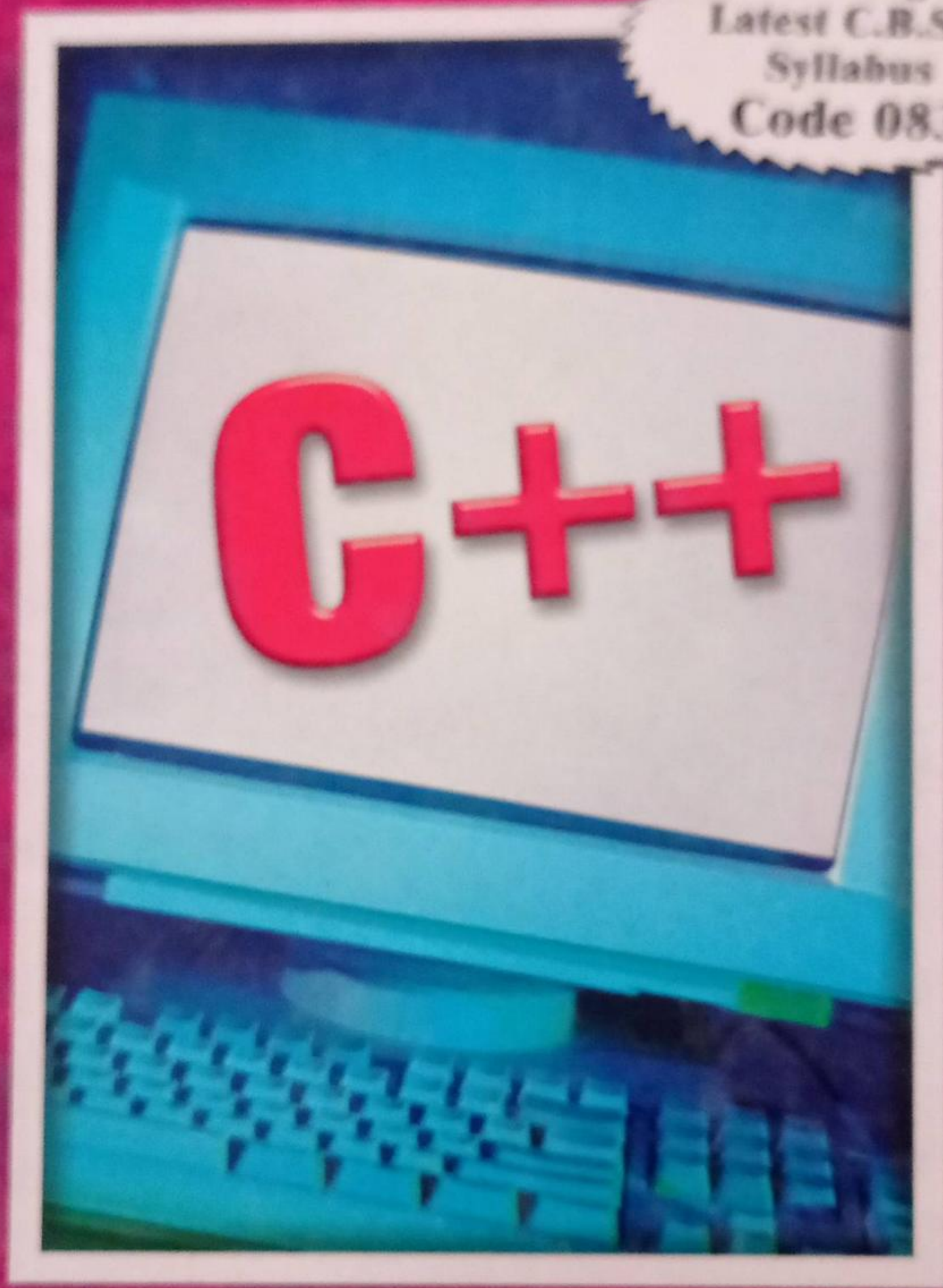


# COMPUTER SCIENCE

(ACCORDING TO LATEST SYLLABUS FOR CLASS XI)

