocol for formatting and displaying documents on the World Wide Web

2. What is a form?

An HTML form is a section of a document containing normal content, markup, special elements called controls (checkboxes, radio buttons, menus, etc.), and labels on those controls.

3.How will you create tables in HTML?

```
<table>
 <tr>
  <th>Company</th>
  <th>Contact</th>
  <th>Country</th>
 </tr>
 <tr>
  <td>Alfreds Futterkiste</td>
  <td>Maria Anders</td>
  <td>Germany</td>
 </tr>
 <tr>
  <td>Centro comercial Moctezuma</td>
  <td>Francisco Chang</td>
  <td>Mexico</td>
```

</tr>

</table>

4.Difference between HTML, CSS and JavaScript.

While HTML creates the basic structure for a website, CSS adds style to that structure, and JavaScript takes all of that work and makes it interactive and more functionally complex.

5. Variables in JavaScript.

- Using var
- Using let
- Using const
- Using nothing

6. Create a Forms in HTML with example.

To create an HTML form, we will use the HTML <form> element. It starts with the <form> tag and ends with the </form> tag. We can add the input elements within the form tags for taking user input. form elements, such as text box, textarea, etc.

<Html>
<Head>
<Title>
Create a Registration form
</Title>
</Head>
<Body>
The following tags are used in this Html code for creating the Registration form:

<form>
<label> Firstname </label>
<input type="text" name="firstname" size="15"/>

<label> Lastname: </label>
<input type="text" name="lastname" size="15"/>

<label>
Course :
</label>

```
<select>
<option value="Course">Course</option>
<option value="BCA">BCA</option>
<option value="BBA">BBA</option>
<option value="B.Tech">B.Tech</option>
<option value="MBA">MBA</option>
<option value="MCA">MCA</option>
<option value="M.Tech">M.Tech</option>
</select>
<br>
<br>
<label>
Gender :
</label><br>
<input type="radio" name="gender"/> Male <br>
<input type="radio" name="gender"/> Female <br>
<input type="radio" name="gender"/> Other
<br>
<br>
<label>
Hobbies:
</label>
<br>
<input type="checkbox" name="Programming"> Programming <br>
<input type="checkbox" name="Cricket"> Cricket <br>
<input type="checkbox" name="Football"> Football  <br>
<input type="checkbox" name="reading Novel"> Reading Novel  <br>
<br>
<br>
<label>
Phone :
</label>
<input type="text" name="phone" size="10"> <br> <br>
Address
```

```
<br>
<textarea cols="80" rows="5" value="address">
</textarea>
<br> <br>
Email:
<input type="email" id="email" name="email"> <br>
<br> <br>
Password:
<input type="Password" id="pass" name="pass"> <br>
<br> <br>
<input type="submit" value="Submit">
<input type="reset" value="Reset">
</form>
</Body>
</Html>
```

7. Ordered and Unordered List with Example.

```
<html >
<head>
   <title>inline style attribute</title>
</head>
<body>
   <ol>
      <li value="51">English</li>
      <li>Hindi</li>
      <li>Maths</li>
      <li>Science</li>
      <li>social science</li>
   </ol>
<ul>
      <li>Sachin</li>
      <li>Manoj</li>
      <li>Parth</li>
      <li>sujay</li>
      <li>Amraditya</li>
   </ul>
</body>
</html>
```

PART C

8. Write the Applications and Advantages of HTML and Java Script.

HTML:

1. HTML is simple to understand and implement

- HTML is a simple language to learn and understand. HTML is the first and most important language that anyone learning web development will encounter. There are no complicated tags, and there is no case sensitivity with HTML.
- It consists of only a few tags that have a specific purpose. One can easily grasp others' code and make adjustments if necessary, so there isn't much more to learn from it. Moreover, unlike other programming languages, it does not throw an error or cause a problem if the developer forgets to close the tags or makes a mistake in the code.

2. HTML is completely free

- One of the biggest advantages of using HTML is that it is free, and no special software is required. HTML does not require any plugins, so one should not have to deal with them when working with any software.
- Even with many open-source content management systems, all necessary plugins are not always free. As a result, it is incredibly cost-effective from a per-business standpoint because there is no fee for obtaining the license if the entire website is constructed in HTML.

3. Every browser supports HTML

- HTML is supported by nearly all browsers worldwide such as Google, Safari, Opera, etc. So there is no need to be concerned about a website built in HTML for browser support because the website will appear in all browsers if the program remembers to optimize the website for the different browsers.
- It is neither difficult nor complex to optimize an HTML-based website for browser compatibility. It gives web developers an easy way to optimize their websites for browsers.

4. HTML is the most search engine friendly

- In comparison to other web programming languages on the market, HTML is one of the most user-friendly search engines (Search Engine friendly means delivering users quality websites with relevant information when searching for a particular one).
- HTML is far easier to use than other computer languages for creating SEO-compliant websites. HTML websites are more accessible for web crawlers to read and access, reducing crawling time and page load time and so enhancing website performance.
- HTML generates the fewest SEO difficulties and offers the most flexibility when attempting to construct an SEO-compliant website. As long as you verify that your HTML code is clean and validated.

JavaScript:

1. Speed

Since JavaScript is an **'interpreted'** language, it reduces the time required by other programming languages like Java for compilation. JavaScript is also a client-side script, speeding up the execution of the program as it saves the time required to connect to the server.

2. Simplicity

JavaScript is easy to understand and learn. The structure is simple for the users as well as the developers. It is also very feasible to implement, saving developers a lot of money for developing dynamic content for the web.

3. Popularity

Since all modern browsers support JavaScript, it is seen almost everywhere. All the famous companies use JavaScript as a tool including *Google, Amazon, PayPal, etc.*

4. Interoperability

JavaScript works perfect with other programming languages and therefore numerous developers prefer it in developing many applications. We can embed it into any webpage or inside the script of another programming language.

5. Server Load

As JavaScript operates on the client-side, data validation is possible on the browser itself rather than sending it off to the server. In case of any discrepancy, the whole website needs not to be reloaded. The browser updates only the selected segment of the page.

6. Rich Interfaces

JavaScript provides various interfaces to developers for creating catchy webpages. Drag and drop components or sliders may give a rich interface to the webpages. This leads to improved user-interactivity on the webpage.

7. Extended Functionality

Third-party add-ons like **Greasemonkey (a Mozilla Firefox extension)** allow the developers to add snippets of predefined code in their code to save time and money. These add-ons help the developers build JavaScript applications a lot faster and with much more ease than other programming languages.

8. Versatility

JavaScript is now capable of front-end as well as back-end development. Back-end development uses NodeJS while many libraries help in front-end development like **AngularJS**, *ReactJS, etc.*

9. Less Overhead

JavaScript improves the performance of websites and web applications by reducing the code length. The codes contain less overhead with the use of various built-in functions for *loops, DOM access, etc.*

9. Write the Tags in HTML with their use.

--...-->	Defines a comment

DOCTYPE>	Defines the document type
>	Defines a hyperlink
bbr>	Defines an abbreviation or an acronym
cronym>	Not supported in HTML5. Use <abbr> instead. Defines an acronym
ddress>	Defines contact information for the author/owner of a document
pplet>	Not supported in HTML5. Use <embed> or <object> instead. Defines an embedded applet
ea>	Defines an area inside an image map
ticle>	Defines an article
ide>	Defines content aside from the page content
dio>	Defines embedded sound content
	Defines bold text

›ase>	Specifies the base URL/target for all relative URLs in a document
›asefont>	Not supported in HTML5. Use CSS instead. Specifies a default color, size, and font for all text in a document
›di>	Isolates a part of text that might be formatted in a different direction from other text it
›do>	Overrides the current text direction
›ig>	Not supported in HTML5. Use CSS instead. Defines big text
›lockquote>	Defines a section that is quoted from another source
›ody>	Defines the document's body
›r>	Defines a single line break
›utton>	Defines a clickable button
›anvas>	Used to draw graphics, on the fly, via scripting (usually JavaScript)

aption>	Defines a table caption
enter>	Not supported in HTML5. Use CSS instead. Defines centered text
ite>	Defines the title of a work
ode>	Defines a piece of computer code
ol>	Specifies column properties for each column within a <colgroup> element
colgroup>	Specifies a group of one or more columns in a table for formatting
data>	Adds a machine-readable translation of a given content
datalist>	Specifies a list of pre-defined options for input controls
dd>	Defines a description/value of a term in a description list
del>	Defines text that has been deleted from a document
details>	Defines additional details that the user can view or hide

dfn>	Specifies a term that is going to be defined within the content
dialog>	Defines a dialog box or window
dir>	Not supported in HTML5. Use instead. Defines a directory list
div>	Defines a section in a document
dl>	Defines a description list
dt>	Defines a term/name in a description list
em>	Defines emphasized text
embed>	Defines a container for an external application
fieldset>	Groups related elements in a form

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Department of Commerce

Information Systems and Management

II-UNIT EXAMINATION - APRIL 2023 (Even semester)

STUDENTS CIRCULAR

SRMASC/COMMERCE/ISM/2022-2023/10

The students are hereby informed that the II Unit Examination will commence from **10.04.2023 to 17.04.2023.** Duration of the Examination is One hour **(12.00 PM to 1.00 PM)** The absentees will be viewed seriously.

CLASS / DATE	10.04.2023	11.04.2023	12.04.2023	13.04.2023	17.04.2023
I B.COM ISM	Language	English	Advanced Financial Accounting	Object Oriented Programming using C++	Indian Economy
II B.COM ISM	Management Information System	Principle of Management	Financial Services	Python Programming	Elements of Operation Research
III B.COM ISM	Software Project Management	Management Accounting	Entrepreneurial Development	Web Technology	-

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II-UNIT EXAMINATION - APRIL 2023 (Even semester)

STAFF CIRCULAR

SRMASC/COMMERCE/ISM/2022-2023/11

All the Staff are hereby informed that II Unit Examination will commence from **10.04.2023 to 17.04.2023** for, I,II & III-B.Com (ISM) Students. Duration of the Examination is One hour **(12.00 PM to 1.00 PM)**. Subject Incharge should send the Question Paper & Answer Key to srmasc.ism@gmail.com on or before 05.04.2023 (Wednesday).

Internal Exam Committee.

1) Dr.R.Malarvizhi – In charge
2) Mr. G.Inbasagaran
3) Mr. S. ElayaMurugan
4) Ms.K.Balasree

Question Pattern for UG

1. 5 out of 7 (5x2=10)
2. 1 out of 2 (1x5=5)
3. 1 out of 2 (1x10=10)

Total = 25 Marks

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DEPARTMENT OF COMMERCE (INFORMATION SYSTEM MANAGEMENT)

II- UNIT EXAMINATION APRIL -2023

STAFF INVIGILATION DUTY

DATE	ROOM NO	STAFF NAME	STAFF SIGNATURE
10.04.2023	105	Mrs.K.Balasree	
	106	Mr.G. Inbasakran	
	107	Mr.S.Elaya Murugan	
11.04.2023	105	Dr.K.Janagaraj	
	106	Dr.M.Pavithra	
	107	Mr.S.Elaya Murugan	
12.04.2023	105	Dr. V. Balakumar	
	106	Mr.S.Elaya Murugan	
	107	Dr.R.Malarvizhi	
13.04.2023	105	Mr.G. Inbasakran	
	106	Mrs.C.Saranya Devi	
	107	Ms. K. Ramya Meenakshi	
15.04.2023	105	Mr.G. Inbasakran	
	106	Mr.S.Elaya Murugan	

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DEPARTMENT OF COMMERCE (Information Systems and Management)
II-Unit Examination April 2023 (Even Semester)
Seating Arrangements - (10.04.2023 to 17.04.2023)

	Register No.	Class	No of Students
Room No : 105	422200565 - 422200582	I B.COM (ISM)	18
	422100617 - 422100634	II B.COM (ISM)	18
	422000446 - 422000463	III B.COM (ISM)	18
	Total		**54**

	Register No.	Class	No of Students
Room No : 106	422200583 - 422200600	I B.COM (ISM)	18
	422100635 - 422100652	II B.COM (ISM)	18
	422000464 - 422000481	III B.COM (ISM)	18
	Total		**54**

	Register No.	Class	No of Students
Room No : 107	422200601 - 422200620	I B.COM (ISM)	19
	422100653 - 422100671	II B.COM (ISM)	19
	422000482 - 422000500	III B.COM (ISM)	18
	Total		**56**

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DEPARTMENT OF COMMERCE

II UNIT TEST, APRIL 2023

ADVANCED FINANCIAL ACCOUNTING - CZ22A

CLASS: I B.com 'A & B' **MARKS:25**

DATE: 12-04-2023 **TIME: 1 Hour**

PART A – (5 X 2 = 10 Marks)

Answer any FIVE questions

1. **CO3 BL1** What is sacrificing ratio?
2. **CO3 BL1** What do you understand by 'admission of a partner '?
3. **CO3 BL2** How do you calculate sacrificing ratio?
4. **CO4 BL2** Explain 'Hidden Goodwill'?
5. **CO3 BL1** What is ' Revaluation of assets and Liabilities'?
6. **CO4 BL1** What is Memorandum revaluation account?
7. **CO3 BL1** What are factors affecting the value of goodwill?

PART B – (1 X 5 = 5 Marks)

Answer any ONE questions

8. **CO3 BL3** A and B are partners in a business sharing profits in the ratio of 5:3 . They decide to admit C into the firm giving him 1/6 th share . Calculate the new profit sharing ratio and sacrificing ratio of the partners?
9. **CO3 BL2** Difference between Gaining Ratio and Sacrificing Ratio?

PART C – (1 X 10 = 10 Marks)

Answer any ONE question

10. **CO3 BL4** Calculate the amount of goodwill at three years purchase of last five years Average profits. The profits were: I year- Rs. 9,600, II year- Rs. 14,400, III year- Rs. 20,000, IV year- Rs. 6,000, V year- Rs.10,000
11. **CO3 BL3** The following were the profits carmed by Bertha & Lam for the past four years.

2007	Rs. 60,00
2008	Rs. 80,000
2009	Rs. 1,00,000
2010	Rs. 1,40,000

You are required to value the goodwill on the basis of 3 years purchase of weighted average profit, assigning weights of 1,2,3 & 4 respectively for the four years.

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Department of Commerce (ISM)

II UNIT TEST, April 2023

CLASS: I B.Com ISM | TIME: 1 Hour

SUB: OOPS in C++ | Max: 25 Marks

Date : 13.04.2023

PART A – (5 X 2 = 10 Marks)

Answer any FIVE questions

CO-2	BL-1	1.What are 'C++ Tokens?
CO-2	BL-1	2.Tell any two types of control structures in C++.
CO-2	BL-1	3.What ae C++ Expressions?
CO-2	BL-1	4.Define functions in C++.
CO-4	BL-1	5.Define the term constructor.
CO-4	BL-1	6.What is destructors?
CO-5	BL-1	7.What is inheritance? And it types?

PART B – (1 X 5 = 5 Marks)

Answer any ONE question

CO-4	BL-5	8.Determine the Type Conversion in C++.
CO-4	BL-5	9.Explain the different types of Constructors.

PART C – (1 X 10 = 10 Marks)

Answer any ONE question

CO-3	BL-5	10.Explain the inline functions and friend function in C++
CO-2	BL-6	11.Discuss the Looping statement in C++.

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II UNIT EXAMINATION-APRIL 2023
INDIAN ECONOMY

Date: 17.04.2023 **Duration: 1 Hr**
Class: I B.Com – A & B AND ISM **Max Marks: 25**

Section-A

I. ANSWER ANY FIVE QUESTIONS:- **(5x2=10)**

CO-3	BL- 1	1.What is meant by Land Reform.
CO-4	BL-1	2.What do you mean by Industrialization.
CO-5	BL-1	3.State Indicative planning.
CO-3	BL-2	4.Define the term Mixed Economy.
CO-3	BL-1	5.What is Subsidy.
CO-4	BL-4	6.Describe New Economic Policy.
CO-4	BL-1	7.What is Industrial Licensing.

Section-B

II. ANSWER ANY ONE QUESTION:- **(1X5=5)**

CO-3	BL- 1	8.What are the objectives of Land Reform measures.
CO-3	BL- 1	9.Briefly discuss the steps taken to increase productivity in agriculture.

Section-C

III. ANSWER ANY ONE QUESTION:- **(1X10=10)**

CO-4	BL- 1	10.What are the advantages of Small Scale Industry?
CO-4	BL- 4	11.Explain the criticisms level against the New Industrial policy 1991.

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II UNIT EXAMINATION APRIL 2023

CLASS : II B.COM ISM TIME: 1 HOUR

SUBJECT: MANAGEMENT INFORMATION SYSTEM MARKS: 25

PART-A

I ANSWER ANY FIVE OF THE FOLLOWING: 5*2 =10

CO-3 BL-1 1. Define Planning.

CO-5 BL-1 2. State an Security audit.

CO-5 BL-1 3. Define Marketing Information System.

CO-4 BL-1 4. State Inference Engine.

CO-4 BL-1 5. Examine Expert System.

CO-4 BL-1 6. List the Characteristics of DSS.

CO-4 BL-1 7. Define DSS.

II ANSWER ANY ONE OF THE FOLLOWING: 1*5 =5

CO-4 BL-2 8. Classify Programmed and Non-Programmed Decision

CO-4 BL-2 9. Discuss the Advantages and Disadvantages of Ess.

III ANSWER ANY ONEOF THE FOLLOWING: 1*10 =10

CO-4 BL-2 10 Explain the Types of Transaction Processing System.

CO-3 BL-2 11.Describe System Development Life Cycle.

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II-Unit Examination –April 2023

Date: 11.04.2023 **Duration: 1 Hr**

Subject & Code : Principles of Management & BS24B **Class:II-B.Com (ISM)**

Section A (5 x 2 = 10)

(Answer any **FIVE** questions)

CO-5 BL-1 1. Define Direction.

CO-3 BL-1 2. What do you understand by the term Organization ?

CO-3 BL-1 3. Define the term delegation and decentralization.

CO-3 BL-1 4. Briefly explain : Span of Control.

CO-3 BL-1 5. What is span of Management?

CO-3 BL-1 6. What is Directing in Management Concept?

CO-3 BL-6 7. Write a note on obstacles in delegation.

Section B (1 x 5 = 5)

(Answer any **ONE** question)

CO-3 BL-2 8. Explain the factors determining the effective delegation.

CO-5 BL-2 9. Describe the importance of Control process.

Section C (1 x 10 = 10)

(Answer any **ONE** question)

CO-3 BL-2 10. Explain the types of Organisation.

CO-5 BL-2 11. Explain in detail the characterises and principal of directing.

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II - Unit Examination - April 2023

Financial Services

Date: 12.04.2023 Time : 1 Hr

Class: II B.Com ISM Sub. Code : BS24C

Part - A

I. Answer any 5 of the following. 5 x 2 = 10

1. Give the meaning of Money market.
2. What do mean by primary market?
3. State any importance of Secondary market.
4. Define merchant banking.
5. What is underwriting?
6. State the meaning of Indigenous banker.
7. What is Gilt – edged market?

Part - B

II. Answer any one the following. 5 x 1 = 5

8. Discuss the importance of Capital market.
9. Differentiate between the Money market and Capital market.

Part - C

10 x 1 = 10

III. Answer any one of the following.

10. Explain the functions of New Issue Market.
11. Explain the role of stock exchanges in capital market growth.

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II-Unit Examination –April 2023

Date: 13.04.2023 **Duration: 1 Hr**

Subject & Code : Python Programming **Class:II-B.Com (ISM)**

Section A (5 x 2 = 10)

(Answer any **FIVE** questions)

CO-2 BL-1 1. How do create Modules in Python?

CO-1 BL-1 2. What is the difference between list & Tuples?

CO-4 BL-1 3. While the Fibonacci series program in python?

CO-2 BL-1 4. What is Python functions?

CO-2 BL-2 5. Differentiate Types of Arguments in Python?

CO- 2 BL-1 6. Explain about default arguments with example.

CO-2 BL-1 7. Define lambda functions with example.

Section B (1 x 5 = 5)

(Answer any **ONE** question)

CO-2 BL-1 8. Explain about : 1) Print ( ) functions

2) Eval ( ) Functions

CO-1 BL-2 9. Discuss about list method and their description with example.

Section C (1 x 10 = 10)

(Answer any **ONE** question)

CO-2 BL-1 10. Explain about imperative modules in python.

CO-3 BL-1 11. Define recursive functions? Give example.

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II UNIT TEST - April 2023

CLASS: III B.Com ISM TIME: 1 Hour

SUB: Software Project Management Max: 25 Marks

PART A – (5 X 2 = 10 Marks)

Answer any FIVE questions

1. What is a technologies?
2. Define the technical plan contents list.
3. What is problems with over-and under-estimates?
4. Define the expert judgement.
5. What are they objectives of activity planning?
6. Illustrate the activity float?
7. What is precedence networks?

PART B – (1 X 5 = 5 Marks)

Answer any ONE question

8. Explain the waterfall model.
9. Discuss the Spiral model

PART C – (1 X 10 = 10 Marks)

Answer any ONE questions

10. Elaborate the software prototyping.
11. Discuss the COCOMO a parametric model.

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Department of Commerce (ISM)

Unit Test – II - Management Accounting

Date: 11.04.23 Time : 1 Hr

Class: III B.Com ISM Sub. Code :BS25B

Part - A

I. Answer any 5 of the following. 5 x 2 = 10

Co3 B1 1. Define Ratio Analysis.

Co3 B1 2. State Solvency Ratio.

Co4 B1 3. Define Cash Flow statement.

Co4 B1 4. State fund flow statement.

Co5 B1 5.Define is Marginal Cost

Co5 B1 6. State is Fixed cost

Co5 B1 7. State is Break even point

Part - B

II. Answer any one the following. 5 x 1 = 5

Co3 B3 8) From the following summarised Profit & Loss account, Calculate operating ratio.

PROFIT & LOSS A/C

Particulars	₹	₹	Particulars	₹	₹
To opening stock		9,950	By sales		85,000
To purchases		54,525	By closing stock		14,900
To sundry expenses		1,425			
To Gross profit c/d		34,000			
Total		99,900	Total		99,900
To operating expenses:			By Gross profit c/d		34,000
Selling & distribution	3,000		By non operating income:	300	
Administration	15,000		Interest(bank)	600	900
financial	1,500	19,500	Profit on sale of shares		
To Net Profit		34,900			34,900

Co4 B3 9) From the information given below Solve breakeven point in units:

Selling price per unit Rs. 16.50

Trading discount per unit Rs. 1.50

Fixed expenses (aggregate) Rs. 7,50,000

Variable expenses per unit Rs. 11.00

Units of production 3,00,000 units

Part - C 10 x 1 = 10

III. Answer any one of the following.

Co5 B3 10. Calculate a flexible budget for production at 80% & 100% activity on the basis of the following information.

Production at 50% capacity – 5000 units

Raw material	Rs. 80 per units
Direct labour	Rs. 50 per units
Direct expenses	Rs. 15 per units
Factory expenses	Rs. 50,000 (50% fixed)
Administration expenses	Rs. 60,000 (60% variable)

Co4 B2 11. Explain cash flow statement format

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Department of Commerce (ISM)

II - Unit Examination - April 2023

Entrepreneurial Development

Date: 12.04.2023 Time : 1 Hr

Class: III B.Com ISM Sub. Code : BS26C

Part - A

I. Answer any 5 of the following. 5 x 2 = 10

1. State any two sources of business opportunity identification.
2. What do you mean by feasibility study?
3. What is Marketing feasibility?
4. What is Financial feasibility?
5. Give the meaning of Business Plan.
6. Define Venture Capital.
7. Give any two functions of commercial banks for Entrepreneurial development.

Part - B

II. Answer any one the following. 5 x 1 = 5

8. Explain the advantages of Business plan.
9. Discuss the role of technical analysis for Entrepreneurs.

Part - C 10 x 1 = 10

III. Answer any one of the following.

10. Discuss the Business plan process.
11. State the Problems faced by entrepreneurs while setting up an enterprise.

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II-Unit Examination –April 2023

Date: 13.04.2023 **Duration: 1 Hr**

Subject & Code : Web Technology

Class:III-B.Com (ISM)

Section A (5 x 2 = 10)

(Answer any **FIVE** questions)

1. Creating a List.
2. Advantages of JavaScript
3. Write the data types in Javascript.
4. How to create Forms in HTML.
5. Write the simple tags in HTML.
6. ASP.Net Language structure
7. Define Tables.

Section B (1 x 5 = 5)

(Answer any **ONE** question)

8. How to create a table in HTML with Example.
9. Describe about Radio Button and Check box.

Section C (1 x 10 = 10)

(Answer any **ONE** question)

10. Write about Label, Text Box, Buttons and Image.
11. Write a Javascript Program using Tables and Forms.

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DEPARTMENT OF COMMERCE (ISM)

II UNIT TEST, APRIL 2023

ADVANCED FINANCIAL ACCOUNTING

Answer key

CLASS: I B.Com (ISM) **MARKS:25**

DATE: 12-04-2023 **TIME: 1 Hour**

PART A – (5 X 2 = 10 Marks)

Answer any FIVE questions

1. **CO3 BL1 What is sacrificing ratio?**

   Answer: The sacrificing ratio is expressed as a proportion in which the existing partners agree to sacrifice their share of profits in favor of the new or outgoing partner. The purpose of determining the sacrificing ratio is to establish a fair and agreed-upon distribution of profits or losses among the partners based on the changes in the partnership structure.

2. **CO3 BL1 What do you understand by 'admission of a partner '?**

   Answer: The "admission of a partner" in the context of business partnerships refers to the process of including a new person as a partner in an existing partnership firm.

3. **CO3 BL2 How do you calculate sacrificing ratio?**

   Answer: Sacrificing Ratio= Old Ratio−New Ratio

4. **CO4 BL2 Explain 'Hidden Goodwill'?**

   Answer: Hidden goodwill refers to the goodwill of a partnership firm that is not explicitly recorded in the books of accounts but is implicitly present due to changes in the profit-sharing ratio during the admission or retirement of a partner.

5. **CO3 BL1 What is ' Revaluation of assets and Liabilities'?**

   Answer: The "revaluation of assets and liabilities" is a process in accounting where a business reviews and adjusts the recorded values of its assets and liabilities. This is typically done to reflect their current fair market values more accurately.

6. **CO4 BL1 What is Memorandum revaluation account?**

   Answer: A Memorandum Revaluation Account is a temporary account used in partnership accounting during the process of revaluing assets and liabilities when there is a change in the partnership structure, such as the admission or retirement of a partner.

7. **CO3 BL1 What are factors affecting the value of goodwill?**

   Answer: Earnings and Profitability, Brand Recognition and Reputation, Location and Market Presence

PART B – (1 X 5 = 5 Marks)

Answer any ONE questions

8. **CO3 BL3 A and B are partners in a business sharing profits in the ratio of 5:3 . They decide to admit C into the firm giving him 1/6 th share . Calculate the new profit sharing ratio and sacrificing ratio of the partners?**

Answer: New profit sharing ratio is 25:15:8 & sacrificing ratio is 5:3

9 . **CO3 BL2 Difference between Gaining Ratio and Sacrificing Ratio?**

Answer: Gaining Ratio: The Gaining Ratio is the ratio in which the continuing partners share the profits among themselves after the admission of a new partner or any change in the profit-sharing structure. It represents the adjusted share of profits for existing partners when a new partner is admitted.