According to  
Latest C.B.S.E  
Syllabus  
Code 083



Satish Jain



BPB PUBLICATIONS



# Contents

Preface v  
Syllabus vii

## COMPUTER SCIENCE

### UNIT-I COMPUTER FUNDAMENTALS

<b>Chapter 1. Basics of Computer and its Operation</b>	<b>3</b>
1.1 INTRODUCTION .....	3
1.2 EVOLUTION OF COMPUTERS .....	4
1.2.1 First Generation (1942-1955) .....	4
1.2.2 Second Generation (1955-1964) .....	6
1.2.3 Third Generation (1964-1975) .....	7
1.2.4 Fourth Generation (1975-1989) .....	7
1.2.5 Fifth Generation (1989-up till now) .....	8
1.3 BASIS OF COMPUTERS AND ITS OPERATION .....	8
1.3.1 Functional Components and their Inter-connection ....	8
1.3.2 Hardware .....	10
1.3.3 Input Devices .....	10
1.3.4 Output Devices .....	12
1.3.5 Central Processing Unit (CPU) .....	13
1.3.6 Memory .....	14
1.4 CONCEPT OF BOOTING .....	14
1.4.1 Booting Sequences with MS-DOS .....	15
1.5 DIRECTORY STRUCTURE .....	16
1.5.1 Flat Directory Structure .....	16
1.5.2 Two-level Directory Structure .....	16
1.5.3 Tree-structure or Hierarchical Directory Structure .....	16
1.6 USE OF OPERATING SYSTEM IN DIRECTORY LISTING	16
1.6.1 Tree .....	17
1.6.2 Path .....	18
1.7 FILE MANAGEMENT COMMANDS .....	19
1.7.1 Rename (REN) .....	19
1.7.2 Del or Erase Command .....	19



1.7.3 Copy .....	20
1.7.4 Xcopy .....	21
1.8 DISK MANAGEMENT COMMANDS .....	23
1.8.1 Format Command .....	23
1.9 SWITCHING BETWEEN TASKS .....	24
1.10 INSTALLATION/REMOVAL OF APPLICATIONS .....	24
REVIEW QUESTIONS WITH ANSWERS .....	25
DESCRIPTIVE TYPE QUESTIONS .....	27

## **Chapter 2. Software Concepts 28**

2.1 INTRODUCTION .....	28
2.1.1 Types of Software .....	28
2.2 APPLICATION SOFTWARE .....	28
2.2.1 Packaged v/s Customized Software Packages .....	29
2.3 SYSTEM SOFTWARE .....	30
2.3.1 Operating Systems .....	30
2.3.2 Compilers .....	32
2.3.3 Interpreters .....	32
2.3.4 Assemblers .....	33
2.4 UTILITY SOFTWARE .....	33
2.4.1 Text Editor .....	34
2.4.2 Debugging Tool .....	34
2.4.3 Sort and Merge Program .....	34
2.4.4 Memory Dump Program .....	34
2.4.5 Trace Routine .....	35
2.4.6 Peripheral Interchange Program (PIP) .....	35
2.4.7 File Manager .....	35
2.4.8 Loader .....	35
2.4.9 Locater .....	35
2.4.10 Virus Scanner and Remover .....	35
REVIEW QUESTIONS WITH ANSWERS .....	36
DESCRIPTIVE TYPE QUESTIONS .....	38

## **Chapter 3. Operating System 39**

3.1 OVERVIEW OF OPERATING SYSTEM .....	39
3.2 NEED FOR OPERATING SYSTEM .....	39
3.3 FUNCTIONS OF OPERATING SYSTEM .....	40
3.3.1 Processor Management .....	40
3.3.2 Memory Management .....	41
3.3.3 File Management .....	42
3.3.4 Input/Output Device Management .....	43
3.4 TYPES OF OPERATING SYSTEM .....	43
3.4.1 Interactive (GUI Based) Operating System .....	44



3.4.2 Time Sharing Operating System .....	44
3.4.3 Real-time Operating System .....	44
3.4.4 Distributed Operating System .....	45
REVIEW QUESTIONS WITH ANSWERS .....	45
DESCRIPTIVE TYPE QUESTIONS .....	47

## UNIT-II PROGRAMMING METHODOLOGY

### Chapter 4. Programming Concepts 49

4.1 INTRODUCTION .....	49
4.2 MODULAR APPROACH .....	49
4.2.1 Advantages of Modular Design of Program .....	49
4.3 CLARITY AND SIMPLICITY OF EXPRESSIONS .....	50
4.4 PROPER NAMES FOR IDENTIFIERS .....	50
4.4.1 Points to be Remembered while using Identifiers .....	50
4.5 COMMENT .....	51
4.6 INDENTATION .....	51
4.7 DOCUMENTATION OF PROGRAM .....	51
4.7.1 Aim of Documentation .....	51
4.7.2 Contents of a System Document .....	52
4.8 PROGRAM MAINTENANCE .....	52
4.8.1 Need of Program Maintenance .....	52
4.9 DEBUGGING AND RUNNING PROGRAMS .....	53
4.9.1 Syntax Errors/Semantic Errors .....	53
4.9.2 Logical Errors .....	54
4.9.3 Run Time Errors .....	54
REVIEW QUESTIONS WITH ANSWERS .....	54
DESCRIPTIVE TYPE QUESTIONS .....	56

### Chapter 5. Problem Solving Methodology and Techniques 57

5.1 INTRODUCTION .....	57
5.2 FLOW CHARTS .....	57
5.2.1 Flowchart Symbols .....	58
5.2.2 Advantages of using Flowcharts .....	61
5.3 PROCEDURE FOR PROBLEM SOLVING .....	62
5.3.1 Step 1: Understanding the Problem .....	62
5.3.2 Step 2: Construction of the List of Variables .....	63
5.3.3 Step 3: Output Design .....	63
5.3.4 Step 4: Program Development .....	64
5.3.5 Step 5. Testing the Program .....	64
5.3.6 Step 6. Validating the Program .....	64



5.4	BREAKING DOWN SOLUTION INTO SMALLER SUBTASKS .....	64
5.5	IDENTIFICATION OF ARITHMETIC AND LOGICAL OPERATION REQUIRED FOR SOLUTION .....	67
5.6	CONTROL STRUCTURES .....	72
5.6.1	Conditional Control .....	73
5.6.2	Looping .....	74
	REVIEW QUESTIONS WITH ANSWERS .....	76
	DESCRIPTIVE TYPE QUESTIONS .....	77

### UNIT-III INTRODUCTION TO PROGRAMMING IN C++

<b>Chapter 6.</b>	<b>Programming by Example in C++ Language</b>	<b>79</b>
6.1	WHAT IS C++? .....	79
6.2	C++ CHARACTER SET .....	79
6.2.1	Source Characters .....	80
6.2.2	Execution Characters/Escape Sequences .....	80
6.3	C++ TOKENS .....	80
6.3.1	Identifiers .....	81
6.3.2	Keywords/Reserved words .....	82
6.3.3	Constants .....	83
6.3.4	Operators .....	83
6.4	STRUCTURE OF A C++ PROGRAM .....	83
6.4.1	Include Files or Preprocessor Directives .....	84
6.4.2	Main Function .....	85
6.5	HEADER FILES .....	85
6.5.1	iostream.h .....	85
6.5.2	iomanip.h .....	85
6.6	COUT .....	87
6.7	CIN .....	87
6.8	USE OF I/O OPERATORS (<< AND >>) .....	88
6.9	MANIPULATORS .....	88
6.9.1	endl .....	88
6.9.2	setw .....	89
6.10	CASCADING OF INPUT/OUTPUT (I/O) OPERATORS ....	89
6.11	ERROR MESSAGE .....	89
6.11.1	Syntax Error or Compilation Error Messages .....	89
6.11.2	Run-time Error Messages .....	90
6.12	USE OF EDITOR .....	90
6.12.1	Basic Commands of Editor .....	90
6.13	COMPILING THE C++ PROGRAM .....	92