Formula: New Ratio –Old RRati

Sacrificing Ratio: The Sacrificing Ratio is the ratio in which the existing partners agree to reduce their share of profits in favor of the outgoing partner when there is a retirement of a partner. It represents the adjusted share of profits for existing partners when a partner is retiring.

Formula: Old Ratio –New Ratio

PART C – (1 X 10 = 10 Marks)

Answer any ONE question

9. **CO3 BL4 Calculate the amount of goodwill at three years purchase of last five years Average profits. The profits were: I year- Rs. 9,600, II year- Rs. 14,400, III year- Rs. 20,000, IV year- Rs. 6,000, V year- Rs.10,000**

Answer: Average profits ₹12,000 & goodwill is 36,000

11. **CO3 BL3 The following were the profits carmed by Bertha & Lam for the past four years.**

2007	**Rs. 60,00**
2008	**Rs. 80,000**
2009	**Rs. 1,00,000**
2010	**Rs. 1,40,000**

You are required to value the goodwill on the basis of 3 years purchase of weighted average profit, assigning weights of 1,2,3 & 4 respectively for the four years.

Answer: Goodwill is ₹ 3,24,000

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Department of Commerce (ISM)

II UNIT TEST, April 2023

CLASS: I B.Com ISM
SUB: OOPS in C++
Date : 13.04.2023

TIME: 1 Hour
Max: 25 Marks

PART A – (5 X 2 = 10 Marks)
Answer any FIVE questions

CO-2 BL-1 1.What are 'C++ Tokens?

A token is the smallest element of a C++ program that is meaningful to the compiler. The C++ parser recognizes these kinds of tokens: Keywords. Identifiers. Numeric, Boolean and Pointer Literals.

CO-2 BL-1 2.Tell any two types of control structures in C++.

Selection Logic (Conditional Flow)

Sequential Logic (Sequential Flow)

CO-2 BL-1 3.What ae C++ Expressions?

This section describes C++ expressions. Expressions are sequences of operators and operands that are used for one or more of these purposes: Computing a value from the operands. Designating objects or functions.

CO-2 BL-1 4.Define functions in C++.

A function is a block of code that performs some operation. A function can optionally define input parameters that enable callers to pass arguments into the function. A function can optionally return a value as output.

CO-4 BL-1 5.Define the term constructor.

A function is a block of code that performs some operation. A function can optionally define input parameters that enable callers to pass arguments into the function. A function can optionally return a value as output.

CO-4 BL-1 6.What is destructors?

A destructor is a member function that is invoked automatically when the object goes out of scope or is explicitly destroyed by a call to delete . A destructor has the same name as the class, preceded by a tilde (~). For example, the destructor for class String is declared: ~String()

CO-5 BL-1 7.What is inheritance? And it types?

An inheritance is a financial term describing the assets passed down to individuals after someone dies. Most inheritances consist of cash that's parked in a bank account but may contain stocks, bonds, cars, jewelry, automobiles, art, antiques, real estate, and other tangible assets.

An inheritance is a financial term describing the assets passed down to individuals after someone dies. Most inheritances consist of cash that's parked in a bank account but may contain stocks, bonds, cars, jewelry, automobiles, art, antiques, real estate, and other tangible assets.

PART B – (1 X 5 = 5 Marks)

Answer any ONE question

CO-4 BL-5 8.Determine the Type Conversion in C++.

A type cast is basically a conversion from one type to another. There are two types of type conversion:

1. Implicit Type Conversion Also known as 'automatic type conversion'.
    - Done by the compiler on its own, without any external trigger from the user.
    - Generally takes place when in an expression more than one data type is present. In such condition type conversion (type promotion) takes place to avoid lose of data.
    - All the data types of the variables are upgraded to the data type of the variable with largest data type.
    - bool -> char -> short int -> int ->
    - unsigned int -> long -> unsigned ->
    - long long -> float -> double -> long double
    - It is possible for implicit conversions to lose information, signs can be lost (when signed is implicitly converted to unsigned), and overflow can occur (when long long is implicitly converted to float).

Example of Type Implicit Conversion:

```
// An example of implicit conversion

#include <iostream>
using namespace std;

int main()
{
  int x = 10; // integer x
  char y = 'a'; // character c

  // y implicitly converted to int. ASCII
  // value of 'a' is 97
  x = x + y;

  // x is implicitly converted to float
  float z = x + 1.0;

  cout << "x = " << x << endl
     << "y = " << y << endl
     << "z = " << z << endl;
```

```
    return 0;
}
```

Output:
x = 107

y = a

z = 108

2. Explicit Type Conversion: This process is also called type casting and it is user-defined. Here the user can typecast the result to make it of a particular data type.
In C++, it can be done by two ways:

   - Converting by assignment: This is done by explicitly defining the required type in front of the expression in parenthesis. This can be also considered as forceful casting.
     Syntax:
     (type) expression

     where *type* indicates the data type to which the final result is converted.
     Example:

```
// C++ program to demonstrate
// explicit type casting

#include <iostream>
using namespace std;

int main()
{
    double x = 1.2;

    // Explicit conversion from double to int
    int sum = (int)x + 1;

    cout << "Sum = " << sum;

    return 0;
}
```

     Output:
     Sum = 2

   - Conversion using Cast operator: A Cast operator is an unary operator which forces one data type to be converted into another data type.
     C++ supports four types of casting:
     1. Static Cast
     2. Dynamic Cast
     3. Const Cast
     4. Reinterpret Cast

        Example:

```
#include <iostream>
using namespace std;
int main()
{


   // using cast operator
   int b = static_cast<int>(f);

   cout << b;
}
```

Output:
3

CO-4 BL-5 9.Explain the different types of Constructors.

A constructor is a special type of function with no return type. Name of constructor should be same as the name of the class. We define a method inside the class and constructor is also defined inside a class. A constructor is called automatically when we create an object of a class. We can't call a constructor explicitly. Let us see the types of constructor.

In this article, I am going to explain only two types of constructors.

Default Constructor

Default constructor does not take any parameter. C# compiler creates a default constructor if we do not define any default constructor inside the class, We can also define the default constructor by writing some codes. I defined a default constructor to assign properties of a class. Let us see with the help of an example.

```
public class Adminclass
{
   string userId = string.Empty;
   string password = string.Empty;
  //Default constructor, having no any parameter
  public Adminclass()
  {
     userId = "shr";
     password = "Pass";
  }
}
C#
Copy
```

In the above example, I defined one class named as Adminclass and one default constructor with the same name as the name of the class. I used default constructor to assign the value to the private properties of the class. This constructor will automatically call when we create an object of this class.

PART C – (1 X 10 = 10 Marks)

Answer any ONE question

CO-3 BL-5 10.Explain the inline functions and friend function in C++

A friend function in C++ is a function that is declared outside a class but is capable of accessing the private and protected members of the class. There could be situations in programming wherein we want two classes to share their members. These members may be data members, class functions or function templates. In such cases, we make the desired function, a friend to both these classes which will allow accessing private and protected data of members of the class.

Generally, non-member functions cannot access the private members of a particular class. Once declared as a friend function, the function is able to access the private and protected members of these classes.

CO-2 BL-6 11.Discuss the Looping statement in C++.

In computer programming, loops are used to repeat a block of code.

For example, let's say we want to show a message 100 times. Then instead of writing the print statement 100 times, we can use a loop.

That was just a simple example; we can achieve much more efficiency and sophistication in our programs by making effective use of loops.

There are 3 types of loops in C++.

- `for` loop
- `while` loop
- `do...while` loop

This tutorial focuses on C++ `for` loop. We will learn about the other type of loops in the upcoming tutorials.

C++ for loop

The syntax of for-loop is:

```
for (initialization; condition; update) {
   // body of-loop
}
```

Here,

- `initialization` - initializes variables and is executed only once

- condition - if true, the body of for loop is executed

  if false, the for loop is terminated
- update - updates the value of initialized variables and again checks the condition

To learn more about conditions, check out our tutorial on C++ Relational and Logical Operators.

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DEPARTMENT OF COMMERCE

INFORMATION SYSTEM MANAGEMENT

II UNIT EXAMINATION-APRIL 2023

INDIAN ECONOMY

Date: 17.04.2023 Duration: 1 Hr

Class: I B.Com – A & B AND ISM Max Marks: 25

Section-A

I. ANSWER ANY FIVE QUESTIONS:- (5x2=10)

CO-3 BL- 1 1.What is meant by Land Reform.

land reform, a purposive change in the way in which agricultural land is held or owned, the methods of cultivation that are employed, or the relation of agriculture to the rest of the economy. Reforms such as these may be proclaimed by a government, by interested groups, or by revolution.

CO-4 BL-1 2.What do you mean by Industrialization.

Industrialization is the process of transforming the economy of a nation or region from a focus on agriculture to a reliance on manufacturing. Mechanized methods of mass production are an essential component of this transition.

CO-5 BL-1 3.State Indicative planning.

Indicative planning is a form of economic planning implemented by a state in an effort to solve the problem of imperfect information in market economies by coordination of private and public investment through forecasts and output targets.

CO-3 BL-2 4.Define the term Mixed Economy.

A mixed economic system is a system that combines aspects of both capitalism and socialism. A mixed economic system protects private property and allows a level of economic freedom in the use of capital, but also allows for governments to interfere in economic activities in order to achieve social aims.

CO-3 BL-1 5.What is Subsidy.

Subsidy is a transfer of money from the government to an entity. It leads to a fall in the price of the subsidised product. Description: The objective of subsidy is to bolster the welfare of the society. It is a part of non-plan expenditure of the government.

CO-4 BL-4 6.Describe New Economic Policy.

The New Economic Policy, or the NEP, is a policy introduced in India in 1991 aimed at restoring macroeconomic stability. The NEP was designed to address the crisis of stagflation, which was a result of the simultaneous increase in prices for both food and manufactured goods.

CO-4 BL-1 7.What is Industrial Licensing.

Industrial licensing is an authority issued by the government organisation to permit the institution or organisation for starting an industry or to start certain function.

Section-B

II. ANSWER ANY ONE QUESTION:- (1X5=5)

CO-3 BL- 1 8.What are the objectives of Land Reform measures.

Land Reforms refer to the redistribution of Lands from the rich class to the poor class. It includes operations, leasing, regulations of ownership, sales, and the inheritance of Land since Land redistribution requires legal changes.

Objectives of Land Reforms

The Indian government aimed at speeding up the socio-economic advancement of rural India and its agricultural industries with this land reform system. Some of the main objectives of Land Reforms are listed below-

- The primary objective concerned an overall renewal of law structure for agricultural lands in India.
- These acts aimed at an equal and uniform distribution of agricultural lands so that concentration of ownership was not in few hands.
- Abolition of intermediaries of the medieval land-ownership system in India.
- Facilitating optimum agricultural produce with healthy and economic practices.
- Ensuring social and economic justice for previous violations of the tiller's rights.
- Uniform ownership of land would prevent exploitation of tenant farmers and will help in reducing rural poverty.
- Elimination of the exploitation in the Land relations.
- To increase agricultural production and infuse equality in society.
- To restructure the agrarian relations in order to achieve an egalitarian social structure.
- To realize the age-old goal of Land to the tiller.

CO-3 BL- 1 9.Briefly discuss the steps taken to increase productivity in agriculture.

1. Implementation of land reforms

For improving the production, land reforms are the first and predominant point.

Machines, tractors, and implements do land reforms. These machines have the qualities that make rugged farming areas smooth to work on the field efficiently. Working on the field is easy, that means an improvement in productivity is easy. Land reforms are the best method to increase production.

2. Interplant

Interplanting is a practice in which different crops are growing together at the same time. It is the best way to maximize the productivity of your growing space. Some crops are the best together, some not.

3. Plant more densely

It is the simplest way to improve the productivity of farms, in this plant crops close together. Many farmers keep their vegetables excessively away, which leads to the abandonment of large areas growing well.

be set up in a short amount of time and provide employment to a larger number of people. This is critical in a country with a large labour pool, such as India.

2. Less capital is required

When compared to large-scale industries, small-scale enterprises require less capital. Because India is a capital-scarce country, Small Scale Industries are better suited to the Indian environment. They can be founded and run by small business owners with limited cash.

3. Contribution to the output of the industrial sector

Small-scale industry products account for a major share of the country's industrial output. They manufacture a variety of consumer goods and also industrial components in big quantities to meet consumer demands. Small-scale industries produce consumer goods that are less expensive and meet the needs of the poor.

4. Obtaining foreign currency

Small-scale industries contribute to the country's foreign exchange earnings by exporting goods to various countries across the world. Simultaneously, their purchases are minimal, resulting in a lower foreign exchange outflow. As a result, Small Scale Industries generate positive foreign exchange. Small Industries in Tirupur, for example, provide a significant share of India's export trade and earn precious foreign cash.

5. Distribution that is fair

Inequalities in wealth distribution and economic power concentration result from large-scale companies. Smaller businesses, on the other hand, divide resources & wealth more evenly. Because it is labour intensive, money is dispersed among a larger number of workers. This has a positive impact on both the economy and society.

6. Make use of local resources

Small-scale industries make productive use of locally available resources that would otherwise be wasted. Tiny sums of money that might otherwise go unused are channelled into the establishment of small businesses. This boosts the economy's capital formation and investment.

7. Entrepreneurial opportunities

Entrepreneurs with low funding can benefit from small scale industries. When compared to large-scale firms, establishing an SSI involves less finance and less expenditure in technology and machines. As a result, small business owners can simply create and run Small Scale Industries. Due to various small entrepreneurs who contributed considerably to the nation's development, Japan, which was ravaged by WWII, had become a major economic force.

8. Cost-effectiveness

4. Plant many crops
The next method of improving productivity is to plant many crops.

5. Raised beds
Traditional farming systems place crops in separate rows by tractor paths, with permanent beds planting multiple rows of crops within beds of the same width. It creates dense plantations, fewer pathways, and more active growing areas. Raised beds are symbolic of improving the productivity of crops.

6. Smart water management
Water is an essential need for planting crops, and by the management of water, you can enhance the production. Water management is the best way to improve production. Using the sprinkler irrigation system, you can increase the output by up to 50%. By the manufacturing canals, tube wells get a better irrigation system for the safety of crops.
7. Heat Tolerant Varieties
Heat tolerant varieties allow the plant to maintain the yields in high temperatures. We must improve the heat-tolerant varieties, and it increases the crop yield by up to 23%.
8. Use nitrogen
Nitrogen is a necessary element for better plant growth, and without nitrogen, most of the crops would not exist. Annually, plus 100 million tonnes of nitrogen are applied to crops in the form of fertilizer to help them grow stronger and better. The use of nitrogen can enhance the production of up to 22%.

9. Improved seeds
Seeds play an essential role in the farms, and improved seeds are best to enhance farm productivity. Improved seeds are suitable for increasing production.
10. Plant protection
According to farming scientists, about 5% of crops destroyed by insects, pests, and diseases. Most of the farmers are oblivious of the use of medicines and insecticides developed in recent years. Improving the production of the crops, yields must use these medicines. To be aware, the farmers about these governments should take steps or employ their technical staff in spraying pesticides and insecticides.

Section-C

III. ANSWER ANY ONE QUESTION:- (1X10=10)

CO-4 BL- 1 10.What are the advantages of Small Scale Industry?

Small-scale industries have traditionally played a crucial part in the country's economic development. Small-scale industries have the following advantages:

1. Possibility of a huge workforce

Small-scale industries have the ability to generate a large number of job opportunities. They have a labour-intensive nature to them. They employ more labour than other production elements. They may

Small-scale businesses can use lean manufacturing techniques to achieve more quality and variety at a reduced cost. When compared to large-scale units, they can be more cost-effective because their expenditures are reduced.

9. Migrator reduction

When people residing in rural areas are unable to find work, they migrate to urban regions in search of work. Large-scale migration places enormous strain on urban land, water, and other resources, resulting in low quality of life. Small-scale industries make use of the skills and abilities of rural craftsmen, artisans, and others, and they provide useful work to people with inherited skills, allowing them to improve their economic status. As a result, small-scale industries aid in the reduction of migration.

10. Operational flexibility

Small businesses are more adaptable. They can quickly adjust to shifting market conditions and capitalise on new opportunities. Some latest small-scale industries are bakeries, school stationaries, beauty parlours, Candle Making Manufacturing Business, Incense Sticks or Agarbattis and Camphor, Handmade Chocolates etc.

11. Flexibility in the face of change

Small-scale businesses are better able to recognise and respond to changing customer needs. They can adapt their procedures, methods, and approaches more quickly to meet changing consumer needs.

12. Personalization

Customers nowadays prefer products that are personalized to their unique requirements. They expect one-of-a-kind items. Large-scale production will not be appropriate in situations where products must be modified to meet the needs of individual customers. If products must be tailored, small industries are more suited.

13. Low social costs

Large-scale businesses impose enormous social costs in the form of air & water pollution, as well as environmental deterioration. Small businesses, on the other hand, face lower societal expenses.

14. Personal interaction with clients

The number of consumers is restricted, and the small business owner is personally involved in the operation. Customers can be kept in touch on a personal level. Their requirements and demands can be recognized and met. As a result, clients are satisfied, and demand remains consistent.22.

15. Self-interest

The solitary entrepreneur of a small business is usually in charge. He earns everything and puts everything on the line. Self-interest can be a powerful drive. As a result, he would put out his best efforts to ensure the company's success.

CO-4 BL- 4 11.Explain the criticisms level against the New Industrial policy 1991.

Industrial Policy in India

The various industrial policy introduced by the Indian government are as follows:

Industrial Policy Resolution, 1948

- It declared the Indian economy as Mixed Economy
- Small scale and cottage industries were given the importance
- The government restricted foreign investments
- Industries were divided into 4 categories
    - Exclusive monopoly of central government(arms and ammunitions, production of atomic energy and management of railways)
    - New undertaking undertaken only by state(coal, iron and steel, aircraft manufacturing, ship building, telegraph, telephone etc.)
    - Industries to be regulated by the government(Industries of basic importance)
    - Open to private enterprise, individuals and cooperatives(remaining)

Industrial Policy Resolution, 1956 (IPR 1956)

- This policy laid down the basic framework of Industrial Policy
- This policy is also known as the Economic Constitution of India

It is classified into three sectors

- Schedule A – which covers Public Sector (17 Industries)
- Schedule B – covering Mixed Sector (i.e. Public & Private) (12 Industries)
- Schedule C – only Private Industries

This has provisions for Public Sector, Small Scale Industry, Foreign Investment. To meet new challenges, from time to time, it was modified through statements in 1973, 1977, and 1980.

Industrial Policy Statement, 1977

- This policy was an extension of the 1956 policy.
- The main was employment to the poor and reduction in the concentration of wealth.
- This policy majorly focused on Decentralisation
- It gave priority to small scale Industries
- It created a new unit called "Tiny Unit"
- This policy imposed restrictions on Multinational Companies (MNC).

Industrial Policy Statement, 1980

- The Industrial Policy Statement of 1980 addressed the need for promoting competition in the domestic market, modernization, selective Liberalization, and technological up-gradation.

- It liberalised licensing and provided for the automatic expansion of capacity.
- Due to this policy, the MRTP Act (Monopolies Restrictive Trade Practices) and FERA Act (Foreign Exchange Regulation Act, 1973) were introduced.
- The objective was to liberalize the industrial sector to increase industrial productivity and competitiveness of the industrial sector.
- The policy laid the foundation for an increasingly competitive export-based and for encouraging foreign investment in high-technology areas.

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II- UNIT TEST APRIL 2023

CLASS : II B.COM ISM **TIME: 1 HOUR**

SUBJECT: MANAGEMENT INFORMATION SYSTEM **MARKS: 25**

PART-A

I ANSWER ANY FIVE OF THE FOLLOWING: **5*2 =10**

Co3 B1 1. Define Planning.

Planning in Management Information Systems (MIS) involves defining the goals and objectives of an organization, identifying the resources needed to achieve those goals, and developing strategies to accomplish them. Planning in MIS helps organizations to make informed decisions and optimize their operations by providing a roadmap for achieving their goals. It involves creating a detailed plan that outlines the tasks, timelines, and resources required to achieve the desired outcomes.

Co5 B1 2. State an Security audit.

A security audit is a comprehensive assessment of an organization's security policies, procedures, and controls to identify vulnerabilities and potential threats to its information systems and data. The primary goal of a security audit is to evaluate the effectiveness of the security measures in place and to identify areas where improvements are needed. The audit can be conducted internally by the organization's own security team or by an external auditor who is independent of the organization. The audit process typically involves a review of the organization's security policies, procedures, and controls, including access control mechanisms, data encryption, intrusion detection systems, and incident response procedures.

Co5 B1 3. Define Marketing Information System.

A Marketing Information System (MIS) is a system used to collect, organize, analyze, and disseminate information about a company's products, customers, competitors, and marketing activities. The primary objective of a Marketing Information System is to support marketing decision-making by providing accurate, timely, and relevant information to marketers. The system is made up of people, equipment, and procedures that gather and analyze data from internal and external sources. The internal sources of data may include sales records, customer data, and inventory data, while external sources may include market research reports, government data, and industry publications.

Co4 B1 4. State Inferene Engine.

An Inference Engine is a component of an Artificial Intelligence (AI) system that is responsible for drawing logical conclusions from the knowledge and data stored in the

system's knowledge base. It uses various techniques and algorithms to make decisions and make predictions based on the available data and rules. The inference engine takes in input data, applies reasoning and inference rules, and produces an output or conclusion. It is often used in expert systems, rule-based systems, and decision support systems.

Co4 B1 5. Examine Expert System.

An Expert System is an artificial intelligence system that uses a knowledge base and inference engine to simulate the decision-making abilities of a human expert in a specific domain. The system is designed to provide expert-level advice and guidance to non-experts, enabling them to solve complex problems and make informed decisions. Expert systems are based on a knowledge representation scheme that captures the expertise of human experts in a specific domain. This knowledge is represented in the form of rules, facts, and relationships that are stored in a knowledge base.

Co4 B1 6. List the Characteristics of DSS.

Some of the key characteristics of Decision Support Systems (DSS) are:

User-friendly interface: DSS should have a user-friendly interface that allows users to easily navigate the system and obtain the necessary information they need to make informed decisions.

Interactive: DSS should be interactive and allow users to modify input parameters, explore various scenarios, and evaluate different options to identify the best solution.

Flexible: DSS should be flexible and able to adapt to changing business requirements and user needs. It should be able to handle a variety of data types, sources, and formats.

Supportive: DSS should support both structured and unstructured decision-making processes. It should be able to handle complex, unstructured problems that require judgment and intuition.

Integrated: DSS should be integrated with other organizational systems, such as data warehouses, enterprise resource planning (ERP) systems, and business intelligence (BI) systems.

Co4 B1 7. Define DSS.

A Decision Support System (DSS) is a computer-based information system that supports business and organizational decision-making activities. DSS provides users with easy access to relevant data and sophisticated analytical tools to support decision-making in a variety of business scenarios.

DSS is designed to help users analyze and solve complex problems that involve large amounts of data and uncertainty. It provides decision-makers with the ability to explore

multiple alternatives, evaluate risks, and make informed decisions based on accurate and timely information.

II ANSWER ANY ONE OF THE FOLLOWING: 1*5 =5

Co4 B2 8. Classify Programmed and Non-Programmed Decision

Programmed decisions are those that are made in a routine and repetitive manner, where the procedures for making the decision have been established and can be followed systematically. These decisions are often made in response to specific situations, and the decision-making process can be automated through computer programs or other standardized methods. Examples of programmed decisions might include routine inventory management, payroll processing, or scheduling.

Non-programmed decisions, on the other hand, are those that are made in response to unique or novel situations where the decision-making process is not well-defined. These decisions typically involve a higher degree of uncertainty and risk, and require more subjective judgment and creativity to reach a resolution. Non-programmed decisions are often made by managers and other leaders in an organization, and may involve issues such as strategic planning, resource allocation, or crisis management. These decisions require a more flexible and adaptable approach, and cannot be easily automated or systematized.

Co4 B2 9. Discuss the Advantages and Disadvantages of Ess.

Advantages of ESS:

Improved decision-making: ESS provides executives with access to relevant and up-to-date information, which helps them make better and faster decisions.

Time-saving: With ESS, executives can quickly access information without having to rely on intermediaries or wait for reports from lower-level managers.

Customizable: ESS can be tailored to meet the specific needs of each organization and its executives, allowing them to access the information most relevant to their roles.

Better communication: ESS can improve communication between executives and other departments, leading to better coordination and collaboration.

Improved data accuracy: ESS provides a single source of truth for data, reducing the chances of errors or discrepancies that may occur when data is spread across multiple systems.

Disadvantages of ESS:

Cost: ESS can be expensive to develop, implement and maintain, especially for smaller organizations with limited budgets.

Complexity: ESS is often complex and requires a high level of technical expertise to implement and manage.

Security risks: ESS stores sensitive information about an organization, which makes it an attractive target for cybercriminals, increasing the risk of data breaches.

Over-reliance on technology: ESS can lead to over-reliance on technology, which may result in executives ignoring important non-quantifiable factors that are essential for strategic decision-making.

User resistance: Some executives may resist using ESS due to concerns about the accuracy and relevance of the data, or due to a lack of familiarity with technology.

III ANSWER ANY ONEOF THE FOLLOWING: 1*10 =10

Co4 B2 10 Explain the Types of Transaction Processing System.

Transaction Processing System (TPS) is a computer-based system that manages and records daily transactions such as sales, purchases, and other financial activities of an organization. There are three main types of TPS:

Batch Processing: In this type of TPS, transactions are collected over a period of time, and then processed together in a batch at a later time. This method is often used for transactions that are not time-sensitive and can be delayed, such as payroll processing or inventory management. Batch processing is efficient and can handle large volumes of data, but it is not suitable for real-time processing.

Online Transaction Processing (OLTP): This type of TPS processes transactions in real-time, as they occur. OLTP is commonly used for systems that require immediate processing of transactions, such as airline reservations, online banking, and e-commerce transactions. OLTP systems are designed to be highly responsive and scalable, and they can process a large number of transactions simultaneously.

Real-time Processing: Real-time TPS processes transactions as soon as they are initiated, providing immediate results. This type of TPS is used in systems that require immediate processing, such as online trading, online auctions, and real-time monitoring systems. Real-time processing is highly responsive and can provide instantaneous feedback, but it requires a highly reliable and secure system infrastructure to prevent data loss or corruption

In conclusion, each type of TPS has its own strengths and weaknesses, and the choice of TPS depends on the specific needs of an organization. Batch processing is suitable for non-time-sensitive and high-volume transactions, while OLTP is suitable for real-time processing and highly responsive systems. Real-time processing is best for systems that require immediate processing and feedback.

Co3 B2 11.Describe System Development Life Cycle.

System Development Life Cycle (SDLC) is a process used to design, develop, and maintain software systems. It is a methodology that consists of several stages, each with specific tasks and objectives. The SDLC is typically divided into six phases:

Planning: In this phase, the project is defined, and requirements are gathered. The scope, goals, and objectives of the project are established, and a feasibility study is conducted to determine if the project is viable.