6.14	LINKING THE C++ PROGRAM .....	92
6.15	RUNNING THE PROGRAM .....	92
6.16	STANDARD INPUT/OUTPUT OPERATIONS USING <i>stdio.h</i> FILE .....	92
6.16.1	gets() .....	92
6.16.2	puts() .....	93
	REVIEW QUESTIONS WITH ANSWERS .....	93
	DESCRIPTIVE TYPE QUESTIONS .....	95
<b>Chapter 7. Data Types, Variables and Constants</b>		<b>96</b>
7.1	CONCEPT OF DATA TYPES .....	96
7.1.1	Built-in Data Type .....	97
7.2	CHOOSING THE DATA TYPE .....	98
7.3	CONSTANTS .....	98
7.3.1	Integer Constants .....	98
7.3.2	Backslash Character Constants .....	99
7.3.3	Floating-Point Constants .....	99
7.3.4	String Constants .....	100
7.4	ACCESS MODIFIERS .....	100
7.4.1	The <i>const</i> Keyword .....	101
7.5	VARIABLES .....	102
7.5.1	Declaration of Variables .....	105
7.5.2	Initialization of Variables .....	105
7.6	ASSIGNMENT STATEMENT .....	106
7.6.1	General Form .....	107
7.7	TYPE MODIFIER .....	108
7.7.1	Unsigned Integers .....	109
7.7.2	Characters and Integers .....	109
	REVIEW QUESTIONS WITH ANSWERS .....	110
	DESCRIPTIVE TYPE QUESTIONS .....	112
<b>Chapter 8. Operators and Expressions</b>		<b>113</b>
8.1	OPERATORS .....	113
8.2	ARITHMETIC OPERATORS .....	113
8.2.1	Unary Arithmetic Operator .....	113
8.2.2	Binary Arithmetic Operators .....	113
8.2.3	Ternary Arithmetic Operator .....	114
8.2.4	Hierarchy of Arithmetic Operators .....	114
8.2.5	Integral Division and Remainder .....	115
8.2.6	Remainder Operator (%) .....	116
8.3	UNARY OPERATORS .....	116
8.4	INCREMENT AND DECREMENT OPERATORS .....	117
8.5	RELATIONAL OPERATORS .....	120



8.6	LOGICAL/BOOLEAN OPERATORS .....	122
8.6.1	Hierarchy of Logical Operators .....	122
8.6.2	Boolean Table for Logical Operator NOT .....	123
8.6.3	Boolean Table for Logical Operator AND .....	123
8.6.4	Boolean Table for Logical Operator OR .....	123
8.7	CONDITIONAL OPERATOR (?) .....	125
8.8	PRECEDENCE OF OPERATORS .....	125
8.9	EXPRESSIONS AND THEIR DEFINITIONS .....	126
8.9.1	Constant Expressions .....	127
8.9.2	Integral Expressions .....	127
8.9.3	Float Expressions .....	127
8.9.4	Pointer Expressions .....	127
8.10	AUTOMATIC TYPE CONVERSIONS IN EXPRESSIONS ....	128
8.10.1	Rules for Automatic (Implicit) Conversion .....	129
8.10.2	Mixing Integers .....	129
8.10.3	Mixing Floating-point Values .....	129
8.10.4	Mixing Integers with Floating-point Values .....	129
8.10.5	Type Compatibility .....	130
8.11	TYPE CASTING .....	130
8.12	ARITHMETIC ASSIGNMENT OR COMPOUND OPERATORS .....	131
	REVIEW QUESTIONS WITH ANSWERS .....	133
	DESCRIPTIVE TYPE QUESTIONS .....	134