Analysis: In this phase, the requirements are analyzed in detail, and a functional specification is created. This phase involves understanding the user's needs and defining the features and functionality of the system.

Design: In this phase, the architecture and design of the system are created. The design includes the technical specifications, database design, and user interface design.

Implementation: In this phase, the actual coding of the system takes place. The programming code is written, and the software is tested to ensure that it meets the requirements.

Testing: In this phase, the system is tested to ensure that it is free from errors and meets the requirements. The testing includes unit testing, integration testing, system testing, and acceptance testing.

Maintenance: In this phase, the system is deployed and maintained. This includes ongoing support and maintenance of the system to ensure that it continues to meet the needs of the users and to address any issues that arise.

The SDLC is an iterative process, which means that each phase may be revisited as needed to refine the system and ensure that it meets the requirements of the users. The SDLC is a structured approach to software development that provides a framework for managing complex projects and ensuring that they are completed on time, within budget, and to the satisfaction of the users.

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Department of Commerce (Information Systems and Management)

II-Unit Examination –April 2023

Date: 11.04.2023 Duration: 1 Hr

Subject & Code : Principles of Management & BS24B Class:II-B.Com (ISM)

Section A (5 x 2 = 10)

(Answer any FIVE questions)

CO-5 BL-1 1. Define Direction.

Direction is an aspect of management that deals directly with influencing, guiding, supervising, and motivating staff for the achievement of organizational goals.

CO-3 BL-1 2. What do you understand by the term Organization ?

An organization is a group of people with a defined relationship in which they work together to achieve the goals of that organization. This relationship does not come to end after completing each task. Organization is a never ending process.

CO-3 BL-1 3. Define the term delegation and decentralization.

1)Delegation is a process of systematic transfer of authority while decentralisation is the end result of planned delegation.

2) Delegation refers to the transfer of authority from one individual to another. Decentralisation refers to the systematic delegation of authority to all units in an organisation-wide context.

CO-3 BL-1 4. Briefly explain : Span of Control.

Span of control is the number of subordinates or direct reports a supervisor is responsible for. It's also called span of management.

CO-3 BL-1 5. What is span of Management?

The Span of Management refers to the number of subordinates who can be managed efficiently by a superior. Simply, the manager having the group of subordinates who report him directly is called as the span of management.

CO-3 BL-1 6. What is Directing in Management Concept?

Directing refers to a process or technique of instructing, guiding, inspiring, counselling, overseeing and leading people towards the accomplishment of organizational goals. It is a continuous managerial process that goes on throughout the life of the organization.

CO-3 BL-6 7. Write a note on obstacles in delegation.

Barriers to successful delegation included poor partnerships, unhealthy attitudes, and lack of a sense of team.

Section B (1 x 5 = 5)

(Answer any ONE question)

CO-3 BL-2 8. Explain the factors determining the effective delegation.

Right tasks

First, Mark needs to determine which tasks are right to delegate. Some questions he may ask at this time would include (1) which tasks are legally appropriate to delegate and (2) can I delegate these tasks based on this organization's policies and procedures? Correctly answering these questions will require familiarity with institutional and nurse practice act guidance. Generally, registered nurses are responsible for assessment, planning, and evaluation within the nursing process. These actions should not be delegated to someone who is not a registered nurse.[2]

Right circumstances

After determining the right tasks for delegation, Mark considers the right circumstances of delegation. In so doing, Mark may ask the following questions: (1) are appropriate equipment and resources available to perform the task, (2) does the delegatee have the right supervision to accomplish the task, and (3) is the environment favorable for delegation in this situation? To appropriately answer these questions, it is imperative that Mark completes an assessment on each client. Patients who are or may become unstable and cases with unpredictable outcomes are not good candidates for delegation. For example, it may be appropriate for unlicensed assistive personnel to feed patients requiring assistance with the activities of daily living. However, if a patient has a high risk for aspiration and a complicated specialty diet, delegation of feeding to unlicensed assistive personnel may not be safe.

Right person

If a task and circumstance are right for delegation, the next "right" of delegation is the right person. Mark needs to consider if the potential delegatees have the requisite knowledge and experience to complete delegated tasks safely, especially concerning the assessed patient acuity. Before delegating a task, the registered nurse must know the delegatee's job description and previous training. Mark may be unsure about his potential delegatee's qualifications. Therefore, he might ask the following questions before delegating a task: (1) have you received training to perform this task, (2) have you ever performed this task with a patient, (3) have you ever completed this task without supervision, and (4) what problems have you encountered in performing this task in the past?

Right supervision

The right supervision must be available in all delegation situations. Nurse practice acts require the registered nurse to provide appropriate supervision for all delegated tasks. In the case study, Mark must be sure that the delegatee will provide feedback after the task is complete. Following task completion, Mark is responsible for evaluating the outcome of the task with the patient. Registered nurses are accountable for evaluation and the overall patient outcomes.

Right direction and communication

Finally, the delegator must give the right direction and communication to the delegatee. All delegators must communicate performance expectations precisely and directly.[3] Mark should not assume that his delegatee knows what to do and how to do it, even for routine tasks. Mark must consider whether the delegatee understood the assigned task, directions, patient limitations, and expected outcomes before the delegatee assumes responsibility for it. The delegatee also must comprehend what, how, and when to report back after the delegated task is complete. Delegatees also need a deadline for task completion for time-sensitive tasks

CO-5 BL-2 9. Describe the importance of Control process.

1. Establishing goals and standards

The task of fixing goals and standards takes place while planning but it plays a big role in controlling also. This is because the main aim of controlling is to direct a business's actions towards its goals. If the members of an organization know their goals clearly, they will invest their entire focus in achieving them.

2. Measuring actual performance against goals and standards

Once managers know what their goals are, they should next measure their actual performance and compare. This step basically helps them in knowing whether their plans are working as intended.

3. Taking corrective action

In case there are discrepancies between actual performances and goals, managers need to take corrective actions immediately. Timely corrective actions can reduce losses as well as prevent them from arising in the future again.

4. Following up on corrective action

Just taking corrective measures is not enough; managers must also take them to their logical conclusion. Even this step requires thorough evaluations and comparisons.

Managers should stick to the problem until they solve it. If they refer it to a subordinate, they must stay around and see to it that he completes the task. They may even mentor him personally so that he may be able to solve such problems by himself later.

Section C (1 x 10 = 10)

(Answer any ONE question)

CO-3 BL-2 10. Explain the types of Organisation.

Types of Organisation and their Structure

There are two broad categories of organisation, which are:

1. Formal Organisation

2. Informal Organisation

Formal Organisation: Formal organisation is that type of organisation structure where the authority and responsibility are clearly defined. The organisation structure has a defined delegation of authority and roles and responsibilities for the members.

The formal organisation has predefined policies, rules, schedules, procedures and programs. The decision making activity in a formal organisation is mostly based on predefined policies.

Formal organisation structure is created by the management with the objective of attaining the organisational goals.

There are several types of formal organisation based on their structure, which are discussed as follows:

1. Line Organisation

2. Line and Staff Organisation

3. Functional Organisation

4. Project Organisation

5. Matrix Organisation

CO-5 BL-2 11. Explain in detail the characterises and principal of directing.

1. Initiates Action

A directing function is performed by the managers along with planning, staffing, organizing and controlling in order to discharge their duties in the organization. While other functions prepare a platform for action, directing initiates action.

2. Pervasive Function

Directing takes place at every level of the organization. Wherever there is a superior-subordinate relationship, directing exists as every manager provides guidance and inspiration to his subordinates.

4. Continuous Activity

It is a continuous function as it continues throughout the life of organization irrespective of the changes in the managers or employees.

5. Descending Order of Hierarchy

Directing flows from a top level of management to the bottom level. Every manager exercises this function on his immediate subordinate.

6. Human Factor

Since all employees are different and behave differently in different situations, it becomes important for the managers to tackle the situations appropriately. Thus, directing is a significant function that gets the work done by the employees and increases the growth of the organization.

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Department of Commerce (ISM)

II - Unit Examination - April 2023

Financial Services

Date: 12.04.2023 Time : 1 Hr

Class: II B.Com ISM Sub. Code : BS24C

Part - A

I. Answer any 5 of the following. 5 x 2 = 10

1.Give the meaning of Money market.

Money market consists of various financial institutions and dealers, who seek to borrow or loan securities. It is the best source to invest in liquid assets. The money market is an unregulated and informal market and not structured like the capital markets, where things are organised in a formal way.

2. What do mean by primary market?

The primary market is the part of the capital market that deals with the issuance and sale of securities to purchasers directly by the issuer, with the issuer being paid the proceeds.

3. State any importance of Secondary market.

The secondary market provides a good mechanism for a fair valuation of a company. The secondary market helps drive the price of securities towards their genuine, fair market value through the basic economic forces of supply and demand. The secondary market promotes economic efficiency.

4. Define merchant banking.

Merchant banking is a professional service provided by the merchant banks to their customers considering their financial needs, for adequate consideration in the form of fee. Merchant banks are banks that conduct fundraising, financial advising and loan services to large corporations

5. What is underwriting?

Underwriting is the process of evaluating risks to protect investors, banks, insurance agencies and other financial institutions. Typically, an underwriter performs this risk analysis to make recommendations for loans, investments and insurance policies.

6. State the meaning of Indigenous banker.

Indigenous banking system is the system of banking that involves private firms or individuals who act as banks by providing financial services such as loans and accepting deposits. Indigenous banking system is made up of indigenous bankers who do not fall under the purview of the government.

7. What is Gilt – edged market?

Gilt edged market is the market where buying and selling of government securities takes place. This securities in this market are risk free as government issues these securities.

Part - B

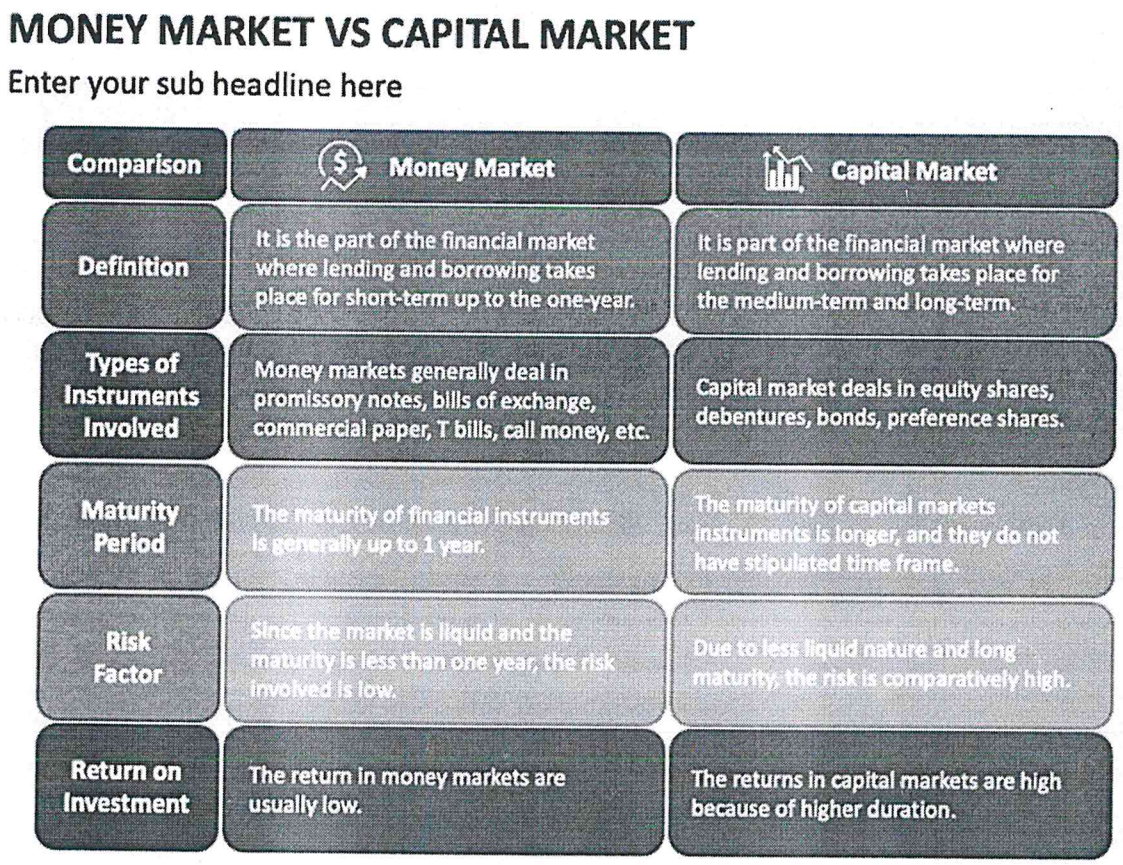
II. Answer any one the following. 5 x 1 = 5

8. Discuss the importance of Capital market.

Capital markets are mainly divided into 2 different types.

1. Primary Markets: The primary market is the part of the capital market that deals with the issuance and sale of securities to investors directly by the issuer. An investor buys securities that were never traded before. Primary markets create long term instruments through which corporate entities raise funds from the capital market.
2. Secondary Markets: The secondary market, also called the aftermarket and follow on public offering is the financial market in which previously issued financial instruments such as stock and bonds are bought and sold

9. Differentiate between the Money market and Capital market.



Part - C

III. Answer any one of the following.

10. Explain the functions of New Issue Market.

There are three entities involved in the functions of the primary market. It includes a company, an investor, and an underwriter. Following are the functions of the primary market:

1. New Issue Offer

New issues are issues that have never been traded on other exchanges and are now offered on a primary market. Setting up a new issue market entails a wide range of responsibilities. For example, carefully assessing the project's viability. Financial arrangements are formed for this purpose and take into consideration promoters' equity, liquidity ratio, debt-equity ratio, etc.

2. Underwriting

When launching a new issue, underwriting is crucial and necessary. If the firm is unable to sell the required number of shares, underwriters are in charge of purchasing unsold shares in the primary market. Financial institutions that take on the role of underwriters can receive underwriting commissions. Investors analyse underwriters and decide if taking the risk of investing in the issue is worthwhile. Also, it is quite possible that the underwriter buys the entire IPO issue and subsequently sells it to the investors.

3. New Issue Distribution

Distribution is yet another very important function. To begin the distribution process, first, a new prospectus is issued. Next, an announcement is made to invite the general public to subscribe to the issue. Here, a detailed report of the company and the issue and information regarding the underwrites is made available for investors to assess and analyse the issue.

The company issues the securities to its investors. The issue can be in the form of a public issue, private placement, rights or bonus issue, and many more. Once the company receives the money, it issues the certificate to the investor. The securities can be issued at face value, premium value or par value. When the issue closes, securities are traded in the secondary market. The trading in the secondary market can happen on the stock exchange, bond market, or derivatives exchange.

The companies that offer securities are looking for expanding their business operations, fund their business targets, or increase their physical presence across the market. The Securities and Exchange Board of India (SEBI) regulates the primary market.

11. Explain the role of stock exchanges in capital market growth.

1. Mobilization of Savings

Capital Markets are one of the most sought-after platforms for institutional investors as well as individuals. To ensure investor's protection, all the trading transactions in the capital markets are regulated with proper regulations and rules. This also helps in consolidating the confidence of small savers and individual investors. In this way, stock exchanges help in attracting savings from large number of investors in the capital markets.

2. Promoting Capital Formation

The mobilization of funds from the savers by the capital markets is channelized to various industries which are involved in production and manufacturing of various goods and services which is beneficial for the economy. This enhances the capital formation and development of the national assets. This channelization of savings into appropriate avenues of investment is one of the primary roles of the stock exchanges.

3. Liquidity of Investment

As an investor, it is very important to consider the liquidity of your investment. This liquidity is provided by the stock exchanges. Investors can liquidate their securities and other capital market assets anytime during the trade hours and days. Therefore, stock exchanges help in ensuring liquidity of investment. The online trading carried out on the stock exchanges after dematerialization of securities has transformed the trading experience. It helps investors in buying, selling and transferring their investment seamlessly.

4. Investment Safety

One of the most important role of stock exchange in ensuring investment safety to the investors. After the dematerialization act, trading on stock exchanges has been completely online. The Securities and Exchange Board of India (SEBI) keeps an eye on the functioning of exchanges and keeps on identifying new loopholes in the system. Several measures are enforced at times to overcome the same and ensure investment safety. The authorities at exchanges try their best to curb speculative practices and minimize the risk for investors to safeguard their confidence.

5. Wide Marketability to Securities

In the earlier days, trading on stock exchanges was done using physical security certificates. The trading was limited to the office of the stock exchange and all dealings were carried out over there only. Investors from distant parts of the country remain in the dark about the price movements on exchanges. After the establishment of online trading system, investors can keep an eye on the price movements and make the most out of all the price movements in the capital markets. The modern stock exchanges backed by information technology have provided wide marketability to the securities.

6. Funds for Development Purpose

As we have already discussed, stock exchanges help in mobilization and channelizing of funds from savers to various industries. Many times, these industries are the one which are involved in government development projects including infra companies, railways, telecommunications etc. Stock exchanges help in constant evaluation of government securities.

7. Barometer of National Economy

The stock exchanges are considered to be the barometer of a nation's economy. The economy of a country is economically symbolized by the most significant stock exchange of that particular country. These stock exchanges help in representing the progress and situation of a nation's economy at national and international levels. For instance, Bombay Stock Exchange or BSE is often considered by overseas investors to have an idea about the economic condition of our country.

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Department of Commerce (Information Systems and Management)

II-Unit Examination –April 2023

Date: 13.04.2023 Duration: 1 Hr

Subject & Code : Python Programming Class:II-B.Com (ISM)

Section A (5 x 2 = 10)

(Answer any FIVE questions)

CO-2 BL-1 1. How do create Modules in Python?

Modules are simply files with the ". py" extension containing Python code that can be imported inside another Python Program. In simple terms, we can consider a module to be the same as a code library or a file that contains a set of functions that you want to include in your application.

CO-1 BL-1 2. What is the difference between list & Tuples?

Criteria	List	Tuple	Set
Mutability	Mutable: Elements can be modified after creation	Immutable: Elements cannot be modified after creation	Mutable: Elements can be modified after creation
Order	Ordered: Elements have a specific order	Ordered: Elements have a specific order	Unordered: Elements have no specific order
Duplicates	Duplicates allowed	Duplicates allowed	Duplicates not allowed
Indexing	Access elements by index	Access elements by index	No indexing
Use	Storing collections of items	Representing data that	Eliminating duplicates - Checking for membership -

CO-4 BL-1 3. While the Fibonacci series program in python?

Given an integer input as the Nth value, the objective is to Find the Fibonacci Series up to the Nth Term using Loops and Recursion. The objective is to print all the number of the Fibonacci series until the Nth term given as an input. Here are some of the methods to solve the above mentioned problem

- Method 1: Using Simple Iteration
- Method 2: Using Recursive Function
- Method 3: Using direct formulae

We'll discuss the above mentioned methods in detail in the sections below. Do check out the blue box below for better understanding of fibonacci series program in python.

CO-2 BL-1 4. What is Python functions?

- Python Built-in Functions.
- Python Recursion Functions.
- Python Lambda Functions.
- Python User-defined Functions.

CO-2 BL-2 5. Differentiate Types of Arguments in Python?

Default Arguments in Python

- Default arguments are values that are provided while defining functions.
- The assignment operator = is used to assign a default value to the argument.
- Default arguments become optional during the function calls.
- If we provide a value to the default arguments during function calls, it overrides the default value.
- The function can have any number of default arguments.
- Default arguments should follow non-default arguments.

- **Positional Arguments in Python**
- During a function call, values passed through arguments should be in the order of parameters in the function definition. This is called positional arguments.
- Keyword arguments should follow positional arguments only.
- ```
  def add(a,b,c):
  ```
- ```
    return (a+b+c)
  ```
- The above function can be called in two ways:
- First, during the function call, all arguments are given as positional arguments. Values passed through arguments are passed to parameters by their position. 10 is assigned to a, 20 is assigned to b and 30 is assigned to c.

Variable-Length Arguments in Python?

Variable-length arguments are also known as arbitrary arguments. If we don't know the number of arguments needed for the function in advance, we can use arbitrary arguments

THERE ARE TWO TYPES OF ARBITRARY ARGUMENTS:

1. Arbitrary positional arguments.
2. Arbitrary keyword arguments.

ARBITRARY POSITIONAL ARGUMENTS IN PYTHON

For arbitrary positional argument, an asterisk (*) is placed before a parameter in function definition which can hold non-keyword variable-length arguments. These arguments will be wrapped up in a tuple. Before the variable number of arguments, zero or more normal arguments may occur.

POSITIONAL OR KEYWORD ARGUMENTS

If / and * are not present in the function definition, arguments may be passed to a function by position or by keyword.

POSITIONAL ONLY PARAMETERS

Positional-only parameters are placed before a / (forward-slash) in the function definition. The / is used to logically separate the positional-only parameters from the rest of the parameters. Parameters following the / may be positional-or-keyword or keyword-only.

CO- 2 BL-1 6. Explain about default arguments with example.

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- The function can have any number of default arguments.
- Default arguments should follow non-default arguments.

CO-2 BL-1 7. Define lambda functions with example.

Lambda functions are small, anonymous functions that can be defined on one line of code. They are often used in Python for short tasks, such as filtering data or applying a function to a series.

To define a lambda function, you use the lambda keyword, followed by the parameters you want to pass to the function, followed by a colon, followed by the expression you want to evaluate. For example, the following code defines a lambda function that takes two numbers as input and returns their sum:

```
>>> add_numbers = lambda x, y: x + y
Use code with caution.
```

You can call a lambda function just like you would call any other function. For example, the following code calls the add_numbers function with the arguments 1 and 2:

```
>>> add_numbers(1, 2)
3
Use code with caution.
```

Lambda functions can be used in a variety of places in Python. For example, you can use them to filter data, apply a function to a series, or pass a function as an argument to another function.

Section B (1 x 5 = 5)

(Answer any ONE question)

CO-2 BL-1 8. Explain about : 1) Print ( ) functions

The print() function prints the specified message to the screen, or other standard output device. The message can be a string, or any other object, the object will be converted into a string before written to the screen.

2) Eval ( ) Functions

The Eval function evaluates the string expression and returns its value. For example, Eval("1 + 1") returns 2. If you pass to the Eval function a string that contains the name of a function, the Eval function returns the return value of the function.

CO-1 BL-2 9. Discuss about list method and their description with example.

Method	Description
append()	Adds an element at the end of the list
clear()	Removes all the elements from the list

copy()	Returns a copy of the list
count()	Returns the number of elements with the specified value
extend()	Add the elements of a list (or any iterable), to the end of the current list
index()	Returns the index of the first element with the specified value
insert()	Adds an element at the specified position
pop()	Removes the element at the specified position
remove()	Removes the item with the specified value
reverse()	Reverses the order of the list
sort()	Sorts the list

Section C (1 x 10 = 10)

(Answer any ONE question)

CO-2 BL-1 10. Explain about imperative modules in python.

Imperative. Imperative programming provides explicit steps to the computer using statements, loops, etc. Below is an example of imperative programming. This is a simple instruction to the computer, how to concatenate characters provided in a list, and make a string.

With an imperative approach, a developer writes code that specifies the steps that the computer must take to accomplish the goal. This is sometimes referred to as algorithmic programming. In contrast, a functional approach involves composing the problem as a set of functions to be executed

CO-3 BL-1 11. Define recursive functions? Give example.

Recursive functions in code often rely on loop setups, where the initial variable is called on multiple times while being altered by the loop. Simple examples of a recursive function include the factorial, where an integer is multiplied by itself while being incrementally lowered. Many other self-referencing functions in a loop could be called recursive functions, for example, where $n = n + 1$ given an operating range.

In addition to simpler recursive functions, programmers and others have come up with much more elaborate functions that also work through principles of recursion. Some, like the Fibonacci sequence, have applications to finance and other areas, where others remain esoteric and largely exclusive to the IT community.

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II UNIT TEST - April 2023

CLASS: III B.Com ISM

TIME: 1 Hour

SUB: Software Project Management

Max: 25 Marks

PART A – (5 X 2 = 10 Marks)

Answer any FIVE questions

1.What is a technologies?

One of the most important ways that technology has affected contemporary company administration is through efficienpcy gains. Technology has simplified many organizational processes, enabling organizations to complete tasks more quickly and accurately.

2. Define the technical plan contents list.

Technical Plan means the statement of work prepared for the development of the Ultrio Assay Product, including the responsibilities to be performed by each party, the responsibilities to be performed jointly, the schedule for performance of those responsibilities, an overall development timeline and a Resource Plan. The initial Technical Plan is described in the Binder, under the heading "Technical Plan, Revision A, dated June 27, 2001,"

3. What is problems with over-and under-estimates?

Sometimes they are larger than the exact area (this is called overestimation) and sometimes they are smaller (this is called underestimation).

4. Define the expert judgement.

Expert judgment is when you call in an expert to get a skilled opinion. It's an estimation methodology for project planning that relies on the expert's opinion to estimate quantitative project details, such as timelines and potential resources.

5. What are they objectives of activity planning?

Before work commences on a project or, possibly, a stage of a larger project, the project plan must be developed to the level of showing dates when each activity should start and finish and when and how much of each resources will be required.

6. Illustrate the activity float?

Float, sometimes called slack, is the amount of time an activity, network path, or project can be delayed from the early start without changing the completion date of the project. Total float is the difference between the finish date of the last activity on the critical path and the project completion date.

7. What is precedence networks?

The precedence diagramming method is a project planning technique that allows project managers to map out all the tasks in a project to plan the order in which they will be executed. This is done by using precedence diagrams, which are project network diagrams that show tasks, their duration and dependencies.

PART B – (1 X 5 = 5 Marks)

Answer any ONE question

8. Explain the waterfall model.

The waterfall project management approach entails a clearly defined sequence of execution with project phases that do not advance until a phase receives final approval. Once a phase is completed, it can be difficult and costly to revisit a previous stage. Agile teams may follow a similar sequence yet do so in smaller increments with regular feedback loops.

The waterfall project management approach follows a linear, sequential formula. It works well for work that has predictable, recurring processes, yet it can leave development teams flat-footed and unable to adjust faster than a competitor.

A single missed deadline or scope change during a waterfall project can cause outsized impacts on subsequent releases. Additionally, when a team is fully focused on the next phase of work, resolving technical debt or fixing bugs can be painful if the team is fully allocated to new feature work and always pressing forward to the next stage.

Below is an illustration of a standard waterfall project with rigidly segmented blocks of time. This creates a "use it or lose it" mentality that encourages developers, product owners, and stakeholders to request as much time as possible in each time window, since there may be no opportunity to iterate in the future. Typically teams using waterfall try to control scope creep through "change control", where everyone agrees the original contract is not changed.

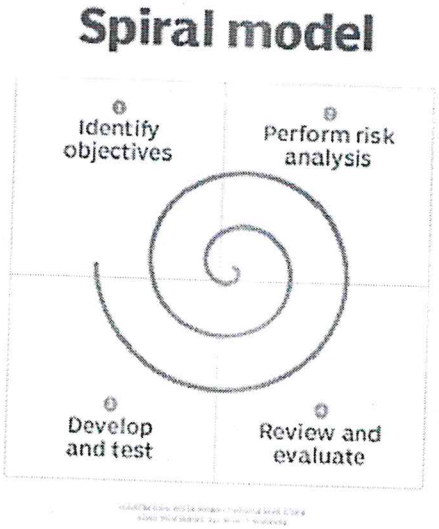
The waterfall model can exacerbate some of the known challenges of building products:

- Blockers and dependency management: Traditional project management styles often create "critical paths", where the project can't move forward until a blocking issue is resolved.
- Difficulty getting user feedback and product validation: To add insult to injury, the end customer can't interact with the product until it's fully complete. Thus, important issues in the product design and code go undiscovered until release.

9. Discuss the Spiral model

The spiral model is a systems development lifecycle (SDLC) method used for risk management that combines the iterative development process model with elements of the Waterfall model. The spiral model is used by software engineers and is favored for large, expensive and complicated projects.

When viewed as a diagram, the spiral model looks like a coil with many loops. The number of loops varies based on each project and is often designated by the project manager. Each loop of the spiral is a phase in the software development process.



Spiral model example

The spiral model enables gradual releases and refinement of a product through each phase of the spiral as well as the ability to build prototypes at each phase. The most important feature of the model is its ability to manage unknown risks after the project has commenced; creating a prototype makes this feasible.

Uses of the spiral model

As mentioned before, the spiral model is best used in large, expensive and complicated projects. Other uses include:

- projects in which frequent releases are necessary;
- projects in which changes may be required at any time;
- long term projects that are not feasible due to altered economic priorities;
- medium to high risk projects;
- projects in which cost and risk analysis is important;
- projects that would benefit from the creation of a prototype; and
- projects with unclear or complex requirements.

Spiral model phases

When looking at a diagram of a spiral model, the radius of the spiral represents the cost of the project and the angular degree represents the progress made in the current phase. Each phase begins with a goal for the design and ends when the developer or client reviews the progress.

Every phase can be broken into four quadrants: identifying and understanding requirements, performing risk analysis, building the prototype and evaluation of the software's performance.

Phases begin in the quadrant dedicated to the identification and understanding of requirements. The overall goal of the phase should be determined and all objectives should be elaborated and analyzed. It is important to also identify alternative solutions in case the attempted version fails to perform.

Next, risk analysis should be performed on all possible solutions in order to find any faults or vulnerabilities -- such as running over the budget or areas within the software that could be open to cyber attacks. Each risk should then be resolved using the most efficient strategy.

In the next quadrant, the prototype is built and tested. This step includes: architectural design, design of modules, physical product design and the final design. It takes the proposal that has been created in the first two quadrants and turns it into software that can be utilized.

Finally, in the fourth quadrant, the test results of the newest version are evaluated. This analysis allows programmers to stop and understand what worked and didn't work before progressing with a new build. At the end of this quadrant, planning for the next phase begins and the cycle repeats. At the end of the whole spiral, the software is finally deployed in its respective market.

PART C – (1 X 10 = 10 Marks)

Answer any ONE questions

10. Elaborate the software prototyping.

A software prototype is a simulation of how the actual project will look, work, and feel and would not have an exact logic involved in the software development phase. Software development team members use it for designing user feedback and user testing. And they come in various levels of sophistication. Software prototyping refers to the process that starts by creating an idea, sketching it, and making it into a clickable prototype that mimics real software.

the top types of prototyping models –

3.1 Throwaway Prototyping

Rapid throwaway or rapid prototyping is one the most important type of prototyping models. It is based on the preliminary requirement of the software applications. The throwaway prototype can be quickly developed by the team to show how the initial requirements of the system will look visually. In this model, the feedback from the customers helps in driving changes in the requirements and after the user feedback is received, the prototype is again created to meet the client's needs.

3.2 Evolutionary Prototyping

Another type of prototyping is an evolutionary prototype. Evolutionary prototypes are created by the team in an incrementally refined manner after accepting the customer's final feedback. This type of prototyping enables the team to save a lot of development time and effort. And the main reason behind it is that the development of a prototype from scratch for every different interaction can be very frustrating.

3.3 Incremental Prototyping

Incremental is a type of prototyping that enables the division of the final product into smaller prototypes and then they are developed individually. This means that different prototypes can be merged into a single software. This approach is used to reduce the feedback time between the application development team and the user.

11. Discuss the COCOMO a parametric model.

the COCOMO model is a parametric estimation model. It helps software teams estimate the cost, effort, and schedule of a project.

How it works

- Regression model: The COCOMO model is based on the number of lines of code (LOC).
- Parameters: The model parameters are derived from fitting a regression formula using data from historical projects.
- Calculations: The model includes 15 multiplying factors from different attributes of the project. It calculates time and effort using this information.

History

- The COCOMO model was developed by Dr. Barry Boehm in the late 1970s.
- It was originally published in (Boehm 1981).
- It became one of the most popular parametric cost estimation models of the 1980s.

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Department of Commerce (ISM)

II-Unit Test April 2023

Management Accounting

III-B.com (ISM)

ANSWER KEY

PART-A

Co3 B1 1. Define Ratio Analysis.

Ratio analysis is a technique used to analyze the financial performance of a company by comparing the relationship between two or more financial variables. It involves calculating various ratios and using them to evaluate the financial health of a business.

Co3 B1 2. State Solvency Ratio.

Solvency ratio measures a company's ability to meet its long-term debt obligations by comparing its assets to its liabilities.

Co4 B1 3. Define Cash Flow statement.

A cash flow statement is a financial statement that provides information about the cash inflows and outflows of a company over a specific period. It shows how much cash a company has generated from its operating activities, investing activities, and financing activities during the period and how it has used that cash. The purpose of a cash flow statement is to provide insight into a company's liquidity, solvency, and overall financial health.

Co4 B1 4. State fund flow statement.

A fund flow statement is a financial statement that shows the inflow and outflow of funds during a specific period. It highlights changes in a company's financial position by analyzing the sources and uses of funds.

Co5 B1 5.Define is Marginal Cost

Marginal cost is the additional cost incurred by a company to produce one additional unit of output. It includes the cost of direct materials, direct labor, and other variable costs that are associated with the production of the additional unit.

Co5 B1 6. State is Fixed cost

Fixed cost is a type of cost that remains constant regardless of the level of production or sales volume. These costs do not change with changes in the quantity of goods or services produced, but they are incurred regularly by the company.

Co5 B1 7. State is Break even point

Break-even point is the level of sales or production at which a company's total revenues equal its total expenses, resulting in zero profit or loss.

PART-B

II. Answer any one the following

Co3 B3 8) From the following summarised Profit & Loss account, Calculate operating ratio.

PROFIT & LOSS A/C

Particulars	₹	₹	Particulars	₹	₹
To opening stock		9,950	By sales		85,000
To purchases		54,525	By closing stock		14,900
To sundry expenses To Gross profit c/d		1,425 34,000			
Total		99,900	Total		99,900
To operating expenses: Selling & distribution Administration financial	 3,000 15,000 1,500	 19,500	By Gross profit c/d By non operating income: Interest(bank) Profit on sale of shares	 300 600	34,000 900
To Net Profit		34,900			34,900

To calculate the operating ratio, we need to divide the operating expenses by the net sales and then multiply by 100.

Operating Expenses = Selling & distribution + Administration + financial

= 3,000 + 15,000 + 1,500

= 19,500

Net Sales = Sales - Closing Stock + Opening Stock

= 85,000 - 14,900 + 9,950

= 80,050

Operating Ratio = (Operating Expenses / Net Sales) x 100

= (19,500 / 80,050) x 100

= 24.35%

Therefore, the operating ratio for the given Profit & Loss account is 24.35%.

Co4 B3 9) From the information given below Solve breakeven point in units:

Selling price per unit Rs. 16.50

Trading discount per unit Rs. 1.50

Fixed expenses (aggregate) Rs. 7,50,000

Variable expenses per unit Rs. 11.00

Units of production 3,00,000 units

To calculate the breakeven point in units, we need to use the following formula:

Breakeven point (units) = Fixed expenses / (Selling price per unit - Variable expenses per unit - Trading discount per unit)

Substituting the given values in the formula, we get:

Breakeven point (units) = 7,50,000 / (16.50 - 11.00 - 1.50)

Breakeven point (units) = 7,50,000 / 4

Breakeven point (units) = 1,87,500 units

Therefore, the breakeven point in units for the given information is 1,87,500 units.

PART-C

III. Answer any one of the following

Co5 B3 10. Calculate a flexible budget for production at 80% & 100% activity on the basis of the following information.

Production at 50% capacity – 5000 units

Raw material	Rs. 80 per units
Direct labour	Rs. 50 per units
Direct expenses	Rs. 15 per units
Factory expenses	Rs. 50,000 (50% fixed)
Administration expenses	Rs. 60,000 (60% variable)

To calculate a flexible budget for production at 80% and 100% activity, we need to first calculate the total variable cost per unit and the total fixed costs.

Variable Cost per Unit = Raw material + Direct labor + Direct expenses
= Rs. 80 + Rs. 50 + Rs. 15
= Rs. 145

Total Fixed Cost = Factory expenses + Administration expenses
= Rs. 50,000 + (60% x Total Variable Cost at 50% capacity x 5,000 units) + Rs. 60,000
= Rs. 50,000 + (0.60 x 145 x 5,000) + Rs. 60,000
= Rs. 9,17,500

Now, we can calculate the flexible budget for production at 80% and 100% activity as follows:

At 80% Activity:
Total Variable Cost = Total Variable Cost at 50% capacity x 80%
= Rs. 145 x 5,000 x 0.8
= Rs. 5,80,000

Flexible Budget at 80% Activity = Total Variable Cost + Total Fixed Cost
= Rs. 5,80,000 + Rs. 9,17,500
= Rs. 14,97,500

At 100% Activity:
Total Variable Cost = Total Variable Cost at 50% capacity x 100%
= Rs. 145 x 5,000 x 1
= Rs. 7,25,000

Flexible Budget at 100% Activity = Total Variable Cost + Total Fixed Cost
= Rs. 7,25,000 + Rs. 9,17,500
= Rs. 16,42,500

Therefore, the flexible budget for production at 80% activity is Rs. 14,97,500 and at 100% activity is Rs. 16,42,500.

Co4 B2 11. Explain cash flow statement format

Particulars	Amount ($)
A. Cash Flow from Operating Activities	
• Cash received from customers	XXX
• Cash paid to employees and suppliers	(XXX)
• Cash generated from operating activities	XXX
• Dividend Received	XXX
• Interest Received	XXX
• Interest Paid	(XXX)
• Taxes Paid	(XXX)
Net Cash Flow from Operating Activities	XXXX
B. Cash flow from Investing Activities	
• Purchase of Machinery	(XXX)
• Proceeds from the sale of machinery	XXX
Net Cash Flow from Investing Activities	(XXX)
C. Cash flow from Financing Activities	
• Proceeds from capital contribution	XXX
• Proceeds from loan	XXX
• Payment of loan	(XXX)
Net Cash Flow from Financing Activities	XXX
Net Increase/Decrease in Cash (A+B+C)	XXX
Cash at beginning of the period	XXX
Cash at the end of the period	XXX

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II - Unit Examination - April 2023

Entrepreneurial Development

Date: 12.04.2023 Time : 1 Hr

Class: III B.Com ISM Sub. Code : BS26C

Part - A

I. Answer any 5 of the following. **5 x 2 = 10**

1. State any two sources of business opportunity identification.
   - Innovation Brainstorming
   - Market Research.
   - Social Listening & Monitoring
2. What do you mean by feasibility study?

   A feasibility study is a preliminary exploration of a proposed project or undertaking to determine its merits and viability. A feasibility study aims to provide an independent assessment that examines all aspects of a proposed project, including technical, economic, financial, legal, and environmental considerations.
3. What is Marketing feasibility?

   Market feasibility studies are documents that help businesses assess their likelihood of success. These studies include an analysis of the industry, competitors, and more.
4. What is Financial feasibility?

   Financial feasibility describes whether or not your project is fiscally viable. A financial feasibility report includes a cost/benefit analysis of the project. It also forecasts an expected return on investment (ROI), as well as outlines any financial risks.
5. Give the meaning of Business Plan.

   A business plan is an essential written document that provides a description and overview of your company's future. All businesses should have a business plan. The plan should explain your business strategy and your key goals to get from where you are now to where you want to be in the future.

6. Define Venture Capital.

Venture capital (VC) is a form of private equity and a type of financing that investors provide to startup companies and small businesses that are believed to have long-term growth potential. Venture capital generally comes from well-off investors, investment banks, and any other financial institutions.

7. Give any two functions of commercial banks for Entrepreneurial development.

Provides loan and advances : Another critical function of this bank is to offer loans and advances to the entrepreneurs and business people, and collect interest. For every bank, it is the primary source of making profits.

Part - B

II. Answer any one the following. **5 x 1 = 5**

8. **Explain the advantages of Business plan.**

1. It helps you forecast future steps
The primary purpose of a business plan is to give you (and investors) an idea of whether your business has the potential to be successful. By mapping out your next steps and setting milestones, you can spot strengths and weaknesses in your ideas and set targets. This is helpful as it may prevent you from proceeding with a business idea that may end up costing you money.

On the other hand, these initial forecasts may provide the positive projections you need to actually get started and even attract outside investment. Even if your business plan produces an uncertain forecast, it still provides a small glimpse of the direction your business wants to head in and how it may perform on the way. This is valuable information, both for business owners and third-party stakeholders.

2. It is required if you want to apply for credit
In order to secure a business loan from an official lender, a business plan is essential. Most banks will not even meet with you to discuss financing unless you have a business plan to present. This is because financial institutions like banks and credit unions need a way to accurately gauge their lending risks.

A well-thought-out business plan gives you the opportunity to show lenders how organised and prepared you are. It should explain how your business will use any capital you are lent and how you intend to make repayments. This level of detail can help to instil confidence in your business by persuading lenders you are a good risk.

3. It helps you to identify future cash flow issues
A business plan should contain detailed cash flow forecasts and analysis. This shows

potential lenders how money is expected to travel in and out of your business. It can also be useful for owners to determine if/when the business is expected to have cash flow problems under certain strategies. Having this information at hand can make it easier to financially plan, ensuring the business is always properly funded.

4. It helps you to allocate resources

One of the biggest challenges for new business owners is resource management. From how much inventory you should buy to setting initial budgets, these decisions can be difficult. A business plan encourages you to create a workable budget and allocate resources before you start spending. This ensures you can afford everything you need and you don't overspend before your business can start making money.

5. It helps you better understand your competition
Creating a business plan requires a great deal of industry research. While you may think you have a strong handle on what you want your business to achieve, only by analysing your competition will you be able to see the full picture. A business plan can help you produce highly valuable insights into competitor demographics. This includes existing consumer trends and preferences, as well as costing insights. These findings are not always viable without conducting business plan competitor analysis.

6. It can help to secure talent

In order for a business to be successful, attracting talented workers is crucial. A business plan can help to secure this talent by setting out a clear vision for the business. From management to skilled entry level staff, by showing individuals the direction and potential of the business, you can start to build a strong and coherent team.

9. Discuss the role of technical analysis for Entrepreneurs.

1.Identifying Trends:

Technical Analysis helps investors identify trends in asset prices. By analyzing historical price charts, traders can spot patterns like head and shoulders, double bottoms, and flags. Recognizing these patterns enables investors to make informed buy or sell decisions.

2. Timing Entry and Exit Points:

Knowing when to enter or exit a trade is crucial. Technical analysis provides valuable insights into potential entry and exit points based on support and resistance levels, moving averages, and other indicators. This helps investors maximize profits and minimize losses.

3. Risk Management:

Capital market investments come with inherent risks. Technical Analysis allows investors to set stop-loss orders and manage risk effectively. By placing stop-loss orders at strategic levels, traders can limit potential losses and protect their capital.

4. Psychology of the Market:

Technical Analysis takes into account the psychology of market participants. Price movements are influenced by emotions like fear and greed. By understanding market psychology, investors can anticipate price movements and make rational decisions.

5. Quantitative Analysis:

Technical Analysis relies on quantitative data and statistical indicators. These objective metrics provide a systematic approach to analyzing securities, reducing the impact of subjective biases.

6. Global Perspective:

In today's interconnected world, capital markets are influenced by global events and trends. Technical Analysis allows investors to consider global factors and their impact on asset prices.

Part - C **10 x 1 = 10**

III. Answer any one of the following.

10. Discuss the Business plan process.

1. Carry out your research

The first step to creating a business plan is to do thorough research about the business and industry you are trying to get into. Tap into all the information you can get about your target audience, potential customer base, competitors, market and industry trends, cost of business, etc.

At the time of conducting your research make sure that you organize your data in a systematic and comprehensible way. This will not only make it easy for you to use your research data but also make it simpler to present to your stakeholders. Also, mark all the sources of your data to present their credentials.

Also, it is a good practice to conduct a SWOT analysis for your company to understand how your company's strengths and weaknesses would help you stand apart from your competitors based on the current market statistics.

2. Make a Framework

Once you're done with your research the next step is to make a framework or a set of strategies for your business based on your research and business goals. You can either design strategies from scratch or reframe previously tried and tested successful strategies to fit your business goals.

But remember that you'll have to tweak strategies to fit your unique competitive advantages and goals. Hence, strategies that are already being used can act as a good foundation, but it is essential to remember that you'll have to expand upon them or improvise them for your business.

3. Formulate your Financial Forecasts

No matter how tedious finances might seem, they are an integral part of any business. When you map out your finances it is essential to note down all the costs you'll incur as you grow and run your business for the next five years and what would be your potential revenue, and if or not it would leave room for profit.

You can get your financial forecast by adding your financial assumptions to a financial system which will give you your cash flow statements and give you an idea of what amount of funds you'll need to start and run your business for the first year.

4. Draft a Plan

As you're done with creating business strategies and planning your finances, it is time to draft your business plan and compile everything into a single document. As you are done with all the technical aspects, this step should feel relatively easy.

But if you need help drafting a business plan and making it look presentable, you can subscribe to business plan software that comes with predesigned templates and tools to make your work easier.

5. Recheck and Improvise

Now as you're done with writing your plan, it is a good idea to give it enough time to edit it. Check for any unclear sentences, irrelevant phrases, or confusing terms. Take suggestions from your team members who are familiar with the functioning of your business. Finally, proofread for any grammar or punctuation errors. One of the most popular and useful pieces of editing advice is to put your work aside for a while and then look at it with fresh eyes to edit it better.

6. Create an Impressive Business Plan Presentation

Now, as you're done with writing your business plan it is time to create a presentation that leaves an excellent impression on your audience. Highlight all the important and relevant points.

Also, add references for your investors like your financial reports, resumes of your key team members, snippets of your marketing plan, and past sales reports to have a well-rounded presentation.

11. **State the Problems faced by entrepreneurs while setting up an enterprise.**

1. Selecting a service or product

An entrepreneur may have the skills and passion to start a company, but one important factor in starting a business is deciding what to sell. To start, they may identify a demand in their community they could meet. A marketing firm or freelance researcher may help them conduct market research to discover what needs there are and which ones they have the resources to address. For example, an entrepreneur may learn that the people in their community drive out of town to get massages, so they know there is a local demand for a spa that they could fill.

Related: 15 Entrepreneur Characteristics To Develop

2. Developing a sales strategy

Though an entrepreneur may recognize an opportunity in a certain community, they might also research the best way to sell to that community. They may hire a professional to create a marketing plan or make one themselves. To do this, they can assess who their target audience is and what strategy might best reach them. For example, if an entrepreneur opens a business in a rural community where they know many people listen to the radio, they may develop a digital ad to broadcast locally.

3. Establishing starting funds

For entrepreneurs who start with lower capital, there are ways to earn funding to get started. They may begin with a traditional bank loan or a federal small business loan. If they plan to provide a product or service that they know has significant demand already, they might start a fundraising campaign. For entrepreneurs who would rather use a self-fueled growth model, they may start by targeting a small audience and slowly building to serve larger client bases.

4. Maintaining a budget

Because running a company can be unpredictable, an entrepreneur can stay prepared by carefully maintaining a budget. They may do this by prioritizing efficient marketing strategies and allocating the rest according to their unique needs. Assessing which expenses are necessary may help entrepreneurs adjust their funds to better prepare for changes. For example, they may observe that there is a more affordable manufacturer they can use and reallocate those savings to address higher utility costs.

5. Sustaining revenue

It's important for entrepreneurs to manage their organization's money carefully to account for any potential delay in invoice payments. Aside from budgeting, entrepreneurs may charge a down payment to ensure they can afford expenses until they receive full payment. By sending invoices as early as possible and requesting payment as soon as they complete projects, entrepreneurs can secure funding to keep operations running efficiently.

6. Staffing the organization

To make sure that they hire people who care about their organization's mission and will work hard, entrepreneurs may oversee the hiring process. They may publish highly detailed listings to attract candidates whose qualifications match the organization's specific needs. Before interviewing anyone, they can develop questions to assess if the candidate might be a good fit for their organization and if the role can help them in their career goals.

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Department of Commerce (Information Systems and Management)

II-Unit Examination –April 2023

Date: 13.04.2023 Duration: 1 Hr

Subject & Code : Web Technology Class:III-B.Com (ISM)

Section A (5 x 2 = 10)

(Answer any FIVE questions)

1.Creating a List.

We use the <ul> tag to create an unordered list. As usual, we need to use the <li> tags within <ul> and to create the list items. The list items (li) inside the unordered list (ul) come with the default style of bullet points – so each of the list items is preceded by a black dot.

2. Advantages of JavaScript

JavaScript simply adds dynamic content to websites to make them look good. HTML work on the look of the website without the interactive effects and all. HTML pages are static which means the content cannot be changed. It adds interactivity to web pages to make them look good.

3. Write the data types in Javascript.

- String.
- Number.
- Bigint.
- Boolean.
- Undefined.
- Null.
- Symbol.
- Object.

4. How to create Forms in HTML.

To create an HTML form, we will use the HTML <form> element. It starts with the <form> tag and ends with the </form> tag. We can add the input elements within the form tags for taking user input. form elements, such as text box, textarea, etc.

5. Write the simple tags in HTML.

To create an HTML form, we will use the HTML <form> element. It starts with the <form> tag and ends with the </form> tag. We can add the input elements within the form tags for taking user input. form elements, such as text box, textarea, etc.

6. ASP.Net Language structure

You can build the static part of an ASP.NET page using HTML tags and literal text. The HTML content of your page is also compiled along with the rest of the contents. The literal text has been made bold and converted to uppercase before being rendered in the browser.

7. Define Tables.

The HTML tables allow web authors to arrange data like text, images, links, other tables, etc. into rows and columns of cells. The HTML tables are created using the <table> tag in which the <tr> tag is used to create table rows and <td> tag is used to create data cells.

Section B (1 x 5 = 5)

(Answer any ONE question)

8. How to create a table in HTML with Example.

This code will create a table with three columns: name, age, and country. The table will have two rows, one for each person. The first person's name is John Doe, their age is 21, and their country is the United States. The second person's name is Jane Doe, their age is 22, and their country is Canada.

You can also add a table header and footer to your table. The table header will appear at the top of the table, and the table footer will appear at the bottom of the table. To add a table header, use the <thead> tag. To add a table footer, use the <tfoot> tag.

Here is an example of how to add a table header and footer to the HTML code above:

```
<table>
  <thead>
    <tr>
      <th>Name</th>
      <th>Age</th>
      <th>Country</th>
    </tr>
  </thead>
  <tbody>
    <tr>
      <td>John Doe</td>
      <td>21</td>
      <td>United States</td>
    </tr>
    <tr>
      <td>Jane Doe</td>
      <td>22</td>
      <td>Canada</td>
    </tr>
  </tbody>
  <tfoot>
    <tr>
      <td>&copy; 2023 John Doe</td>
    </tr>
  </tfoot>
</table>
Use code with caution.
```

This code will create a table with three columns: name, age, and country. The table will have two rows, one for each person. The first person's name is John Doe, their age is 21, and their country is the United States. The second person's name is Jane Doe, their age is 22, and their country is Canada. The table footer will appear at the bottom of the table, and it will contain the copyright information for John Doe.

9. Describe about Radio Button and Check box.

S.No.	Radio button	Checkbox
1	Radio buttons are used when we need to pick a single option out of various available alternatives.	A checkbox authorises us to choose one or more options.
2	Here we use an HTML <input> tag and set the radio as a type attribute.	We use the HTML <input> tag followed by the checkbox attribute.
3	Radio button is a single control unit.	Checkbox is a multiple control unit.
4	When we need to restrict the user's selection to just one option, then we use it.	It is operated when we need to permit the user to choose multiple options.
5	It is shown as a little circle on the screen.	It is shown as a small square box.

Section C (1 x 10 = 10)

(Answer any ONE question)

10. Write about Label, Text Box, Buttons and Image.

Label Control

Label control is used to display a textual information at a specific location in your page. For example, if the form submission fails or succeeds you may want to inform the user by displaying a message with a Label control. Label control is a very basic control and most of the time you will use its Text property to print some messages on the label. The following

Button Control

Button control, when clicked, submits the page back to the server for performing some certain functionality. When a button is clicked the page will be posted back to the server and Page_Load event will be executed before the Control events (such as Button_Click where you want to execute a set of code to perform some functionality) are executed. Please refer to the ViewState and PostBack tutorial if you want to learn more about PostBack event.

TextBox Control

Whenever you need some input text from the user, TextBox is the control that you need in your web form. Basically, TextBox allows users to enter some text. ASP.NET TextBox control comes with many properties for customization. By default, TextBox control is a single-line-textbox once placed on the form. You can convert it into a multi-line textbox via its TextMode property (i.e., TextMode="MultiLine") or if you have a textbox to which user will enter some sensitive information such as password you can set TextMode="Password".

11. Write a Javascript Program using Tables and Forms.

This task can be an interview question for you. It's not that searching around different tutorials or stackoverflow or something else quickly. It's the step by step process we can build to achieve this.

As we regularly follow, first divide the big item into chunks.

Steps:

- create a sample form with several fields with submit button. I added 'name & email' fields.
- create a table column headers to show upfront. Which shows matching the labels of above form.
- Enter values and perform interaction upon clicking on submit button.
- Sample error message can be shown when user submits without values.

I will explain what is happening under publishToTable().

- capture name and email values. (You can add more form fields if you require).
- Checking for non-empty values and showing error in case if at least one value is empty using span.
- Adding value to table only when both values are present. Hence checking both values and then forming td elements.
- Then, creating table elements using javascript and assigning 'name and email' to td.

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தமிழ்த்துறை

முதலாம் ஆண்டு – இரண்டாம் பருவம்

அலகுத் தேர்வு – 2

நரம்: 1.00 மணி மதிப்பெண்: 25

ள்: 10 / 04 / 2023 2022 – 2023 / LA12A / EVEN

பகுதி – 1

வையேனும் ஐந்து வினாக்களுக்கு மட்டும் விடையளிக்கவும் (5 x 2 = 10)

1. குறுந்தொகையைத் தொகுத்தவர் யார்?
2. அகநானூற்றின் மூன்று பிரிவுகளைக் குறிப்பிடுக.
3. சேர மன்னர்களைப் பற்றிப் பாடப்பட்டுள்ள சங்க நூல் எது?
4. மூன்று சங்கங்கள் இருந்த இடங்களைக் குறிப்பிடுக.
5. பதினெண்கீழ்க்கணக்கு நூல்களில் அற நூல்கள் எத்தனை?
6. "வேளாண்வேதம்" என்றழைக்கப்படும் நூல் எது?
7. 'நான் தமிழ்துறைக்கு சென்றுத் தமிழ்பேராசிரியரை சந்தித்தேன்' – மேற்கண்ட சொற்றொடரில் வல்லினம் மிகும், மிகா இடங்களை எழுதுக.