## **Chapter 9. Flow of Control** **136**

9.1	CONDITIONAL STATEMENTS .....	136
9.1.1	General form of the <i>if-else</i> statement .....	136
9.1.2	Using <i>if</i> Statement with Compound Tasks .....	138
9.1.3	Nested <i>if-else</i> Statement .....	143
9.2	THE <i>switch</i> STATEMENT .....	143
9.2.1	Nested <i>Switch...Case</i> Statement .....	147
9.2.2	Comparison of nested <i>if</i> statements and the <i>switch</i> Statement .....	148
9.3	THE <i>break</i> STATEMENT .....	149
9.4	THE CONDITIONAL OPERATOR ? AS ALTERNATIVE TO <i>if</i> .....	150
9.5	LOOPS .....	151
9.5.1	The <i>while</i> Statement .....	151
9.5.2	The <i>do-while</i> Statement .....	154
9.5.3	The <i>for</i> Statement .....	155
9.6	NESTED LOOPS .....	158
9.7	COMMA OPERATOR .....	161
9.8	THE <i>exit()</i> FUNCTION .....	162



9.9 CONTINUE STATEMENT .....	162
REVIEW QUESTIONS WITH ANSWERS .....	163
DESCRIPTIVE TYPE QUESTIONS .....	164
<b>Chapter 10. Structured Data Type: Array</b> .....	<b>168</b>
10.1 WHAT IS DATA STRUCTURE? .....	168
10.1.1 Classification of Data Structures .....	168
10.2 ARRAY .....	168
10.2.1 Declaration of One-dimensional Array .....	168
10.2.2 Declaration of more than one Array at the same time .....	169
10.2.3 Initialization of One-dimensional Array .....	169
10.2.4 Difference between Array Subscript and Array Element .....	170
10.2.5 Inputting Array Elements .....	174
10.2.6 Accessing Array Elements .....	174
10.2.7 Reading in an Unknown Number of Elements in an Array .....	175
10.3 MANIPULATION OF ARRAY ELEMENTS .....	181
10.3.1 Sum of the Elements in an array .....	181
10.3.2 Product of the Elements in an array .....	182
10.3.3 Average value of the Elements in an array .....	182
10.3.4 Linear Search in an array .....	183
10.3.5 Finding the maximum/minimum Element in an array .....	184
10.4 ARRAY OF STRINGS .....	184
10.4.1 Declaration of a String .....	185
10.4.2 Initialization of a Strings .....	186
10.4.3 An Array of Strings .....	187
10.5 STRING MANIPULATION .....	189
10.5.1 Counting number of Vowels, Consonants, Digits, Special Characters in a String .....	189
10.5.2 Case Conversion .....	190
10.5.3 Reversing a String .....	190
10.5.4 Reversing each word in a String .....	191
10.5.5 String and Character Related Functions .....	192
10.6 MULTIDIMENSIONAL ARRAYS .....	194
10.6.1 Declaration of Two-dimensional Array .....	194
10.6.2 Initializing a Two-dimensional Array .....	195
10.6.3 Inputting Array Elements .....	196
10.6.4 Accessing Array Elements .....	197
10.7 MANIPULATIONS OF ARRAY ELEMENTS .....	198
10.7.1 Sum of Row Elements in Two-dimensional Array .....	198