பகுதி – 2

வையேனும் ஒரு வினாவுக்கு மட்டும் விடையளிக்கவும் (1 x 5 = 5)

8. நும் பாடப்பகுதியில் இடம்பெற்றுள்ள 'பாலைப் பாடிய பெருங்கடுங்கோ' வின் கலித்தொகைப் பாடல் கருத்தினை விளக்குக.
9. நாலடியாரில் இடம்பெற்றுள்ள 'ஈகை' குறித்த பாடல்களின் கருத்தை விளக்குக.

பகுதி – 3

எவையேனும் ஒரு வினாவுக்கு மட்டும் விடையளிக்கவும் (1 x 10 = 10)

10. "சுற்றந்தழால்" அதிகாரத்தின் கருத்தினை விளக்குக.
11. வல்லின ஒற்று மிகும் இடங்களையும் மிகா இடங்களையும் குறித்துச் சான்றுடன் விளக்குக.

LE12A

SRM ARTS AND SCIENCE COLLEGE, KATTANKULATHUR

Department of Hindi

UNIT TEST- II (10th APRIL 2023)

Time: 1 Hr. Max. Marks :25

SECTION A - (5 x 2 = 10 marks)

किन्हीं पाँच प्रश्नों का 50 शब्दों में उत्तर लिखिए।

1. लक्ष्मी का स्वागत एकांकी के शीर्षक की सार्थकता पर विचार कीजिए।
2. रौशन की माता का परिचय दीजिए।
3. रहमान गाय को दाऊदयाल को ही क्यों बेचना चाहता था?
4. दाऊदयाल रहमान का ही ऋणी होने की बात क्यों कहता है?
5. मुरलीवाले के बारे में लोगों का क्या कहना था?
6. मिठाईवाले ने अपनी मिठाइयों के गुणों के बारे में क्या कहता है?
7. मिठाईवाले के बारे में रोहिणी का संदेह क्या था?

SECTION B - (1x 5 = 5 marks)

कोई एक का सप्रसंग व्याख्या कीजिए।

8. क्या शादी ही दुनिया में सब कुछ है। घर में बच्चा मर रहा है, और तुम्हें शादी की सूझ रही है। आखिर तुम लोगों को हो क्या गया है।
9. वही जो सरला के मरने पर अपनी लड़की के लिए कह रहे थे। बड़े भले आदमी हैं। सुनती हूँ, सियालकोट में उनका बड़ा काम है।

SECTION C - (1 x 10 = 10 marks)

कोई एक प्रश्न का उत्तर दें।

10. मुक्तिधन कहानी का सारांश लिखिए।
11. हिन्दी में अनुवाद कीजिए।

It is true to say that service to man is service to God. Rabindranath Tagore in his poem Leave this chanting,says that God is to be found with the poor toiling people. He suggests that service of the masses is the service of God. All the saints and religious teachers have stressed the importance of serving humanity. If we lend a helping hand to a person in need, if we being comfort to a troubled mind, if we wipe out tears from a poor mans eyes we certaintly serve God through our selfless acts. It is said that God loves those who love their fellow beings. So the best way to serve God is to serve Humanity.

LK12A

SRM ARTS AND SCIENCE COLLEGE
II UNIT TEST, 10TH APRIL 2023

CLASS: II YEARS
SUBJECT: FRENCH II

TIME: 1 HOUR
MAX. MARKS: 25

SECTION –A (5x2= 10 MARKS) ANSWER ANY FIVE

Repondez aux questions au choix :

1. Qui a réalisé les quatres bâtiments totalement différents ?
2. Combien d'étages sont-la dans le Vistal a Montréal ?
3. Nommez deux monuments légendes de Jean Nouvel :
4. Nommez une ville européenne.
5. Combien de pays sont dans l'UE ?
6. Quelle est la devise de l'UE ?
7. Nommez un pays qui n'utilise pas l'euro.

SECTION –B (1X5=5 MARKS) ANSWER ANY ONE

8. **Réagissez aux situations en utilisant un impératif :**
   a) Votre professeur parle très vite et vous n'avez pas compris :
   « Madame, (répéter) _____ s'il vous plait !
   b) Vous invitez vos parents a déjeuner le dimanche :
   « (Venir) _____dejeuner a la maison dimanche !
   c) Vous êtes a Paris ; vous décidez, avec vos amis, de partir demain matin a 8h pour visiter Le musée de Louvre :
   « (Partir) _____ a 8 h, on arrivera au musée vers 9 heures. »
   d) Vos deux amies ne font jamais de sport :
   « (Faire) _____ du sport avec moi le dimanche ! »
   e) Votre petit frère mange beaucoup :
   « Ne pas manger_____ de gâteau, tu vas grossir ! »
9. **Completez avec au, aux, a la, a l', du, de la, des, de l' :**
   a) On va (a) _____ cinéma ce soir a 21 h ?
   b) Tu as (de) _____ clés de la voiture ?
   c) Ou est la sortie (de) _____ magasin ?
   d) Tu m'attends, je vais (a) _____ toilettes.
   e) Mon frère a des très belles photos (de) _____ iles grecques.

SECTION –C (1X10=10 MARKS) ANSWER ANY ONE

10. **Conjuguez les verbes au passe compose:**
    i) Partir ii) parler iii) tomber iv) prendre v) arriver.
11. **Mettez les verbes à l'imperatif :**
    i) Avoir ii) écouter iii) répéter iv) faire v) venir.

SRM ARTS AND SCIENCE COLLEGE

Kattankulathur-603 203.

Department of Commerce (Accounting & Finance)

Date: 10/04/2023 **Duration: 1 Hour** **Class: III B. Com (A&F)**

Subject Name & Code: **Advanced Cost Accounting**

Section - A

(5 x 2 = 10)

(Answer any **FIVE** questions)

CO 2 BL 1 1. Define Process Costing.

CO 2 BL 2 2. Describe the abnormal loss?

CO 3 BL 1 3. State the meaning of operating costing?

CO 3 BL 1 4. Examine how is Passenger Kilometre calculated?

CO 4 BL 2 5. Express the meaning contribution?

CO 4 BL 1 6. State the meaning of Margin of Safety?

CO 5 BL 6 7. Write short notes on Material Cost Variance

Section - B

(1 x 5 = 5)

(Answer any **ONE** question)

CO 3 BL 3 8. From the following information, Calculate Total Passenger-km.

Number of buses	-	5
Days operated in the month	-	25
Trips made by each bus	-	4
Distance of route	-	20km long (one side)
Capacity of bus	-	50 passengers
Normal passenger travelling	-	90% of capacity

CO 5 BL 3 9. From the following particulars, calculate (i) Material cost Variance (ii) Material Price Variance (iii) Material usage variance

Materials	**Standard**		**Actual**	
	Units	Price	Units	Price
A	1010	1	1080	1.2
B	410	1.5	380	1.8
C	350	2	380	1.9

(1 x 10 = 10)

Section C

(Answer any **ONE** question)

CO 4 BL 3 10. From the following information you are required to find out (i) Contributi
(ii) BEP (iii) Margin of safety (iv) Profit

	Rs.
Total Fixed cost	4500
Total variable cost	7500
Total sales	15000
Units sold	5000 units

Also calculate the volume of sales to earn a profit of Rs.6000.

CO 5 BL 3 11. Mr A runs a tempo service in the city. He furnishes the following data a
wants you to compute the cost per running km. Calculate Cost per running km.

Cost of vehicle	25,000
Road license fee per annum	750
Supervisor's salary per annum	1,800
Driver's wage per hour	4
Cost of fuel per litre	6.50
Repairs & maintenance per km	1.50
Tyre allocation per km	2.00
Garage rent per annum	3,200
Annual insurance premium	1,200
Km. run per litre	6
Km. run during the year	12,000
Estimated life of vehicle in km	1,00,000

The vehicle runs 20km per hour on an average.

I-'

SRM ARTS AND SCIENCE COLLEGE
Kattankulathur-603203
DEPARTMENT OF ENGLISH
II UNIT TEST – EVEN SEMESTER 2022-2023

Subject Name & Code: Communicative English-II /LZ12A **Class:** I Year
Duration: 1 Hour **Max. Marks:** 25

PART- A (5 marks)

CO: 1 BL: 1 1. Read following passage and answer the questions that follow. (5x1=5)

The most beautiful humming birds are found in the West Indies and South America. The crest of the tiny head of one of these birds shines like a sparkling crown of colored light. The shades of color that adorn its breast are equally brilliant. As the bird flits from one flower to another, it looks more like a bright flash of sunlight than it does a living being. You ask, why are they called humming birds? It is because they make a soft, humming noise by the rapid motion of their wings—a motion so rapid, that as they fly, you can hardly see that they have wings. One day when walking in the woods, I found the nest of one of the smallest humming birds. It was about half the size of a very small hen's egg, and it was attached to a twig no thicker than a steel knitting needle. It seemed to have been made of cotton fibers and was covered with the softest bits of leaf and bark. It had two eggs in it, and each was about as large as a small sugarplum. When you approach the spot where one of these birds has built its nest, you need to be careful. The mother bird will dart at you and try to peck you. Its sharp beak may hurt you. The poor little thing knows no other way of defending its young, and instinct teaches it that you might carry off its nest if you find it.

Answer the following

1. Why does the author say the hummingbird looks like a "bright flash of sunlight?"
2. Why do you think it is hard to find a hummingbird's nest?
3. What might happen if you try to take the nest of a hummingbird?
4. How do you think the author feels about hummingbirds?
5. According to you, what will be the appropriate title for the above passage?

PART B - (10 marks)

CO: 2, 4 BL: 1 Identify the error and write the correct answ (5x1=5)

a) I usually get up on seven o'clock.
b) I can't buy it for such a high price.
c) Divide the apple between you three.
d) I have other books except these.
e) The man shot the bird by a gun.

CO: 3BL: 6 3. Rewrite the passage by arranging them in correct order (5x1=5)

(A)With that, I swallowed the shampoo, and obtained the most results almost on the spot. (B)The man shuffled away into regions to make up a prescription, and after a moment I got thr the shop-telephone to the Consulate, intimating my location. (while the pharmacist was wrapping up a six-ounce bottle of the I groaned and inquired whether he could give me something f gastric cramp (D)I intended to stage a sharp gastric attack, and an old-fashioned pharmacy, I asked for a popular shampoo consisting of olive oil and flaked soap.

PART C - (10 marks)

CO: 5, 6 BL: 3 4. Answer any TWO of the following.

(2x5=10)

a) Prepare a Brochure for an Academic event of your choice

b) Write a Letter of Application to an editor of a newspaper for th of a sports reporter

c) While travelling by bike, you are caught by the police and fine not wearing helmet. You asked to pay the fine and drive away. W Script based on this situation.

---------x---------

SRM ARTS AND SCIENCE COLLEGE

Department of Commerce

(Accounting and Finance)

II Unit Examination - April 2023

CORPORATE AND BUSINESS LAW – CA24A

ate: 11.04.2023 **Max.Marks:25**

lass: II B.COM A & F **Duration: 1 Hr**

Part – A

Answer any **FIVE** questions. **(5x1=5)**

CO4 BL2: 1. Define Company.

CO3 BL1: 2. What is free consent.

CO3 BL1: 3. What is undue influence.

CO3 BL1: 4. What is unlawful agreement.

CO4 BL2: 5. Define lifting of corporate veil.

CO5 BL1: 6. Expand NCLT.

CO5 BL1: 7. what is share capital.

Part – B

Answer any **TWO** questions. **(2x5=10)**

CO4 BL1: 8. Explain the features of company

CO5 BL1: 9.Explain the kinds of company meeting

Part – C

Answer any **ONE** question. **(1x10=10)**

CO5 BL6: 10. Explain The types of share capital?

CO4 BL4: 11. Distinguish between memorandum and articles of association.

SRM ARTS AND SCIENCE COLLEGE

Department of Commerce

(Accounting and Finance)

II Unit Examination - April 2023

CORPORATE AND BUSINESS LAW – CA24A

ate: 11.04.2023 Max.Marks:25

lass: II B.COM A & F Duration: 1 Hr

Part – A

Answer any **FIVE** questions. **(5x1=5)**

CO4 BL2: 1. Define Company.

CO3 BL1: 2. What is free consent.

CO3 BL1: 3. What is undue influence.

CO3 BL1: 4. What is unlawful agreement.

CO4 BL2: 5. Define lifting of corporate veil.

CO5 BL1: 6. Expand NCLT.

CO5 BL1: 7. what is share capital.

Part – B

Answer any **TWO** questions. **(2x5=10)**

CO4 BL1: 8. Explain the features of company

CO5 BL1: 9.Explain the kinds of company meeting

Part – C

Answer any **ONE** question. **(1x10=10)**

CO5 BL6: 10. Explain The types of share capital?

CO4 BL4: 11. Distinguish between memorandum and articles of association.

SRM ARTS AND SCIENCE COLLEGE
Kattankulathur-603203

Department of Commerce (Accounting and Finance)
II Unit Examination – April 2023

Management Accounting

te: 11.04.2023
me: 12.00-1.00pm

Maximum Marks:25
Class : III-B.Com (A&F)

Section-A **(5*2=10)**

Answer any five questions

CO-5 BL-1 1) What is Fund flow statement?

CO-4 BL-1 2) Define ratio analysis?

CO-6 BL-1 3) What is Budget, state any two objectives.

CO-5 BL-1.4) Define Marginal costing?

CO-6 BL-1.5) what is flexible budget?

CO-5 BL-3 6) For a company, Sales Rs 8,000, Variable cost are Rs 4,000, and fixed costs are Rs 4,000. Calculate the following P/V ratio, BEP (sales), Margin of Safety.

CO-4 BL-3 7) From the following information, calculate current ratio.

Trade receivables (debtors)	1, 00,000	Bills payable	20,000
Prepaid Expenses	10,000	Sundry Creditors	40,000
Cash and cash equivalents	30,000	Debentures	2,00,000
Short term investments	20,000	Inventories	40,000
Machinery	7,000	Expenses Payable	40,000

Section-B **(5*1=5)**

Answer any one question

CO-4 BL-2 8) Explain the Various types of Ratios?

CO-6 BL-3 9) S. K. Brothers wish to approach the bankers for temporary overdraft facility for the period from October 2010 to December 2010. During the period of this period of these three months, the firm will be manufacturing mostly for stock. You are required to prepare a cash budget for the above period.

Month	Sales (Rs.)	Purchases (Rs.)	Wages (Rs.)
August	3,60,000	2,49,600	24,000
September	3,84,000	2,88,000	28,000
October	2,16,000	4,86,000	22,000
November	3,48,000	4,92,000	20,000
December	2,52,000	5,36,000	30,000

(a) 50% of credit sales are realized in the month following the sales and remaining 50% in the second following.

(b) Creditors are paid in the month following the month of purchase

(c) Estimated cash as on 1-10-2010 is Rs.50,000.

Section-C

(10*1=10)

Answer any one question

CO-4 BL-3 10) The following Trading and Profit and Loss Account of Fantasy Ltd. for the year 31-3-2000 is given below:

Particular	Rs	Particular	Rs
To opening stock	76,250	By sales	5,00,000
Purchases	3,15,250	Closing stock	98,500
Carriage and Freight	2,000		
Wages	5,000		
Gross profit b/d	2,00,000		
	5,98,500		**5,98,500**
To Administration Exp	1,01,000	By gross profit b/d	2,00,000
Selling & Dist. Exp	12,000	Non-operating incomes:	
Non-operating Exp	2,000	Interest on Securities	1,500
Financial Exp	7,000	Dividend on Shares	3,750
Net profit c/d	84,000	Profit on sale of shares	750
	2,06,000		**2,06,000**

Calculate:

1. Gross Profit Ratio 2. Expenses Ratio 3. Operating Ratio
4. Net Profit Ratio 5. Operating (Net) Profit Ratio 6. Stock Turnover Ratio.

CO-6 BL-3 11) Prepare a flexible budget for overheads on the basis of the following data. Ascertain overhead rates at 60%, 70% and 100% capacity.

Variable overheads:	**At 60% capacity (Rs)**
Material	6,000
Labour	18,000
Semi-variable overheads:	
Electricity:	30,000
40% Fixed	
60% variable	
Repairs:	
80% fixed	3,000
20% Variable	3,000
Fixed overheads:	
Depreciation	16,500
Insurance	4,500
Salaries	15,000
Total overheads	93,000
Estimated direct labour hours	1,86,000

SRM ARTS AND SCIENCE COLLEGE
Kattankulathur-603 203.
Department of Commerce (Accounting and Finance)
II-Unit Examination – April 2023

Date: 12.04.2023 **Duration: 1 Hr**

Class: I B.COM(A&F)

Subject Name & Code: Advanced Financial Accounting & CZ22A

Section A (5 x 2 = 10)

(Answer any **FIVE** questions)

CO-3 BL-1 1.What is a departmental Accounts?

CO-3 BL-1 2. What are departmental accounts?

CO-3 BL-1 3. What do you understand by inter departmental transfer?

CO-4 BL-1 4. What is gaining ratio?

CO-4 BL-1 5. What is revaluation account?

CO-4 BL-1 6. Enumerate the accounting problems arising out of retirement of a partner

CO-4 BL-2 7. Distinguish sacrificing ratio and gaining ratio (Any two points)

Section B (1 x 5 = 5)

(Answer any **ONE** question)

CO-3 BL-3 8.From the following particulars, prepare the departmental trading and profit and loss A/c for the year ending 31-12-2020

Particulars	Dept. x	Dept. y
Stock(1-1-2020)	9,000	8,400
Sales	42,000	36,000
Purchases	27,000	21,600
Direct expenses	5,490	8,520
Postage	360	360
Stock(31-12-2020)	10,800	4,800

Indirect expenses for the entire business was Rs.3,900 which are to be divided in the proportion of sales of the two departments.

CO-4 BL-5 9.K,M and S are three partners sharing profits in the ratio of 4:3:2 K retires assuming M and S will share profits in future in the ratio of 5:3 determine the gaining ratio

Section C (1 x 10 = 10)

(Answer any **ONE** question)

CO-3 BL--3 10. The following purchase were made by a business house having three departments.

Dept. A -1,000 units

Dept. B - 2,000 units at a total cost of Rs. 1,00,000

Dept. C - 2,400 units

Stocks on 1st January were:

Dept. A – 120 units

Dept. B – 80 units

Dept. C – 152 units

Dept. A – 1020 units at Rs. 20 each

Dept. B – 1920 units at Rs.22.50 each

Dept. C – 2496 units at Rs.25 each

The rate of gross profit is same in each case. Prepare departmental trading account

CO-4 BL-3 11. A,B and C are partners in a firm sharing profits and losses in the ratio of 1/3:1/2:1/6 respectively. Their balance sheet as on 31.03.2006

Liabilities	Rs.	Assets	Rs.
Reserve fund	16,000	Building	50,000
Capital. A	30,000	Machinery	40,000
B	40,000	Furniture	10,000
C	25,000	Stock	25,000
Loan payable	15,000	Debtors 18,000 Less: provision 500	17000
Sundry creditors	25,000	Cash	8,500
Total	**1,51,000**	**Total**	**1,51,000**

C retires on 31.3.2006 subject to the following conditions

a) Goodwill of the firm valued at Rs.24,000

b) Machinery to be depreciated by 10%

c) Furniture to be depreciated by 5%

d) Stock to appreciated by 15% and buildings to appreciated by 10%

e) Reserve for doubtful debts to be raised to Rs.2,000

Prepare necessary ledger accounts and show the balance sheet of the new firm

SRM ARTS AND SCIENCE COLLEGE
Kattankulathur – 603203

Department of Commerce (Accounting & Finance)
II Unit Examination – April 2023

Working Capital Management

Date: 12.04.2023
Time: 12.00-1.00 pm

Maximum Marks: 25
Subject code: CA24B

Section-A **(5*2=10)**

Answer any five questions

CO-4 BL-1 1) Define Cash management?

CO-5 BL-2 2) What is meant by Receivables management?

CO-5 BL-2 3) What is credit period?

CO-5 BL-2 4) What do you mean by credit evaluation?

CO-6 BL-1 5) Define Inventory management?

CO-6 BL-2 6) What do you mean by EOQ?

CO-6 BL-2 7) Explain the term ABC Analysis.

Section-B **(5*1=5)**

Answer any one question

CO-5 BL-2 8) Explain the various steps to improve your accounts receivable?

CO-6 BL-2 9) Explain the need for inventories and importance of its management?

Section-C **(10*1=10)**

Answer any one question

CO-5 BL-2 10) What are the strategies for effective accounts receivable management?

CO-6 BL-3 11) Calculate Minimum stock level, Maximum stock level and re-ordering level:

Maximum consumption	=	300 units per day
Minimum consumption	=	180 units per day
Normal consumption	=	190 units per day
Reorder period	=	10-15 days
Reorder Quantity	=	2,000 units
Normal reorder period	=	13 days

SRM ARTS AND SCIENCE COLLEGE

Department of Commerce (Accounting and Finance)
II Unit Examination - April 2023

ENTREPRENEURIAL DEVELOPMENT

Date: 12.04.2023
Class: III B.COM A & F

Max.Marks:25
Duration: 1 Hr

Part – A

Answer any **FIVE** questions. **(5x1=5)**

CO3 BL1: 1. What Is Market Analysis.

CO3 BL1: 2. What Is Technical Analysis.

CO3 BL1: 3. What Is Cost Benefit.

CO4 BL2: 4. Define Business Plan.

CO4 BL1: 5. Expand CPM & PERT.

CO5 BL1: 6. What is meant by Venture capital

CO5 BL1: 7. What is Business angles

Part – B

(2x5=10)

Answer any **TWO** questions.

CO5 BL1: 8. Explain the venture capital and it's Process.

CO4 BL1: 9.Explain the Business plan process.

Part – C

(1x10=10)

Answer any **ONE** question.

CO3 BL6: 10. Explain The Factors Affecting Identification Of Business Opportunities.

CO4 BL5: 11. Explain The Stages In Project Formulation.

SRM ARTS AND SCIENCE COLLEGE

Department of Commerce

(Accounting and Finance)

II Unit Examination - April 2023

PRINCIPLES OF MANAGEMENT

te: 13.04.2023 Max.Marks:25

ıss: I B.COM A & F Subject code: CZ22B

ration: 1 Hr

Part – A

Answer any **FIVE** questions. **(5x1=5)**

CO3 BL1: 1 What is Policy.

CO3 BL1: 2. What is an Informal Organization.

CO3 BL2: 3 Define Authority.

CO3 BL1: 4. What is Decentralization.

CO4 BL1: 5 What is Responsibility Accounting.

CO4 BL1: 6 What is Span of Control.

CO5 BL1: 7. What is mean by direction.

Part – B

Answer any **TWO** questions. **(2x5=10)**

CO4 BL4: 8. Distinguish Between Authority and Responsibility

CO4 BL4: 9. Describe The Importance Of Centralization.

Part – C

Answer any **ONE** question. **(1x10=10)**

CO4 BL6: 10. Explain Briefly The Various Kind of Policy .

CO5 BL6: 11. Explain the importance of control process.

SRM ARTS AND SCIENCE COLLEGE

Kattankulathur-603 203.

Department of Commerce (Accounting & Finance)

II-Unit Examination – April 2023

Date: 13.04.2023 **Duration: 1 Hour** **Class:** II B.Com (A&F)

Subject Name & Code: Indirect Taxation & CZ24D

Section A (5 x 2 = 10)

(Answer any **FIVE** questions)

CO 3 BL 1 1. What do you mean by Assessment?

CO 3 BL 1 2. What is Refund?

CO 3 BL 1 3. What do you mean by Input Tax Credit?

CO 4 BL 1 4. Define GST Audit.

CO 4 BL 1 5. Explain the rules for becoming GST Practitioners.

CO 5 BL 1 6. What is Custom Area?

CO 5 BL 1 7. Explain Countervailing duty and Anti-dumping duty.

Section B (1 x 5 = 5)

(Answer any **ONE** question)

CO 3 BL 1 8. Explain about the Provisions composition under GST.

CO 5 BL 1 9. What is the process of levy and collection of Customs Duty?

Section C (1 x 10 = 10)

(Answer any **ONE** question)

CO 3 BL 2 10. Write about Officers under GST?

CO 5 BL 2 11. Explain the term Baggage under the Customs Act 1962.

SRM ARTS AND SCIENCE COLLEGE
Kattankulathur-603 203.
Department of Commerce (Accounting and Finance)
II-Unit Examination – April 2023

Date: 13.04.2023 **Duration: 1 Hr** **Class: III B.COM(A&F)**

Subject Name & Code: Capital markets

Section A

(5 x 2 = 10)

(Answer any **FIVE** questions)

CO-3 BL-1 1. State the meaning of stock exchange

CO-3 BL-2 2. Explain the term authorized clerk

CO-3 BL-1 3. Define national Stock exchange

CO-3 BL-1 4. State the meaning of jobbers

CO-4 BL-1 5. Who is merchant banker

CO-4 BL-1 6. What is underwriting

CO-4 BL-1 7. State the meaning of new issues market

Section B

(1 x 5 = 5)

(Answer any **ONE** question)

CO-3 BL-4 8. Distinguish commodity exchange and stock exchange

CO-4 BL-1 9. Explain the methods of new issues

Section C

(1 x 10 = 10)

(Answer any **ONE** question)

CO-3 BL-1 10. Explain the steps in stock trading

CO-4 BL-4 11. Distinguish primary market and secondary market

SRM ARTS AND SCIENCE COLLEGE
Kattankulathur – 603203

Department of Commerce (Accounting & Finance)
II Unit Examination – April 2023

Financial Analytics and Control

Date: 17.04.2023
Time: 12.00-1.00 pm

Maximum Marks: 25
Subject code:CA32B

Class : I-B.Com (A&F)

Section-A **(5*2=10)**

Answer any five questions

CO-4 BL-1 1) What is Prime cost.

CO-4 BL-2 2) State any two objective of cost behavior.

CO-4 BL-1 3) Define standard costing.

CO-4 BL-2 4) Explain the term ABC costing.

CO-5 BL-1 5) What do you mean by Lean Manufacturing

CO-5 BL-3 6) Write a short note on theory of Constraints.

CO-5 BL-1 7)What is capacity management.

Section-B **(5*1=5)**

Answer any one question

CO-4 BL-2 8) Difference between joint and by- product costing.

CO-5 BL-1 9) What are the steps in the theory of constraints.

Section-C **(10*1=10)**

Answer any one question

CO-4 BL-2 10) Briefly explain the types of concept of cost.

CO-5 BL-2 11) Explain the five principles of lean manufacturing.