10.7.2	Sum of Column Elements in Two-dimensional Array	198
10.7.3	Sum of Diagonal Elements in Two-dimensional Array	199
10.7.4	Finding maximum/minimum values in Two-dimensional Array	200
	REVIEW QUESTIONS WITH ANSWERS	201
	DESCRIPTIVE TYPE QUESTIONS	204
<b>Chapter 11.</b>	<b>User Defined Functions</b>	<b>205</b>
11.1	WHAT IS A FUNCTION?	205
11.1.1	Why do We Use Function?	205
11.2	SIMPLE C++ FUNCTION	206
11.3	CLASSIFICATION OF FUNCTIONS	209
11.4	BUILT-IN FUNCTIONS	209
11.5	USER DEFINED FUNCTIONS	209
11.5.1	General Form of Function	209
11.5.2	Advantages of Functions	209
11.6	DEFINING A FUNCTION	210
11.6.1	Local Variables	210
11.6.2	Function Prototype	212
11.6.3	Use of <i>void</i>	213
11.7	INVOKING/CALLING A FUNCTION	214
11.7.1	Passing Arguments to a Function	214
11.8	SPECIFYING ARGUMENT DATA TYPES	220
11.8.1	Default Arguments	220
11.8.2	Constant Arguments	220
11.8.3	Pass by Value	221
11.8.4	Pass by Reference	221
11.8.5	Returning Values and their Types	223
11.8.6	Returning Non-integer Values	224
11.9	CALLING FUNCTIONS WITH ARRAYS	224
11.9.1	Addresses of Things Versus Things	225
11.10	SCOPE RULES OF FUNCTIONS AND VARIABLES	229
11.10.1	File Scope	229
11.10.2	Local Scope	229
11.10.3	Class Scope	230
11.11	LOCAL AND GLOBAL VARIABLES	231
11.12	STORAGE CLASS SPECIFIERS	232
11.12.1	Lifetime	232
11.12.2	Visibility	233
11.12.3	Extern	234
11.12.4	Auto	236



REVIEW QUESTIONS WITH ANSWERS .....	236
DESCRIPTIVE TYPE QUESTIONS .....	239
<b>Chapter 12. Mathematical Functions and Other Functions</b>	<b>240</b>
12.1 HEADER FILES .....	240
12.1.1 math.h .....	240
12.1.2 stdlib.h .....	241
12.2 MATHEMATICAL FUNCTIONS .....	243
12.2.1 fabs() .....	243
12.2.2 log() .....	243
12.2.3 log10() .....	243
12.2.4 pow() .....	243
12.2.5 sqrt() .....	244
12.2.6 sin() .....	244
12.2.7 cos() .....	244
12.2.8 abs() .....	244
12.2.9 randomize() .....	244
12.2.10 random() .....	244
12.2.11 frexp() .....	244
12.2.12 fmod() .....	245
12.2.13 modf() .....	245
12.3 MEMORY MANAGEMENT FUNCTIONS .....	245
12.3.1 The <i>calloc()</i> Functions .....	245
12.3.2 The <i>free()</i> Function .....	245
12.3.3 The <i>malloc()</i> Function .....	246
12.3.4 The <i>realloc()</i> Function .....	246
REVIEW QUESTIONS WITH ANSWERS .....	246
DESCRIPTIVE TYPE QUESTIONS .....	247
<b>Chapter 13. Event Programming</b>	<b>248</b>
13.1 INTRODUCTION .....	248
13.2 INITIAL REQUIREMENT FOR DESIGNING GAMES .....	248
13.2.1 Developing an Interface for User .....	248
13.2.2 Developing Logic for Playing a Game .....	248
13.2.3 Developing Logic for Scoring Points .....	249
13.2 MEMORY GAME: NUMBER GUESSING GAME .....	249
13.3 CROSS 'N KNOTS GAME: A REGULAR TIC-TAC-TOE GAME .....	250
13.4 HOLLYWOOD/HANGMAN: A WORD GUESSING GAME .....	255
13.5 DICE GAME .....	260