SRM ARTS AND SCIENCE COLLEGE

Department of Mathematics

Unit Test – II (2022-2023 Even Semester)

Date : 17-10-2023 **Duration : One hour** **Class : II B.COM., (A&F)**

Subject Name & Code : Elements of operation Research/CZ34A

Section A (5 x 2 = 10)

(Answer any **FIVE** questions)

CO4 BL1 1. Define the transportation problem.

CO4 BL2 2. Explain the meaning of unbalanced transportation problem.

CO5 BL6 3. Write the meaning of the mixed strategy.

CO5 BL1 4. Define zero-sum game.

CO4 BL1 5. Define the term "Basic feasible solutions"

CO5 BL1 6. Define value of the game.

CO5 BL1 7. Name the different types of game.

Section B (1 x 5 = 5)

(Answer any **ONE** question)

CO4 BL5 8. Find the initial basic feasible solution to the followings TP using VAM

		Destination				
		D_1	D_2	D_3	D_3	Supply
Factory	F_1	3	3	4	1	100
	F_2	4	2	4	2	125
	F_3	1	5	3	2	75
	Demand	120	80	75	25	300

CO5 BL3 9. Solve a game with the following pay-off matrix

Player B \ Player A	
	$\begin{bmatrix} -1 & 2 & -2 \\ 6 & 4 & -6 \end{bmatrix}$

Section C (1 x 10 = 10)

(Answer any **ONE** question)

CO5 BL3 10. Solve the following problem graphically

	Player B		
Player A	$\begin{bmatrix} 1 & 3 & 11 \\ 8 & 5 & 2 \end{bmatrix}$		

CO4 BL3 11. Solve the following AP

$$\begin{bmatrix} 41 & 72 & 39 & 52 \\ 22 & 29 & 49 & 65 \\ 27 & 39 & 60 & 51 \\ 45 & 50 & 48 & 52 \end{bmatrix}$$

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SRM ARTS AND SCIENCE COLLEGE

[Affiliated to the University of Madras and approved by the Government of Tamilnadu]
(Accredited with A + Grade by NAAC & An ISO 9001 : 2015 Certified Institution)
Kattankulathur, Chengalpattu District – 603 203
Department of Commerce
[Accounting & Finance]
II - Unit Examination – April - 2023

Class : III.B.Com [A& F] **Time :** 12.00 PM to 1.00 PM

Subject : Income Tax Law and Practice – II **Date :** 17.04.2023

Maximum Marks : 25

SECTION - A [5 X 2 = 10 Marks]

Answer any FIVE Questions
All Questions carry EQUAL Marks

1. Define the term " **Clubbing of income** ".
2. Interpret the word " **Deemed income** "
3. Demonstrate - " **Set – off carry forward and set – off lossess**".
4. Point out the concept " **Deduction U/ S 80 GG**".
5. Recommend - the term" **Assessment of individual** ".
6. Quote – the meaning of " **Self Assessment** "
7. Decide the practical idea of an " **Due date of filing of return**"?

SECTION - B [1 X 5 = 5 Marks]

Answer any ONE Question

8. From the following particulars compute the total income of Mr. Ram for the assessment year 2022-23.

Particulars	Rs
Income from house property	(-) 8,000
Short term capital gain on sale of shares	95,000
Long term capital loss on sale of bonds	(-) 85,000
Other sources : Interest on Govt. Securities	18,000

The assessee has unabsorbed depreciation of Rs. 35,000 being brought forward from 2020-21. Assessee had closed the business and all the assets have been disposed of.

(OR)

9. Mr. X earned gross total income of Rs. 5,00,000 in the previous year 2021- 22 and made the following donations during the year:

1. Rs. 10,000 to Chief Minister's Earthquake Relief Fund Gujarat.
2. Rs. 15,000 to National foundation for communal Harmony.
3. Rs. 20,000 to Municipal Corporation approved for promotion of family planning.
4. Rs. 45,000 to approved institutions .
5. Rs. 20,000 to Swachh Bharat Kosh.

Compute the amount of deduction admissible to him u/s 80 G for the assessment year 2022-23.

SECTION - C [1 X 10 = 10 Marks]

Answer any ONE Question

10. From the particulars given below, compute the total income for the previous year 2021- 22.

	Particulars	Rs.
(i)	Income from let – out house [Computed]	6,000
(ii)	Annual Rental value of his self -occupied house	4,000
(iii)	Municipal taxes	400
(iv)	Profit from electric goods business after depreciation	10,000
(v)	Profit from agency business	3,000
(vi)	Speculation gain from Gold	2,000
(vii)	Long-term Capital Gain from land	7,000
(viii)	Short- term Capital Gain	2,000
	Following losses have been brought from 2020-21 previous year	
(i)	Loss from electric goods business	6,000
(ii)	Loss from agency business	1,000
(iii)	Speculation loss from Silver	4,000
(iv)	Unabsorbed Depreciation	1,000
(v)	Long- term Capital loss	4,400
(vi)	Short – term Capital loss	3,000

[OR]

11. From the particulars given below compute total income of Mr. Singh a, physically handicapped person, for the assessment year 2022-23.

	Particulars	Rs.
1.	Salary received from employer	3,00,000
2.	Annual rental value of let out house	15,000
3.	Interest on loan taken to purchase another house which is self- occupied	20,000

4. He had sold another residential house which is self occupied
   Its fair market value on 1.4.2001 was Rs. 6,20,000. Out of capital gain of
   The house he invested Rs. 5,00,000 in bonds of National Highway Authority on India notified u/s 54 EC. C.I.I for 2021 – 22 is 317 .
5. He won Rs. 40,000 in race course betting and Rs. 2,000 in a factory.
6. He paid Rs. 6,000 by cheque as premium to secure health insurance policy of GIC for his family.
7. His mother who is dependent on him is suffering from cancer and he spent Rs. 46,500 on her treatment.
8. His minor son is mentally retarded on whose special education he spent Rs. 15,000 during the year.
9. He donated Rs. 10,000 to Karnataka State Chief Minister's Relief fund.
10. He gave Rs. 2,000 for repair of a notified temple and Rs 1,500 to family planning Association of India.

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எஸ். ஆர். எம். கலை மற்றும் அறிவியல் கல்லூரி

தமிழ்த்துறை 2122053

முதலாம் ஆண்டு – இரண்டாம் பருவம்

அலகுத் தேர்வு – 1

நேரம்: 1.00 மணி

நாள்: 23 / 01 / 23

மதிப்பெண்:25

2022 – 2023 / LA12A / EVEN

பகுதி – 1

எவையேனும் ஐந்து வினாக்களுக்கு மட்டும் விடையளிக்கவும் (5 x 2 = 10)

1. நற்றிணை நூலைத் தொகுப்பித்தவர் யார்?
2. புறநானூறு குறிப்பு வரைக?
3. திருக்குறளின் வேறு பெயர்கள் யாவை?
4. எட்டுத்தொகை நூல்களுள் புறநூல்களை எழுதுக.
5. யாதும் ஊரே யாவரும் கேளிர் யார் கூற்று?
6. முல்லைப்பாட்டின் ஆசிரியர் யார்?
7. அடுக்குத் தொடர் என்றால் என்ன?

பகுதி – 2

எவையேனும் ஒரு வினாவுக்கு மட்டும் விடையளிக்கவும் (1 x 5 = 5)

8. பத்துப்பாட்டிலுள்ள அக நூல்களை விவரிக்க.
9. நல்லந்துவனார் கூறும் குறிஞ்சித் திணையின் பாடல் பொருளை விவரி.

பகுதி – 3

எவையேனும் ஒரு வினாவுக்கு மட்டும் விடையளிக்கவும் (1 x 10 = 10)

10. காலம் அறிதல் அதிகாரத்தின் மூலம் வள்ளுவர் கூறும் கருத்துக்களை விளக்கி எழுதுக?
11. எட்டுத் தொகை நூல்களுள் அகநூல்களை விளக்கி கட்டுரை வரைக.

V. Nithya

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LE12A

SRM ARTS AND SCIENCE COLLEGE, KATTANKULATHUR

UNIT TEST- II (27th February 2023)

ıe: 1 Hr. Max. Marks : 25

SECTION A - (5 x 2 = 10 marks)

किन्हीं पाँच प्रश्नों का 50 शब्दों में उत्तर लिखिए।

1. औरंगजेब की सबसे बड़ी इच्छा क्या थी ?
2. औरंगजेब अपने आप को पिता की मृत्यु का दोषी क्यों मानता है ?
3. औरंगजेब अपने को बदनसीब बाप क्यों समझता है ?
4. बसंत ऋतु का नाटक एकांकी का उद्देश्य क्या है ?
5. धर्मेन्द्र बसन्ती की दोस्ती के बारे में जज साहब से क्या कहता है ?
6. प्रोफसर कुल्लु पहाड़ क्यों गये थे ?
7. प्रोफसर साहब ने देवी की मूर्ति की चोरी क्यों की ?

SECTION B - (1x 5 = 5 marks)

कोई एक का सप्रसंग व्याख्या कीजिए।

8. यह अहमदनगर है बेटी! शिया रियासत बीजापुर और गोलकुण्डा के करीब। दुश्मनी दोस्ती में छुपकर आती है। जिन्दगी में यह हमेशा याद रखो।
9. आज आप सिर्फ वकालत कर रहे हैं, जिसमें भावना नहीं केवल एक निर्मम स्वार्थ है।

SECTION C - (1 x 10 = 10 marks)

कोई एक प्रश्न का उत्तर दें।

10. औरंगजेब की आखिरी रात एकांकी का सारांश लिखिए।
11. हिन्दी में अनुवाद कीजिए।

One day an English gentlman named Rowland Hill was walking past a house when he saw a postman take a letter up to the gate. A young girl came out to receive it. She turned it over in her hand. The price of the postage was one shilling. But she has no money to pay for the letter. The postman put it back in his bag and turned away from the house. Rowland Hill, who was a kind hearted man, paid the shilling and the postman handed the letter to the girl. It was her dear brotherङs letter. This made Hill think how letters would be sent at less cost so that the poor and the rich alike could hear more often from their friends and relatives. He thought and at last made a plan, and with the help of Government, soon started cheap postage. We should thank Rowland Hill for doing us a great service.

LK12A

SRM ARTS AND SCIENCE COLLEGE

UNIT TEST II - 27TH FEBRUARY 2023

CLASS: TIME: 1 HOUR MAX. MARKS: 25

SECTION –A (5x2= 10 MARKS) ANSWER ANY FIVE

Repondez aux questions au choix :

1. Qui a réalisé les quatres bâtiments totalement différents ?
2. Combien d'étages sont-la dans le Vistal a Montréal ?
3. Nommez deux monuments légendes de Jean Nouvel :
4. Nommez une ville européenne.
5. Combien de pays sont dans l'UE ?
6. Quelle est la devise de l'UE ?
7. Nommez un pays qui n'utilise pas l'euro.

SECTION –B (1X5=5 MARKS) ANSWER ANY ONE

8. **Réécrivez les phrases en utilisant Il ne faut pas.**

a) Prendre la direction de rennes puis tourner a droite juste âpres Le Mans.
b) Vous devez attacher votre ceinture de sécurité.
c) Mettez 3 œufs et 100 grammes de sucre et mélangez bien.
d) C'est un hôpital. Ne parle pas trop fort !
e) Monsieur Dupont est en ligne, rappelez un peu plus tard.

9. **Faites une seule phrase en utilisant ou, qui ou que.**

a) Cette femme est très jolie. Je vois cette femme tous les jours dans le bus.
b) L'hôtel est au centre-ville. Nous avons dormi à I' hôtel.
c) J'aime bien les chaussures noires. Les chaussures noires sont dans la vitrine.
d) Le fauteuil rouge me plait beaucoup. Mes parents m'ont offert le fauteuil rouge.
e) Lili connait le village corse. Nous avons visite le village corse en mai dernier.

SECTION –C (1X10=10 MARKS) ANSWER ANY ONE

10. **Conjuguez les verbes au passe compose:**

i) Partir ii) parler iii) tomber iv) prendre v) arriver.

11. **Completez :**

a) Propriano _____ de 3500 habitants.
b) La cote _____ de belles plages.
c) _____ une _____ de plongée.
d) Elle _____ une piscine très agréable.

I-UNIT EXAMINATION FEBRUARY -2023
ADVANCE CORPORATE ACCOUNTING

Date : 27.02.2023 Class: II-B.Com (A&F)

TIME: 12.00 PM TO 1.00 PM Max Mark : 25 Marks

PART-A **(5*2=10)**

ANSWER ANY FIVE

CO-1 BL-1 1.What do you mean by Capital Reduction

CO-1 BL-1 2.Recall the procedures for Reducing Share Capital.

CO-1 BL-1 3.Enumerate Internal Reconstruction.

CO-3 BL-1 4.Who is a Liquidator.

CO-3 BL-1 5.What is Liquidation.

CO-3 BL-1 6.Who are Preferential Creditors.

CO-1 BL-2 7. Discuss the types of Internal Reconstruction.

PART-B **(1*5=10)**

ANSWER ANY ONE

CO-1 BL-3 8. **The share capital of Balu Ltd. consists the following :**

10,000 6% preference shares of Rs. 100 each and 50,000 equity shares of Rs. 10 each. The shares were fully paid up. The company had accumulated losses totalling Rs. 3,50,000 besides preliminary expenses of Rs. 20,000. It was also ascertained that the fixed assets which stood in the books at Rs. 14,00,000 was overvalued to the extent of Rs. 4,00,000. A scheme of capital reduction was approved as follows:

(i) 6% preference shares were to be converted into 7% preference shares of Rs. 60 each.

(ii) Equity shares were to be reduced to Rs. 2 each. Construct the Journal entries for the above transaction.

payment was made as follows:

Liquidation expenses Rs. 25,000

Preferential creditors Rs. 75,000 and

Secured creditors Rs. 20,00,000 and

Unsecured creditors Rs. 15,00,000

Calculate the total remuneration payable to the liquidator.

PART-C **(1*10=10**

ANSWER ANY ONE

CO-1 BL-6 10. The following is the balance sheet of Harrish Industries Ltd. 31.12.2006.

Liabilities	Rs	Assets	Rs
Share capital 6,000, 6% preference share of Rs. 100 each 12,000 equity shares of Rs. 100 each	6,00,000 12,00,000	Goodwill	45,00
8% debentures	3,00,000	Land and Building	6,00,000
Bank overdraft	3,00,000	Plant and Machinery	9,00,000
Sundry creditors	1,50,000	Stock	1,30,000
		Debtors	1,40,000
		Cash	15,000
		Preliminary expenses	20,000
		Profit and Loss A/c	7,00,000
	25,50,000		25,50,000

(b) The debenture holders took over stock and debtors in full satisfaction of the their claims.

(c) The land and buildings to appreciated by 30% and plant and machinery to be depreciated by 30%.

(d) The Fictitious and intangible assets are to be eliminated.

(e) Expenses of reconstruction amounted to Rs. 5,000

Give journal entries and prepare the reconstructed balance sheet.

CO-3 BL-6 11. A company went in liquidation on 31.3.2008 when the following balance sheet was prepared.

Liabilities	Rs	Assets	Rs
Share capital 19,500 shares of Rs. 10 each	1,95,000	Goodwill	60,000
Sundry creditors : Partly secured (on building)	53,310	Building	48,000
Secured creditors	99,790		
Preferential creditors	24,200		
Bank overdraft	8,000	Machinery	65,500
		Stock	56,800
		Sundry Debtors	48,820
		Cash	2,500
		P & L account	98,680
	3,80,300		3,80,300

Machinery Rs. 51,000

Stock Rs. 39,000

Debtors Rs. 58,500

Cash Rs. 2,500

The expenses of liquidation amounted to Rs. 1,000. The liquidator's remuneration was agreed at 2.5% on the amount realized (including cash) and 2% on the amount paid to unsecured creditors.

Prepare Liquidator's final statement of account.

Department of Commerce (Accounting & Finance)

Date: 27/02/2023 **Duration: 1 Hour**

Subject Name: Advanced Cost Accounting **Class: III B. Com (A&F)**

Section A (5 x 2 = 10)

(Answer any **FIVE** questions)

CO-1 BL-1 1. Define contract costing.

CO-1 BL-1 2. Examine the 'Retention of Money.

CO-1 BL-1 3. Sate the meaning of Work Certified.

CO-1 BL-1 4. Define Notional Profit.

CO-2 BL-2 5. Explain process costing?

CO-2 BL-2 6. Explain the meaning of 'Normal loss'.

CO-2 BL-1 7. State the meaning of 'Joint products'

Section B (1 x 5 = 5)

(Answer any **ONE** question)

CO-1 BL-3 8. Solve the following particulars are related to contract undertaken by Ram Construction Ltd.

Plant purchased Rs. 60,000; Wages paid Rs. 3,40,000; Overhead apportioned Rs. 40,000; Material issued to site Rs. 3,36,000; Plant at site Rs. 48,000; Work uncertified Rs. 20,000; Cash received Rs. 6,00,000 (being 80% of work certified). **Prepare contract account.**

CO-2 BL-3 9. Calculate a Process Account: A product passes through two processes. The following details relate to process 'A'. You are required to ascertain the process cost to be transferred to process 'B'.

Direct materials (100 units)	12,000
Direct wages	8,000
Direct expenses	5,000
Overheads	11.000

Input 1000 units; output 1000 units as there was no loss of units.

Section C (1 x 10 = 10)

(Answer any **ONE** question)

CO-1 BL-3 10. The following expenses were incurred on an unfinished contract during the accounting 2010: **Rs.**

Materials	90,000
Wages	80,000
Other expenses	5,000

Rs 2,00,000 was received from the contractee, being 80% of the work certified. Work done but not certified was Rs. 5,000. Determine the profit to be credited to Profit and Loss Account in all the three alternatives given below:

(i) Contract price Rs. 3, 00,000
(ii) Contract price Rs. 5, 50,000
(iii) Contract price Rs. 12,00,000

CO-2 BL-3 11. Calculate the cost of each process and total cost of production from the data given below.

	Process 1 Rs.	Process 2 Rs.	Process 3 Rs.
Material	2,250	750	300
Wages	1,200	3,000	900
Direct Expenses	500	500	500
Works overhead	1,890	2,580	1,875

Other indirect expenses of Rs. 1,275 should be apportioned on the basis of wages.

Date: 01.03.2023 **Duration: 01 Hr**

Subject Name: Advanced Financial Accounting

Class: I-B.Com (A&F)

Section A (5 x 2 = 10)

(Answer any **FIVE** questions)

All Questions carry EQUAL Marks

CO-1 BL-1 1. What are the different kinds of Branches.

CO-1 BL-1 2. What are the features of dependent Branches.

CO-1 BL-1 3. What do you understand by a Wholesale Branch.

CO-3 BL-1 4. What is Sacrificing Ratio.

CO-3 BL-1 5. What is memorandum of Revaluation Account.

CO-3 BL-4 6. List out the methods of valuation of Goodwill.

CO-3 BL-4 7. List out the adjustments needed at the Time of Admission of a Partner.

Section B (1 x 5 = 5)

(Answer any **ONE** question)

CO-1 BL-1 8.R.N Swamy & co have opened a branch at Neyveli. The following is a list of transaction between the head office and the branch for the year ending June 30,2021.

Stock at branch on 31 St July 2020	-	3000
Goods supplied to branch	-	48000
Salaries	-	2400
Rent.	-	720
Telephone.	-	200
Petty expenses.	-	300
Remittance received from the branch	-	55000
Stock on 30 th June 2021	-	2500
Balance of petty cash	-	20

CO-3 BL-3 9. A and B are partners in a business sharing profits in the ratio of 5:3. They decide to admit C into the firm giving him 1/6th share. Calculate the new profit sharing ratio and sacrificing ratio of the partners.

Section C (1 x 10 = 10)

(Answer any **ONE** question)

CO-1 BL-3 10. From the following particulars relating to Bombay branch for the year ending 31 St December 2022. Prepare branch account in the head office books.

		Rs.
Stock at the branch on 1.1.2022	-	15000
Debtors at the branch on 1.1.2022	-	3000
Petty cash at the branch on 1.1.2022	-	300
Goods sent to branch during 2022	-	252000
Remittance from the branch during 2022:		
Cash sales	-	60000
Received from debtors	-	210000
Credit sale during 1993	-	228000
Cheque sent to branch during 2022:		
For Salaries	-	9000
For Rent and taxes	-	1500
For Petty cash	-	1100
Stock at the branch on 31.12.2022	-	25000
Petty cash on 31.12.2022	-	200
Goods returned by the branch	-	2000
Debtors on 31.12.2022	-	48000

CO-3 BL-3 11. X and Y were partners sharing profits and losses in the ratio of 2:1. Their Balance sheet as on 31.12.2013 was as follows:

Liabilities	Rs.	Assets	Rs.
Creditors	65,900	Cash	1,200
Capital– X Capital–Y	30,000 20,000	Debtors	9,700
		Stock	20,000
		Machinery	35,000
		Buildings	50,000
Total	**1,15,900**	Total	**1,15,900**

They decided to admit Z as a partner for 1/3rd share in the profit of the firm, subject to the following conditions.

(a) That he should bring in Rs. 15,000 as his capital

(b) That the value of stock and machinery be depreciated by 10%

(c) That the provision of 5% on sundry debtors be made for doubtful debts.

(d) That the value of buildings be appreciated by Rs. 9,500

Prepare necessary ledger accounts and Balance sheet after Z's admission

SRM ARTS AND SCIENCE COLLEGE

Kattankulathur-603 203.

Department of Commerce (Accounting and Finance)

Date: 01.03.2023 **Duration: 1 Hr**

Subject: Entrepreneur Development **Class:**III-B.Com (A&F)

Section A (5 x 2 = 10)

(Answer any **FIVE** questions)

CO-1 BL-1 1. Define an Entrepreneur

CO-1 BL-1 2. Define Risk

CO-1 BL-1 3. What is meant by Motivation

CO-2 BL-2 4. Explain SIDO,NSIC

CO-2 BL-1 5. What is Entrepreneur Development.

CO-2 BL-1 6. Who is a Corporate Entrepreneur

CO-2 BL-1 7. What is Business Opportunity

Section B (1 x 5 = 5)

(Answer any **ONE** question)

CO-1 BL-2 8. Explain the function of an Entrepreneur

CO-2 BL-2 9. Explain the role of IDBI

Section C (1 x 10 = 10)

(Answer any **ONE** question)

CO-1 BL-1 10. List out the various types of entrepreneur.

CO-2 BL-2 11. Explain the function of IDBI.

SRM ARTS AND SCIENCE COLLEGE

Kattankulathur-603 203.

Department of Commerce

(ACCOUNTING AND FINANCE)

I UNIT TEST, FEBRUARY 2023

Date: 02.03.2022 **Duration:1 hr**

Class: III B.Com (A/F) **Max.Marks :25**

Subject Name & Code: CAPITAL MARKET

Section A (5 x 2 = 10)

(Answer any **FIVE** questions)

CO-1 BL-1 1. Define Financial Markets.

CO-1 BL-1 2. What is company Fixed Deposit.

CO-1 BL-1 3. State the meaning of Gilt-edged Market.

CO-1 BL-1 4. What do you understand by the term Private Placement

CO-2 BL-2 5. Discuss the any two rights of Investors.

CO-2 BL-1 6. State the meaning of Insiders?

CO-2 BL-2 7. Discuss any two regulatory role of SEBI?

Section B (1 x 5 = 5)

(Answer any **ONE** question)

CO-1 BL-2 8. Differentiate share and debentures?

CO-2 BL-2 9. Explain the objective of SEBI?

Section C (1 x 10 = 10)

(Answer any **ONE** question)

CO-1 BL-2 10. Explain the instruments used in the capital market?

CO-2 BL-2 11. Discuss the powers and functions of SEBI?

SRM ARTS AND SCIENCE COLLEGE
Kattankulathur-603 203.
Department of Commerce (Accounting & Finance)

Date: 02.03.2023 **Duration: 1 Hour**

Subject: Indirect Taxation **Class: II B.Com (A&F)**

Section A (5 x 2 = 10)

(Answer any **FIVE** questions)

CO 1 BL 1 1. Define 'Tax'.

CO 1 BL 1 2. What is 'Direct tax'? Given the examples.

CO 1 BL 1 3. State the meaning of Specific duties?

CO 1 BL 1 4. What is 'Single tax system?

CO 2 BL 1 5. What is GST?

CO 2 BL 1 6. What are the objectives of GST?

CO 2 BL 1 7. What are the different types of GST in India?

Section B (1 x 5 = 5)

(Answer any **ONE** question)

CO 1 BL 1 8. Define the following:

a) Chartered Accountant

b) Continuous supply of goods

CO 2 BL 1 9. What are the benefits of GST?

Section C (1 x 10 = 10)

(Answer any **ONE** question)

CO 1 BL 2 10. Describe the direct and indirect taxes levied by Government of India.

CO 2 BL 2 11. Give an introduction to GST in India.

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Kattankulathur-603 203.

Department of Commerce (Accounting and Finance)

Date: 02.03.2023 **Duration: 1 Hr**

Subject: Principles of Management **Class:I-B.Com (A&F)**

Section A

(5 x 2 = 10)

(Answer any **FIVE** questions)

CO-1 BL-1 1. Define Management

CO-1 BL-1 2. What Is Esprit De Crops

CO-1 BL-1 3. What do You Mean By Scalar Chain

CO-1 BL-1 4. List out level of Management

CO-1 BL-1 5. What is a scientific Management

CO-2 BL-1 6. Define planning

CO-2 BL-1 7. What is Administration.

Section B

(1 x 5 = 5)

(Answer any **ONE** question)

CO-1 BL-2 8. Explain the Management is Art or Science – Comments.

CO-1 BL-1 9. List of importance of Planning

Section C

(1 x 10 = 10)

(Answer any **ONE** question)

CO-1 BL-2 10. Explain the 14 principles of management

CO-2 BL-2 11. Explain the methods of planning.

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Kattankulathur – 603 203

Department of Commerce [Accounting & Finance]

I- UNIT EXAMINATION – FEBURUARY 2023

SUB : Corporate & Business Law Maximum Marks : 25

DATE : ~~28.02.2023~~ 3/3/2023 CLASS : II-B.Com (A & F)

Time : 12. 00 PM to1.00 PM

SECTION - A [5 X 2 = 10]

Answer any FIVE Questions

CO-1 BL-1 1.Define the term 'Contract' as per Indian contract Act, 1872.

CO-1 BL-1 2.What is meant by an 'Agreement' .

CO-2 BL-1 3.What do you understand by the term 'Undue Influence'?

CO-2 BL-1 4.Define the term ' Co-ercion.

CO-2 BL-1 5.What is mean an offer?

CO-2 BL-1 6.What is mean an Acceptance?

CO-2 BL-1 7.What is lawful consideration?

SECTION - B [1 X 5 =5]

Answer any ONE Question

CO-1 BL-2 8.Distinguish between contract VS agreement.

CO-2 BL-1 9.Explain the classification of offer.

SECTION - C 1 X 10 =10]

Answer any ONE Question

CO-1 BL-1 10.Explain the essential elements of a valid contract?

CO-2 BL-2 11.Discuss the legal rules to a valid consideration.

SRM ARTS AND SCIENCE COLLEGE

Kattankulathur- 603203

Department of Commerce (Accounting and Finance)

I Unit Examination – February 2023

Management Accounting

Date: ~~28.02.2023~~ 3/3/2023

Time: 12.00-1.00pm

Maximum Marks:25

Class:III-B.Com (A&F)

Section-A

Answer any five questions **(5*2=10)**

CO-1 BL-1 1.What is Management Accounting?

CO-1 BL-1 2.What are the objectives of management accounting?

CO-1 BL-1 3.What are the Limitations of management accounting?

CO-2 BL-1 4.What is Financial Statement Analysis?

CO-2 BL-1 5.List out the tools of Financial Statement Analysis.

CO-2 BL-3 6.Prepare common size of the following items in a common size Income statement.

	2006	2007
Sales	10,00,000	16,00,000
Cost of Sales	8,00,000	12,00,000
Gross Profits	2,00,000	4,00,000

CO-3 BL-3 7.Calculate Gross profit Ratio from the following data: Cost of goods sold – 50,000 (70 of sales)

Section-B

(5*1=5)

Answer any one question

CO-1 BL-1 8.Explain the scope and objectives of management accounting?

CO-2 BL-6 9.From the following profit and loss account of x ltd, for the year ended 3st Dec 2004 and 2005. You are required to prepare a comparative Income statement for the year 2004 and 2005.

Profit and loss Account

rticulars	2004	2005	Particulars	2004	2005
Cost of goods sold	600	750	By Net Sales	800	1,000
Administrative Exp	20	20			
Selling Exp	30	40			
Net profit	150	190			
	800	**1,000**		**800**	**1,000**

Section-C

(10*1=10)

Answer any one question

CO-1 BL-2 10.Distinguish between Management accounting and Cost Accounting?

CO-2 BL-6 11.B ltd and C ltd furnish you the following balance sheet and you are requested to prepare a common size balance sheet as on 31st March 2007.

bilities	B ltd	C ltd	Assets	B ltd	C ltd
are Capital	50,00,000	25,000	Fixed assets	60,00,000	10,000
serves	5,00,000	20,000	Inventories	25,00,000	5,000
m loans	20,00,000	-	Debtors	10,00,000	20,000
rrent Liabilities	25,00,000	5,000	Cash	5,00,000	15,000
	1,00,00,000	**50,000**		**1,00,00,000**	**50,000**

SRM ARTS AND SCIENCE COLLEGE
Kattankulathur-603203
DEPARTMENT OF ENGLISH
I UNIT TEST – EVEN SEMESTER 2022-2023

Subject Name & Code: Communicative English-II / LZ12A **Class:** I Year
Duration: 1 Hour **Max. Marks:** 25

PART- A (5 marks)

CO: 1 BL: 1 1. Read following advertisement and answer the questions that follow. (5x1=5)



a) What do they advertise?

b) How can you apply for the post?

c) What is the name of the company?

d) What is the name of the post?

e) What are the skills the company requires for the post?

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Kattankulathur – 603203

Department of Commerce (Accounting & Finance)

I Unit Examination – February 2023

Financial Analytics and Control

Date: 03.03.2023 Maximum Marks: 25

Time: 12.00-1.00 pm Class: I-B.Com (A&F)

Section-A (5*2=10)

Answer any five questions

CO-1	BL-1	1.What is Accounting Information systems?
CO-1	BL-1	2.State any two advantages of enterprise resource planning?
CO-1	BL-1	3.Enumerate enterprise performance management system?
CO-2	BL-1	4.What is SDLC?
CO-2	BL-2	5.Extend BPA and its purpose
CO-2	BL-1	6.What do you mean by Business intelligence?
CO-2	BL-1	7.What is data visualization

Section-B (5*1=5)

Answer any one question

CO-1	BL-1	8.Explain the functions of data governance policies and procedures?
CO-2	BL-2	9.Discuss the Role of finance manager in technology enabled finance transformation.

Section-C (10*1=10)

Answer any one question

CO-1	BL-	10.Explain the life cycle of data?
CO-2	BL-1	11.Explain the stages of systems development life cycle?

SRM ARTS AND SCIENCE COLLEGE
Department of Mathematics

Unit Test – I (2022-2023 Even Semester)

Duration : One hour **Class : II B.Com., (A&F)**

Date : **03-03-2023**

Subject Name & Code : ***Elements of operations Research/CZ34A***

Section A

(Answer any **FIVE** questions) (5 x 2 = 10)

CO1 BL1 1. Define OR.

CO1 BL1 2. Define objective function?

CO1 BL1 3. List the various phases of OR.

CO2 BL1 4. Define Linear Programming.

CO2 BL6 5. Write any two advantages of LPP.

CO2 BL1 6. List any two limitations of LPP.

CO1 BL6 7. Write any two advantages of OR.

Section B (1 x 5 = 5)

(Answer any **ONE** question)

CO1 BL2 8. Explain the application of OR.

CO2 BL2 9. Explain the basic assumptions of LPP.

Section C (1 x 10 = 10)

(Answer any **ONE** question)

CO1 BL2 10. Explain the techniques of OR

CO2 BL6 11. A paper mill produces two grades of papers, A and B. Owing to raw material restrictions; it cannot produce more than 400 tons of A and 300 tons of B in a week. There are 200 production hours in a week. It requires 0.2 hours and 0.4 hours to Produces a ton of A and B respectively, with corresponding profits of Rs.300 and Rs.600 per ton. Formulate the above as LPP.

80x2

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Kattankulathur, Chengalpet District – 603 203

Department of Commerce [Accounting & Finance]

I Unit Examination – February - 2023

Income Tax Law and Practice – II

e : **03.03.2023**

e : **12. 00 PM TO 1. 00 PM** **Maximum Marks: 25**

Class :III-B.Com [A&F]

SECTION - A

[5 X 2 = 10]

Answer any FIVE Questions

All Questions carry EQUAL Marks

.1 BL-1 1.Define the term **" Capital Gain".**

1 BL-2 2.Interpret the word **" Short term Capital Assets"**

1 BL-3 3.Demonstrate - **"Capital Asset ".**

1 BL-4 4.Point out the concept **" Cost of acquisition".**

1 BL-5 5.Recommend - the term**" Cost of Improvement ".**

2 BL-1 6.Quote – the meaning of **" Casual Income"**

2 BL-5 7.Decide the practical idea of an **"Interest on Securities"?**

SECTION - B

[1 X 5 = 5]

Answer any ONE Question

1 BL-1 8.Find out the indexed cost of following long term capital assets if they are sold during the ious year 2021-22.

Asset	Year of purchase	Cost (Rs.)	FMV on 1.4.2001
Jewellery	2004-05	80,000	-
Bonds	2006-07	2,00,000	-
House	2010-11	4,00,000	-
Plot inherited in 1999-2000	Acquired by father in 1998-1999	1,00,000	2,00,000

[OR]

2 BL-3 9.Construct income from other sources from information given below:

	Rs.
Winnings from Lottery	1,00,000
Amount received from race winnings	35,000

Received during the previous year 2021- 2022

Received Rs. 20,000 as gift from his friend

Received Rs. 1,00,000 as gift from his elder brother.

Received Rs. 1,40,000 as gift on his marriage.

Received Rs. 80,000 as gift from NRI friend on 1/1/2022

Another gift of Rs. 18,000 received from his cousin.

SECTION - C [1 X 10 = 10]

Answer any ONE Question

CO-1 BL-3 10.Mr. X purchased a plot in 2006 – 2007 for Rs .4,00,000 and it was sold on 15 2022 for Rs. 14,80,000. He paid Rs. 20,000 as brokerage charges. He invested Rs. 2,00,000 in bonds i by National Highway Authority of India on 31 /03/ 2022 and Rs. 3,10,000 in Bonds issued by Electrification Corporation on 01/ 06 / 2022 [Both Notified u/s 54EC].

Construct the taxable amount of capital gain if CII for 2006-2007-122, 2021-2022-317.

[OR]

CO-2 BL-3 11. Construct income from the other sources from particulars given below:

		Rs.
1.	Interest on deposits with a company	10,000
2.	University remuneration on working a examiner	6,000
3.	Royalty for writing books	60,000
	He claims to have spent Rs. 20,000 on writing these books	6,000
4.	Interim dividend paid on 01/ 05/ 2021	3,000
5.	Stake money on race horses	1,50,000
	Horses are maintained by him and expenses on maintenance of these horses are	2,40,000
6.	Family pension received	36,000

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SRM ARTS AND SCIENCE COLLEGE

Kattankulathur – 603 203

Department of Commerce [Accounting & Finance]

I- UNIT EXAMINATION – FEBURUARY 2023

SUB : Corporate & Business Law Maximum Marks : 25

DATE : ~~28.02.2023~~ 3/3/2023 CLASS : II-B.Com (A & F)

Time : 12. 00 PM to1.00 PM

SECTION - A [5 X 2 = 10]

Answer any FIVE Questions

CO-1 BL-1 1.Define the term 'Contract' as per Indian contract Act, 1872.

CO-1 BL-1 2.What is meant by an 'Agreement' .

CO-2 BL-1 3.What do you understand by the term 'Undue Influence'?

CO-2 BL-1 4.Define the term ' Co-ercion.

CO-2 BL-1 5.What is mean an offer?

CO-2 BL-1 6.What is mean an Acceptance?

CO-2 BL-1 7.What is lawful consideration?

SECTION - B [1 X 5 =5]

Answer any ONE Question

CO-1 BL-2 8.Distinguish between contract VS agreement.

CO-2 BL-1 9.Explain the classification of offer.

SECTION - C 1 X 10 =10]

Answer any ONE Question

CO-1 BL-1 10.Explain the essential elements of a valid contract?

CO-2 BL-2 11.Discuss the legal rules to a valid consideration.

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Kattankulathur, Chengalpet District – 603 203
Department of Commerce
[Accounting & Finance]
I Unit Examination – January - 2022
III.B.Com [A & F]
Income Tax Law and Practice – II

Maximum Marks : 25 **Time : 12. 00 PM TO 1. 00 PM**

SECTION - A **[5 X 2 = 10 Marks]**
Answer any FIVE Questions
All Questions carry EQUAL Marks

1. **The term " Capital Gain".**
Profits or gains arising from transfer of a capital asset are called "Capital Gains" and are charged to tax under the head "Capital Gains". Capital asset is defined to include: (a) Any kind of property held by an assessee, whether or not connected with business or profession of the assesse.

2. **The word " Short term Capital Assets"**
Any capital asset held by the taxpayer for Any capital asset held by the taxpayer a period of not more than 36 months immediately preceding the date of its transfer will be treated as short-term capital asset.

3. **Demonstrate - "Capital Asset ".**
Stocks, bonds, trademarks, patents, or other non-physical goods can be capital assets depending on their use. Capital assets may also represent a claim on indebtedness, mutual funds, or tenancy rights.

4. **The concept " Cost of acquisition".**

Cost of acquisition is the total of expenses incurpred when a business acquires a new client or a new asset. In accounting, the cost of acquisition is a line item that includes all expenses related to buying an asset. In sales and marketing, the cost of acquisition includes all the costs of acquiring new customers.

5. **The term" Cost of Improvement ".**
Cost of improvement is the capital expenditure incurred by an assessee for making any addition or improvement in the capital asset. It also includes any expenditure incurred in protecting or curing the title.

6. **Quote – the meaning of " Casual Income"**
It's an income which is earned by chance and not likely to occur again in a year. This earning is neither anticipated nor provided for in any agreement. For example, incomes from winning lotteries, card games, game shows, horse races, crossword puzzles or any other games come under casual incomes.

7. **The practical idea of an "Interest on Securities"**
According to Section 2(28B) "Interest on securities" means:
Interest on any security of the Central Government or a State Government;
a. Interest on debentures or other securities for money issued by, or on behalf of a local authority or a company or a corporation established by Central, State or Provincial Act.

Thus securities may be divided into following categories:
Securities issued by Central/State Governments;
1. Debentures/bonds issued by a local authority;
2. Debenture/bonds issued by companies;
3. Debenture/bonds issued by a corporation established by a Central, State or Provincial Act i.e. autonomous and statutory corporations.

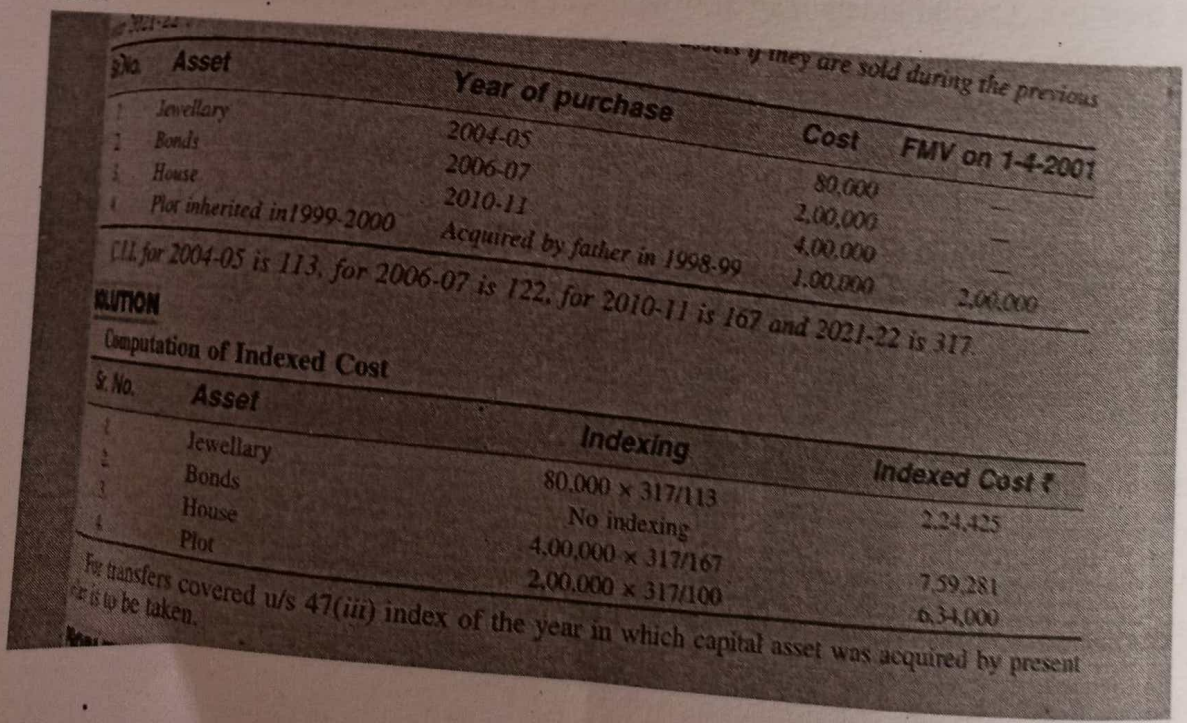
SECTION - B **[1 X 5 = 5 Marks]**

Answer any ONE Question

8. Find out the indexed cost of following long term capital assets if they are sold during the previous year 2021-22.

Sl No	Asset	Year of purchase	Cost (Rs.)	FMV on 1.4.2001
1	Jewellery	2004-05	80,000	-
2	Bonds	2006-07	2,00,000	-
3	House	2010-11	4,00,000	-
4	Plot inherited in 1999-2000	Acquired by father in 1998-1999	1,00,000	2,00,000

Ans:



Sl No.	Asset	Year of purchase	Cost	FMV on 1-4-2001
1	Jewellary	2004-05	80,000	—
2	Bonds	2006-07	2,00,000	—
3	House	2010-11	4,00,000	—
4	Plot inherited in1999-2000	Acquired by father in 1998-99	1,00,000	2,00,000

CII for 2004-05 is 113, for 2006-07 is 122, for 2010-11 is 167 and 2021-22 is 317.

SOLUTION

Computation of Indexed Cost

Sr. No.	Asset	Indexing	Indexed Cost ₹
1	Jewellary	80,000 × 317/113	2,24,425
2	Bonds	No indexing	
3	House	4,00,000 × 317/167	7,59,281
4	Plot	2,00,000 × 317/100	6,34,000

For transfers covered u/s 47(iii) index of the year in which capital asset was acquired by present owner is to be taken.

9.Computation of income from other sources:

		Rs.
[i] Winnings from Lottery		
[ii] Amount received from race winnings [35,000 X100/70]	=	1,00,000
	=	50,000

Gifts Received during the previous year 2021- 2022

[i] Received Rs. 20,000 as gift from his friend		
[ii] Received Rs. 1,00,000 as gift from his elder brother	= 20,000	
[iii] Received Rs. 1,40,000 as gift on his marriage.	= nil	
[iv] Received Rs. 80,000 as gift from NRI friend on 1/1/2022	= 80,000	
[v] Another gift of Rs. 18,000 received from his cousin.	= 18,000	1,18,000
Taxable income from other sources	=	2,68,000

SECTION - C [1 X 10 = 10 Marks]

Answer any ONE Question

10. Computation of taxable capital gain

Particulars	Rs	Rs
Sale price of plot		14,80,000
Less: Expenses on sale		20,000
Net consideration		14,60,000
Less : Indexed cost [4,00,000 X 1		
	=	
Long tern capital gain		
Less: Exemption U/S 54EC		
Amount invested in National highways Authority of india		
[i] bonds	Rs. 2,00,000	
[ii] Amount invested in bonds REC	Rs. 3.10,000	
	Rs. 5,10,000	
But exemption is restricted to amount		
Of long term capital gain	=	
Taxable long term capital gain		

11.Computation of income from the other sources

General incomes u/s 56 [1]

			Rs.
1.	Interest on deposits with a company		10,000
2.	University remuneration on working a examiner		6,000
3.	Royalty for writing books	60,000	
	He claims to have spent Rs. 20,000 on writing these books	20,000	40,000
4.	Family pension received	36,000	
	Less: Std deduction [36,000 X 1/3]	12,000	24,000

Specific incomes u/s 56 [2]

5.	Dividend declared by R.& Co.		6,000
6.	Interim dividend paid on 01/ 05/ 2021		nil
7.	stake money on race horses	1,50,000	
	Horses are maintained by him and expenses on maintenance of these horses are	2,40,000	
		90,000	nil

Income from other sources = 86,000

SRM ARTS AND SCIENCE COLLEGE
Kattankulathur-603 203.
Department of Commerce (Accounting and Finance)

bject: Entrepreneur Development **Class:**III-B.Com (A&F)

Section A **Duration: 1 Hr**

(Answer any **FIVE** questions) (5 x 2 = 10)

-1 BL-1 1.Define an Entrepreneur

entrepreneur is someone who has an idea and who works to create a product or service that people buy, as well as an organization to support that effort. An entrepreneur takes on most of the risk and ative for their new business, and is often seen as a visionary or innovator.

-1 BL-1 2.Define Risk

k implies future uncertainty about deviation from expected earnings or expected outcome. Risk sures the uncertainty that an investor is willing to take to realize a gain from an investment. scription: Risks are of different types and originate from different situations.

-1 BL-1 3.What is meant by Motivation

ivation is an important factor which encourages persons to give their best performance and help in hing enterprise goals. A strong positive motivation will enable the increased output of employees a negative motivation will reduce their performance. A key element in personnel management is ivation.

-2 BL-2 4.Explain SIDO,NSIC

all Industries Development Organisation (SIDO)

C National Small Industries Corporation (NSIC)

-2 BL-1 5.What is Entrepreneur Development.

process of entrepreneurship development helps people get more knowledge about starting a firm. itionally, it helps the current business owners assess their expertise and experience and learn fresh ods and concepts.

CO-2 BL-1 6.Who is a Corporate Entrepreneur

A corporate entrepreneur is an individual who conducts at least part of their creation activities at wo using corporate resources, people, and/ or time. Independent entrepreneurs are individuals who crea opportunities without any association to a company in the creation process.

CO-2 BL-1 7.What is Business Opportunity

A business opportunity, also called bizopp, is the chance to take advantage of an occurrence in t market to begin a business. It involves some kind of favourable condition which exists in the market. business opportunity is what makes some businesses succeed while others fail. 8)(i) Innovation a Creativity – Innovation generally refers to changing processes or creating more effective processe products and ideas. For businesses, this could mean implementing new ideas, creating dynamic produc or improving your existing services. Creativity is defined as "the tendency to generate or recogni ideas, alternatives, or possibilities that may be useful in solving problems, communicating with othe Creativity and innovation have always been recognized as a sure path to success. Entrepreneurs thi outside of the box and explore new areas for cost-effective business solution

Section B

(1 x 5 = 5)

(Answer any **ONE** question)

CO-1 BL-2 8.Explain the function of an Entrepreneur

(i) Innovation and Creativity – Innovation generally refers to changing processes or creating mo effective processes, products and ideas. For businesses, this could mean implementing new idea creating dynamic products or improving your existing services. Creativity is defined as "the tendency generate or recognize ideas, alternatives, or possibilities that may be useful in solving problem communicating with others. Creativity and innovation have always been recognized as a sure path success. Entrepreneurs think outside of the box and explore new areas for cost-effective busine solutions.

(ii) Risk taking and Achievement – Entrepreneurship is a process in which the entrepreneur establish new jobs and firms, new Creative and growing organization which is associated with risk, ne opportunities and achievement. It results in introducing a new product or service to society. In genera entrepreneurs accept four types of risks namely Financial Risk, Job Risk, Social & Family Risk Mental & Health Risk, which are as follows:

(a) Financial Risk – Most of entrepreneurs begin by using their own savings and personal effects and they fail, they have the fear of losing it. They take risk of failure.

O-2 BL-2 9.Explain the role of IDBI

ole of IDBI

s an apex development bank, the IDBI's major role is to co-ordinate the activities of other evelopment banks and term-financing institutions in the capital market of the country.Providing chnical and administrative assistance for promotion, management and expansion of industry thus rforming promotional and development functions.

rect Assistance: The IDBI grants loans and advances to industrial concerns. The bank guarantees ans raised by industrial concerns in the open market from the State Co-operative Banks, the Scheduled nks, the Industrial Finance Corporation of India (IFCI) and other 'notified' financial institutions.

direct Assistance: Providing refinancing facilities to the IFCI, SFCs and other financial institutions proved by the government. IDBI subscribes to the shares and bonds of the financial institutions and reby provide supplementary resources.

ordinating the activities of financial institutions for the promotion and development of industries.

BI is the leader, coordinator and innovator in the field of industrial financing in our country. Its major ivity is confined to financing, developmental, co-ordination and promotional functions.

nning, promoting and developing industries with a view to fill the gaps in the industrial structure by ceiving, preparing and floating new projects.

Section C

(1 x 10 = 10)

(Answer any **ONE** question)

-1 BL-1 10.List out the various types of entrepreneur.

ctions performed by IDBI

the IDBI has shown its particular interest in the development of small-scale industries is onstrated by the setting up of the Small Industries Development Fund (SIDF) in May 1986, the onal Equity Fund Scheme (NEFS) in 1988, and the Voluntary Executive Corporation Cell (VECC) providing support in the nature of equity to tiny and small-scale industries engaged in ufacturing, cost not exceeding Rs. 5 lakhs. The scheme is administrated by the IDBI through nalised banks.

owing which type of entrepreneur you are can help you better position your brand and your business line, whether you want to run an ecommerce shop, become an industry thought leader, or build a mbership site.

re are the 10 most common types of entrepreneurs and examples of each type.

Small Business Entrepreneur

u know that local restaurant that you take visitors to when they come to town? Or your favorite ee shop that you pop into every morning before work? Those are owned by small business repreneurs. Many of the businesses that you know and love are small businesses, or at least started as one.

small business is independently owned and operated and doesn't have plans to expand into a large mpany. According to the U.S. Small Business Administration (SBA), there are 32.5 million small sinesses in the US as of 2021.

Large Business Entrepreneur

e opposite of a small business owner, a large business entrepreneur refers to the leaders of large mpanies and corporations such as Microsoft or Disney. These types of entrepreneurs are often C-level cutives like a CEO.

rge company is different from a small business in that its goal is to expand by developing new ducts or services — or even buying smaller companies — to meet consumer demand. The goal of a e business entrepreneur is to lead the initiatives that will help the company increase its market value. e a large business entrepreneur, it helps to be strategic and have the ability to focus on high-level s.

artup Entrepreneur

e the term 'startup' is often associated with Silicon Valley, you don't need to reside in the tech hub e a startup entrepreneur. A startup entrepreneur is the founder of a scalable company. Startups are technology focused and are either bootstrapped or rely on funding from outside stors.Examples of startups include Canva, Airbnb, Square, and Uber, to name a few.Even if you 't the founder of a tech startup, there are still ways to get involved with this type of preneurship.If you want to be a startup entrepreneur or get involved in the startup industry, you

The IDBI has also introduced the single window assistance scheme for grant of term-loans and
capital assistance to new, tiny and small-scale enterprises. As per data available, IDBI has
about one-third of total industrial assistance to small-sector alone.

The scope of business of the IDBI has also been extended to cover consulting, merchant
trusteeship activities.

CO-2 BL-2 11.Explain the function of IDBI.

The 10 Types of Entrepreneurs

Small Business Entrepreneur

Large Business Entrepreneur

Start-up Entrepreneur

Solo Entrepreneur

Innovator Entrepreneur

Imitator Entrepreneur

Social Entrepreneur

Buyer Entrepreneur

Hustler Entrepreneur

Researcher Entrepreneur

How to Position Yourself Online

The 10 Types of Entrepreneurs

The word 'entrepreneur' is defined as a person who owns or operates a business. While the term
applied to a broad number of people and businesses, it doesn't touch on the specific
entrepreneurship that people can focus on.

There are several types of entrepreneurs, from the well-known types like small business entrepre
lesser-known types like the researcher entrepreneur.

The IDBI has also introduced the single window assistance scheme for grant of term-loans and working capital assistance to new, tiny and small-scale enterprises. As per data available, IDBI has extended about one-third of total industrial assistance to small-sector alone.

The scope of business of the IDBI has also been extended to cover consulting, merchant banking and trusteeship activities.

CO-2 BL-2 11.Explain the function of IDBI.

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There are several types of entrepreneurs, from the well-known types like small business entrepreneurs to lesser-known types like the researcher entrepreneur.

have to have an idea for a scalable solution, be scrappy, and be willing to put in a lot of hard work before you see results.

4. Solo Entrepreneur

A solo entrepreneur, or solopreneur as they're often referred to, is someone who operates a one-person business. Similar to a small business entrepreneur in that they are independently owned, a solopreneur doesn't work with partners. These types of entrepreneurs often run service-based businesses like consulting, coaching, or freelancing.

Innovator Entrepreneur

Apple. Google. Amazon. Tesla. What word comes to mind when you think of these companies? Innovation. The brains behind these brands — Steve Jobs, Larry Page, Jeff Bezos, and Elon Musk — are examples of innovator entrepreneurs.

Imitator Entrepreneur

Before you question the credibility of an 'imitator entrepreneur,' keep reading. These types of entrepreneurs take an existing business, product, or service, and make it better. Many entrepreneurs fall into this category. There can only be a few true innovators, after all — most businesses are usually an iteration of something that already exists. But that doesn't mean these types of entrepreneurs can't build massively successful businesses from it.

Social Entrepreneur If your mission is to change the world, then you're a social entrepreneur. This type of entrepreneur strives to make a difference with their company, on either a small scale or a global scale. Leaders at nonprofits are great examples of social entrepreneurs.

Buyer Entrepreneur

Other than building a business, a buyer entrepreneur either buys or funds another business to help them grow. This type of entrepreneur typically has extensive experience building companies throughout their career and uses that expertise to improve the companies they buy.

Warren Buffet, the CEO of Berkshire Hathaway, is a buyer entrepreneur. His successful investments have earned him the position of being one of the wealthiest people in the world.

9. Hustler Entrepreneur

A hustler entrepreneur lives up to their name. They are driven, highly-motivated, and hustle hard to get to the top. These types of entrepreneurs are often a natural when it comes to sales and will pitch their product or service to anyone and everyone they meet.

Spanx founder Sara Blakely is the definition of a hustler entrepreneur. The self-made billionaire built Spanx from the ground up — from creating the first prototype of the now-famous shapewear to personally reaching out to major retailers to get them to carry her clothing line.

If you're the type of person who doesn't flinch at a rejection email, always has your elevator pitch ready to go, and will stop at nothing to get your business in front of the right people, then you're probably a hustler entrepreneur.

10. Researcher Entrepreneur

Researcher entrepreneurs are, as the name implies, research and data-driven. They have in-depth expertise about the product or service they offer and are motivated to share that knowledge with their customers.

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Department of Commerce (Accounting & Finance)

Duration: 1 Hour **Class: III B.Com (A&F)**

ADVANCED COST ACCOUNTING ANSWER KEY

SECTION-A

01. Define contract costing.

Ans: "It is a form of specific order costing in which costs are attributed to individual contracts."

-Chartered Institute of Management Accountants (CIMA) London

02. Examine the 'Retention Money'.

Ans: It is described as the sum of money held by the employer as a safeguard for any defective or non-conforming work by the contractor. Retention money safeguards the employer by defects which can occur during the defects liability period if the contractor doesn't response according to the contract terms.

03. State the meaning of Work Certified.

Ans: The work done under the contract shall be judged by the contractees architect, surveyor, or engineer who will issue a certificate stating the value of work done so far and approved by him such work is known as work certified. Revenue in books is recognized on the basis of work certification.

04. Define Notional Profit.

Ans: It is an estimate of earnings primarily used in the building and construction industry. It is used to smooth out fluctuations in reported revenue due to contracts that take a long time to complete. It is calculated by the equation:

Value of work certified + Value of work not yet certified – Cost of work to date

05.Explain process costing.

Ans: With process costing, companies determine item cost by tracking the cost of each stage in the production process, instead of tracking costs for each individual item. After adding up the cost of all the steps in the process, they divide the total cost by the number of items. This is called the cost per unit. For example, a paper company might track the cost of each stage in the process of turning wood pulp into reams of paper, then divide the total cost by the number of reams to get the cost per ream.

06. Explain the meaning of 'Normal Loss'.

Ans: Normal loss is an inherited loss that cannot be avoided. It should be taken into account while valuing the closing stock. For instance, if a consignment of fruits is sent, some of them will be destroyed in loading and unloading while some fruits will not be in a state to be sold. No entry is recorded for normal loss in the books.

07. State the meaning of 'Joint Products'.

Ans: Joint products are two or more products that are generated within a single production process. They can't be produced separately and will incur undifferentiated joint costs. To be considered a joint product, each product must be of roughly equal economic importance.

SECTION-B

08. The following particulars are related to contract undertaken by Ram Co Ltd.

Plant purchased Rs. 60,000; Wages paid Rs. 3,40,000; Overhead a Rs. 40,000; Material issued to site Rs. 3,36,000; Plant at site Rs. 48, uncertified Rs. 20,000; Cash received Rs. 6,00,000 (being 80% of work

Prepare contract account.

[Madras, B.Com(AF) (AF6D)

[Ans : Notional profit :

Ans: Dr. Contract A/C Cr

PARTICULARS	AMOUNT (Rs)	PARTICULARS	AMOUNT (Rs)
To Plant Purchased	60,000	By Work-in-progress:	
To Wages	3,40,000	Work Certified	7,50,000
To Overheads	40,000	Work Uncertified	20,000
To Materials	3,36,000	By Plant @ Site	48,000
To Notional Profit (B/F)	42,000		
	8,18,000		8,18,000

09. A product passes through two processes. The following details relate to process 'A'. You are required to ascertain the process cost to be transferred to process 'B'.

	Rs.
Direct materials (100 units)	12,000
Direct wages	8,000
Direct expenses	5,000
Overheads	11,000

Input 1000 units; output 1000 units as there was no loss of units.

Solution :

Process 'A' Account

Particulars	*Units*	*Rs*	*Particulars*	*Units*	*Rs*
To Direct Materials	1000	12,000	By Process		
To Direct Wages		8,000	'B' (Transfer)	1000	36,000
To Direct Expenses		5,000	(at Rs. 36 per unit)		
To Overheads		11,000			
	1000	36,000		1000	36,000

- Future contracts
- Options contract

Exchange-traded funds (ETFs)

ETFs are capital market instruments where many investors pool their resources to invest in bonds, equity or gold. Having features of both shares and mutual funds, most ETFs are registered with the Securities and Exchange Board of India (SEBI). Like mutual funds, ETFs are beneficial for investors looking to invest in an index, a basket of stocks or a commodity.

Foreign exchange instruments

The foreign exchange instruments are traded on the foreign market. They consist of derivatives and currency agreements. The currency agreements are further categorised into:

- Currency futures
- Currency swaps
- Currency options

CO-2 BL-2 11. Discuss the powers and functions of SEBI?

Functions of SEBI

- Prohibiting insider trading is defined as the selling or buying of securities by insiders of a company.
- Promoting fair trade practices in the securities market.
- Preventing malpractices by checking price rigging.
- Providing financial education to the investors.

The regulations of the SEBI Act give this autonomous body three kinds of powers: quasi-judicial, quasi-legislative, and quasi-executive.

In conclusion, the genesis of GST in India can be traced back to the recommendations of the Kelk
Task Force and the need for a uniform tax structure across the country. The idea was first introduced
the Finance Minister's budget speech in 2006, and after several years of consultations and negotiation
the GST Bill was finally passed in 2017. The GST system has simplified the tax system, reduced th
cost of doing business, and increased tax compliance in the country.

PRIMARY MARKET	SECONDARY MARKET
Primary market transactions involve fixed prices, typically set by the issuing company or underwriter.	Secondary market transactions involve fluctuating prices determined by supply and demand.
The primary market is where the first transaction occurs.	The secondary market is

	alteration after passing special resolution in AGM and prior consent of Central Government or Company Law Board is imperative.	Special resolution in AGM
Relation	Specifies the interplay between company and third-party	Governs the interplay between company and its members & also among the members.
Acts done outside the scope	Absolutely void	Can be ratified by shareholders.

******** ALL THE BEST*********

Balance sheet – 1,42,000

CO-4 BL 11. From the following particulars prepare a profit and loss A/C of S bank. For the year ended 31.12.2019

Interest on loans -260

Interest on fixed deposit -280

Rebate on bills discounted -50

Commission charged to customers-9

Establishment expense -56

Discount on bills discounted-200

Interest on current account -45

Printing and advertisement -3

Interest on cash credit -225

Rent and taxes -20

Interest on overdraft -56

Director's and auditor's fees-4

Interest on savings bank accounts -70

Postage and telegrams-2

Sundry charges-2

ANSWER:

Net profit – 268

Balance carried over to balance sheet - 201

communications are typically formal and are used for various purposes, including collaboration, information sharing, coordination of activities, and decision-making. Agency correspondence plays a crucial role in ensuring efficient and effective communication between entities.

Maintain a professional and respectful tone throughout the letter.

policy.]Immediate Actions Taken:

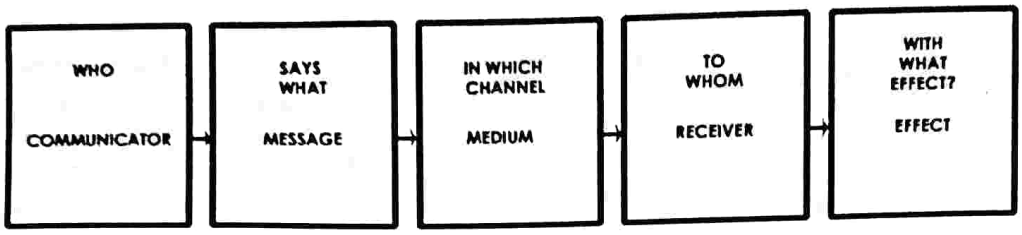
During my [Number of Years] years of teaching experience, I have had the privilege of instructing a diverse range of students at [Your Previous Teaching Institution(s)]. I am well-versed in designing curriculum materials, delivering engaging lectures, and facilitating interactive classroom discussions.

ıswer any ONE question:

Explain in brief about Lasswell Model of Communication

Lasswell, the American political scientist states that a convenient way to describe an act of communication is to answer the following questions

- Who
- Says What
- In Which Channel
- To Whom
- With what effect?



This model is about process of communication and its function to society, According to Lasswell there are three functions for communication:

1. Surveillance of the environment
2. Correlation of components of society
3. Cultural transmission between generation
4.

Lasswell model suggests the message flow in a multicultural society with multiple audiences. The flow of message is through various channels. And also, this communication model is similar to Aristotle's communication model.

In this model, the communication component who refers the research area called "Control Analysis",

Says what is refers to "Content Analysis",

In which channel is refers to "Media Analysis",

To Whom is refers to "Audience Analysis"

With What Effect is refers to "Effect Analysis"

Example:

CNN NEWS – A water leak from Japan's tsunami-crippled nuclear power station resulted in about 100 times the permitted level of radioactive material flowing into the sea, operator Tokyo Electric Power Co said on Saturday.

Who – TEPC Operator

What – Radioactive material flowing into sea

Channel – CNN NEWS (Television medium)

Whom – Public

Effect – Alert the people of japan from the radiation.

2.Interpret "Meaning" in the Communication process

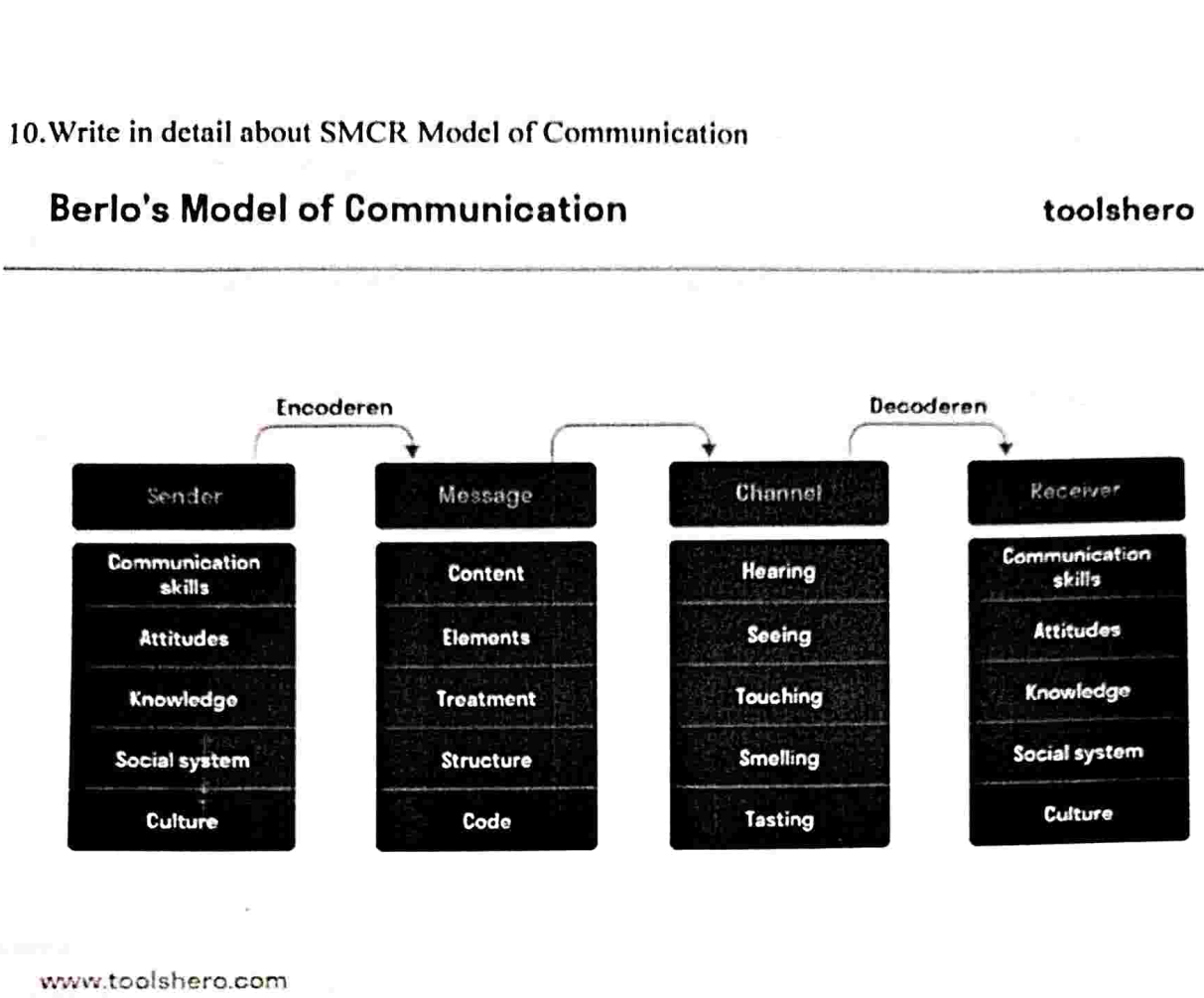
The basic definition of *interpretation*, according to the Webster dictionary is the "action of explaining the meaning of something; the way something is explained or understood."

In terms of language, the definition of *interpretation* should be broader: rendering a spoken or signed message into another spoken or signed language, preserving the register and meaning of the source language content.

It is the spoken or signed language communication between users of different languages. A language interpreter or sign language interpreter must not only quickly and carefully interpret meaning, but also tone and intent of the original message into the target or interpreted language.

SECTION - C
1X10 = 10
Answer any ONE question:

10.Write in detail about SMCR Model of Communication



Components of Berlo's SMCR Model of Communication

Berlo's SMCR Model of Communication includes four components that describe the communication process. The different components in the model are influenced by various factors.

Sender

The sender of the message is the source who creates and sends the message to the receiver. The source is the start of the communication process and is the person who encodes the message.

Factors that may influence the sender are also applicable to the receiver. Consider how the message is interpreted, for example. Berlo's SMCR Model of Communication identifies the following factors that affect the source:

Communication skills

Communication skills include: reading, listening, speaking etc.

Attitude

One's attitude in relationship to the audience, receiver and subject changes the meaning and consequence of the message.

Knowledge
Familiarity with the subject of the message makes communication more effective.

Social systems
Values, beliefs, religion and rules influence the way in which the sender communicates the message, alongside location and circumstances.

Culture
Cultural differences may result in the message being interpreted differently.

Message

The message is the package of information or meaning that is sent from sender to receiver. The message can be sent in various forms, such as audio, speech, text, video or other media.

The sender of the messages always wants the receiver to interpret the message in a certain way. The source's intention is therefore translated into a coded message. The receiver should understand the message with reasonable accuracy. The message is influenced by:

Content
The content of the message from beginning to end.

Elements
Elements are (non)verbal aspects, such as gestures and signs, that may influence the message. Albert Mehrabian's 7 38 55 rule of Communication goes into this in more detail.
Treatment
Treatment refers to the way in which the message is sent, the message's packaging.

Structure
As the word suggests, the structure of the message refers to the way in which it is structured.

Code
The code of the message is the form in which the message is sent. This may include text, language, video, gestures, music, etc.

Channel

The channel is the medium used to send the message. The medium must be able to be picked up by the sensory system of the receiver and may therefore involve vision, sound, smell, taste or touch. Humans have the following senses:

- Hearing
- Seeing
- Touching

- Smelling
- Tasting

Mass communication always involves technical tools, such as phones, the Internet and television. In these cases, the transmitted information is assimilated via vision and sound.

Receiver

The receiver is the person who receives and subsequently decodes the coded message. In a linear communication process, the receiver is always located at the end.

In order to make communication as effective and smooth as possible, Berlo's SMCR Model of Communication assumes the receiver's thinking pattern must be in accordance with that of the sender.

The same factors therefore influence this component in Berlo's SMCR Model of Communication. After all, the receiver decodes the message him/herself and gives it their own meaning.

11.Summarize the types of barriers in communication with examples

The process of communication has multiple barriers. The intended communique will often be disturbed and distorted leading to a condition of misunderstanding and failure of communication. The Barriers to effective communication could be of many types like linguistic, psychological, emotional, physical, and cultural etc. We will see all of these types in detail below.

Linguistic Barriers

The language barrier is one of the main barriers that limit effective communication. Language is the most commonly employed tool of communication. The fact that each major region has its own language is one of the Barriers to effective communication. Sometimes even a thick dialect may render the communication ineffective.

As per some estimates, the dialects of every two regions changes within a few kilometers. Even in the same workplace, different employees will have different linguistic skills. As a result, the communication channels that span across the organization would be affected by this.

Thus keeping this barrier in mind, different considerations have to be made for different employees. Some of them are very proficient in a certain language and others will be ok with these languages.

Browse more Topics under Communication

- Types of Communication
- Network in Communication

let people know about other cultures and how to be courteous and tolerant of others.

Organisational Structure Barriers

As we saw there are many methods of communication at an organizational level. Each of these methods has its own problems and constraints that may become barriers to effective communication. Most of these barriers arise because of misinformation or lack of appropriate transparency available to the employees.

Attitude Barriers

Certain people like to be left alone. They are the introverts or just people who are not very social. Others like to be social or sometimes extra clingy! Both these cases could become a barrier to communication. Some people have attitude issues, like huge ego and inconsiderate behaviours.

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DEPARTMENT OF VISUAL COMMUNICATION
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II B. Sc Visual communication

Internal Assessment Test II – OCT- 2022

Communication Culture and Society

Date: 31.10.2022 **Max Marks: 25**
Subject Code: BV25A

SECTION - A

Answer any FIVE of the questions: **5 x 2 = 10**

1) Mass Media
2) Media Effects
3) Stereotyping
4) Social Construction
5) Audience
6) Popular Culture
7) Marxism

SECTION - B

Answer any ONE question: **1X5 = 5**

8) Enlist the functions of Mass Media.
9) Write short notes on Media Texts.

SECTION - C

Answer any ONE question: **1X10 = 10**

10) Describe Psychoanalysis theory.
11) Discuss the concept of Hero-worship in Tamil Nadu with suitable examples.

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The superego is the final aspect of personality to emerge, and it contains our ideals and values. The values and beliefs that our parents and society instill in us are the guiding force of the superego and it strives to make us behave according to these morals.

The Ego's Defense Mechanisms

Defense mechanisms are strategies that the ego uses to protect itself from anxiety. These defensive tools act as a safeguard to keep unpleasant or distressing aspects of the unconscious from entering our awareness. When something is experienced as overwhelming or even inappropriate, defense mechanisms keep the information from entering our consciousness, which minimizes our distress.

11) Discuss the concept of Hero-worship in Tamil Nadu with suitable examples.

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Internal Assessment Test II- 2022

TELEVISION PRODUCTION

Max Marks: 25

SECTION - A

Answer any FIVE of the questions: **5 x 2= 10**

1. Color Temperature
2. Back light
3. Camera movements
4. Dubbing
5. Foot candle
6. Camera Lenses
7. XLR

PART - II

Answer any ONE question: **1X5 = 5**

8. Explain Voice over, BGM, SFX
9. Explain different types of Video Formats

PART III

Answer any ONE question: **1X10 = 10**

10. Explain in detail about Post-Production
11. Different types of microphones and its pickup patterns

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Internal Assessment Test I – SEP- 2022

ADVERTISING AND PUBLICATION DESIGN – BV23A

Max Marks: 25

SECTION - A

5 x 2 = 10

Answer any five of the questions:

1. Advertising.
2. Any two functions of Advertising.
3. Types of Advertising based on geographical segmentation.
4. Any 3 societal role of Advertising.
5. Pop up Ads.
6. Target Audience.
7. USP.

SECTION - B

1X5 = 5

Answer any One question:

8. Definition of Advertisement and its Nature.
9. Discuss about Modern Advertising.

SECTION - C

1X10 = 10

Answer any One question:

10. Explain the different Functions of Advertising.
11. Describe the different classifications of Advertisements.

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Internal Assessment Test I – SEP- 2022

Communication Aesthetics

Max Marks: 25

SECTION - A

Answer any five of the questions: **5 x 2 = 10**

1. Aesthetics
2. Communication Aesthetics
3. Graphic Designer
4. Visual Communication Designer
5. Reality and Creativity
6. Creativity and Communication
7. Noise in Communication

SECTION - B

Answer any One question: **1X5 = 5**

8. Explain The Elements of Visual Design
9. What is the role of Aesthetics Communication in Advertising?

SECTION - C

Answer any one question: **1X10 = 10**

10. Briefly Explain the Principles of Design
11. Describe the Communication Design Problems

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Visual design was born out of a mixture of graphic design and user interface (UI) design. It focuses on the aesthetics of a website or any other type of digital design. Does the finished product look good? That is the question visual designers aim to answer.

5. Reality and Creativity

Reality is the way life really is, not the way it may appear to be or how you would like it to be. And, Creativity is a way of living life that embraces originality and makes unique connections between seemingly disparate ideas.

6. Creativity and Communication

Creativity is an ability to think out of the box and create new ways to solve problems. Creative communication is the ability to communicate those ideas and thoughts in the most effective manner. We believe every child should nurture the methods to think and communicate well

7. Noise in Communication

Communication noise refers to influences on effective communication that influence the interpretation of conversations.

SECTION - B

Answer any One question: **1X5 = 5**

8. Explain the Elements of Visual Design

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Internal Assessment I – September- 2022

COMMUNICATION CULTURE AND SOCIETY

Max Marks: 25

PART – A

Write notes on any FIVE **5X2 = 10**

1. Mass Media
2. Public Opinion
3. Audience
4. Media effects
5. Media Determinants
6. Mass culture
7. Media Text

PART – B

Write notes on any One **1X5 = 5**

8. Explain the Definition, Nature and Scope of Mass Media
9. Explain the positive effects of mass media..

PART – C

Write notes on any FIVE **1X10 = 10**

10. Define Mass Audience and Typology of Mass Audience.
11. Describe the Normative Theories of Press.

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and other media. The government media provide positive thoughts to create a strong socialized society as well as providing information, education, entertainment, motivation and mobilization. The theory describe the whole purpose of the mass media is to educate the greater masses of working class or workers. Here, the public was encouraged to give feedback which would able to create interests towards the media. According to authoritarian theory, the media controlled and censored by the ministries in the country but libertarian is fully free without any intervention of any authority or government, Social responsibility theory – press freedom in one hand but other hand they controlled the press by raising question and Soviet media theory, the whole control of the media is under the leader of the nation.

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III B.Sc Visual Communication
Internal Assessment Test I- 2022

TELEVISION PRODUCTION

Max Marks: 25

SECTION - A

Answer any FIVE of the questions: **5 x 2= 10**

1. Script
2. Slug lines
3. CCD
4. Story board
5. Ticker
6. Interlace scanning
7. Visualization

PART - B

Answer any one question: **1X5 =5**

8. Explain types of editing transitions.
9. Explain the types of shots, camera angles and camera movements.

PART - C

Answer any one question: **1X10 =10**

10. Explain briefly about principles of script writing.
11. Explain in detail about three stages of production.

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looking at it are factors that contribute to how acceptably sharp an image is. It also depends on how good your vision is!

Scientifically, it is based on something called the circle of confusion. This involves more physics than I'm going to get into here! Spencer talks about it in his article "Hyperfocal Distance Explained." So, check that out for more of the technical details if you are so inclined.

In these two sketches, I have tried to illustrate what is meant by a narrow and large DoF. In a photograph with a narrow DoF, only a small slice of the image is in focus. Conversely, with a large DoF, much more of the scene is sharp.

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4. Infotainment

Ans:

Infotainment is *a type of media that tries to combine educational or useful information and entertaining content*

5. Edutainment

Ans:

Education and Entertainment is an Edutainment. Edutainment encourages personalized learning. A better understanding of theoretical subjects. Enhance Creativity & Visualization. Transforms conventional classrooms to smart classrooms. Paperless advantages.

6. New Media

Ans:

New media is any media—from newspaper articles and blogs to music and podcasts—that are delivered digitally. From a website or email to mobile phones and streaming apps, any internet-related form of communication can be considered new media.

7. Online Entertainment

Ans:

Entertainment through online mode. It's like downloading, playing, and enjoying entertainment media (such as games, music, and video) from the Internet

SECTION - B

Answer any One question: **2X5 = 10**

8. What is the difference between Reality Principle and Pleasure Principle?

Step 7: Cite your sources properly

Give credit where credit is due; cite your sources.

Citing or documenting the sources used in your research serves two purposes: it gives proper credit to the authors of the materials used, and it allows those who are reading your work to duplicate your research and locate the sources that you have listed as references. The MLA and the APA Styles are two popular citation formats.

Failure to cite your sources properly is plagiarism. Plagiarism is avoidable!

Step 8: Proofread

The final step in the process is to proofread the paper you have created. Read through the text and check for any errors in spelling, grammar, and punctuation. Make sure the sources you used are cited properly. Make sure the message that you want to get across to the reader has been thoroughly stated.

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DEPARTMENT OF VISUAL COMMUNICATION
KATTANKULATHUR 603 203

II UNIT TEST - 2022

CLASS: I MSc Visual Communication TIME: 1 Hour

SUB: CONTEMPORARY TRENDS IN INDIAN MEDIA Max: 25 Marks

PART A – (5 X 1 = 5 Marks)

Answer any **FIVE** questions

1. Classical Hollywood Cinema.
2. Silent Era.
3. French Cinema.
4. Dutch Cinema.
5. Russian Cinema.
6. Spanish Cinema.
7. Experimental Movies.

PART B – (2 X 5 = 10 Marks)

Answer any **TWO** questions

8. Write and explain about the classical Hollywood Cinema period its evolution and development.
9. Describe about the early prominent Hollywood directors and their contribution era wise.
10. Explain about the silent era and experimental movie makers of the early period.

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Internal Assessment Test II – 2022

Entertainment and Society (MCQAE)

Max Marks: 25

SECTION- A

Write a short note on any five questions: **5 x 1 = 5**

1. Understanding Audience
2. Media Effect
3. Demographic
4. Medium - Term Effect
5. Critical thinking
6. Social Scientist's Media Effect
7. Social Media

SECTION - B

2X5 = 10

Answer any Two questions:

desire to bring about changes in society, frequently with a focus on overcoming the bourgeois class and the strength of the individual. Expressionism itself, especially since it has been placed within the context of Modernism, is hard to specifically differentiate and so it does have a number of connections to other movements of its time. The Expressionists from the beginning "were divided into two groups: one which was metaphysically inclined and one in which political action and expediency predominated." These two groupings were widespread enough that over time, German Expression has been grouped in with German Modernism. This form of Expressionism also shared ideas with and was influenced by Futurism, Dada, and other Expressionist movements.

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