## UNIT-IV COMPUTER SYSTEM ORGANISATION

<b>Chapter 14. Data Representation</b>	<b>265</b>
14.1 NUMBER SYSTEMS .....	265
14.1.1 Decimal Number System .....	265
14.1.2 Binary Number System .....	265
14.1.3 Octal Number System .....	267
14.1.4 Hexadecimal Number System .....	268
14.2 INTEGER NUMBER .....	269
14.3 FLOATING POINT NUMBER .....	269
14.3.1 Fixed Point Representation .....	269
14.3.2 Floating Point Representation .....	270
14.3.3 Normalized Floating-Point Numbers .....	271
14.3.4 Conversion of Decimal Real Number into Binary Real Number .....	272
14.4 1'S COMPLEMENT .....	272
14.5 2'S COMPLEMENT .....	272
14.6 INTERNAL STORAGE ENCODING OF CHARACTERS ....	273
14.6.1 ASCII .....	273
14.6.2 ISCII (Indian Script Code for Information Interchange) .....	276
14.6.3 UNICODE .....	276
REVIEW QUESTIONS WITH ANSWERS .....	276
DESCRIPTIVE TYPE QUESTIONS .....	278
 <b>Chapter 15. Processors, Registers and CPU</b>	 <b>279</b>
15.1 PROCESSORS .....	279
15.1.1 Single Processor .....	279
15.1.2 Dual Processors .....	279
15.1.3 Multiple Processors .....	279
15.2 KINDS OF PROCESSORS .....	279
15.2.1 CISC .....	280
15.2.2 RISC .....	280
15.3 BASIC CONCEPTS OF MICROPROCESSOR .....	281
15.4 TYPES OF MICROPROCESSORS .....	281
15.4.1 8-Bit Microprocessor .....	281
15.4.2 16-Bit Microprocessor .....	281
15.4.3 32-Bit Microprocessor .....	281
15.4.4 64-Bit Microprocessor .....	281
15.5 CLOCK SPEED .....	282
15.6 CONCEPT OF SYSTEM BUS .....	282
15.6.1 Data Bus .....	282
15.6.2 Address Bus .....	282



15.6.3 Control Bus .....	283
15.7 REGISTERS .....	283
15.7.1 Accumulator .....	284
15.7.2 Program Counter .....	284
15.7.3 Registers required for the Basic Computer .....	284
15.8 WHAT IS A CPU? .....	284
15.9 COMMONLY USED CPU's PROCESSORS AND CPU RELATED TERMINOLOGIES .....	285
15.9.1 Intel Pentium Series .....	285
15.9.2 Intel Celeron .....	286
15.9.3 Cyrix .....	286
15.9.4 AMD Series .....	286
15.9.5 Xeon .....	287
15.9.6 Intel Mobile .....	287
15.9.7 Mac Series .....	287
15.9.8 CPU Cache .....	289
15.10 CONCEPT OF HEAT SINK .....	289
15.10.1 CPU Fan .....	290
15.11 MOTHERBOARD .....	290
REVIEW QUESTIONS WITH ANSWERS .....	291
DESCRIPTIVE TYPE QUESTIONS .....	293
<b>Chapter 16. Memory</b> .....	<b>294</b>
16.1 INTRODUCTION .....	294
16.1.1 Cache Memory .....	294
16.1.2 Buffer .....	295
16.2 MAIN MEMORY .....	295
16.3 RAM .....	295
16.3.1 Static RAM (SRAM) .....	296
16.3.2 Dynamic RAM (DRAM) .....	296
16.3.3 Types of DRAM .....	296
16.4 ROM .....	296
16.4.1 PROM .....	297
16.4.2 EPROM .....	297
16.5 ACCESS TIME .....	297
REVIEW QUESTIONS WITH ANSWERS .....	298
DESCRIPTIVE TYPE QUESTIONS .....	299
<b>Chapter 17. Input Output Ports</b> .....	<b>300</b>
17.1 INPUT/OUTPUT PORTS/CONNECTIONS .....	300
17.1.1 Power Connector .....	300
17.1.2 Monitor Socket .....	301



17.2	PORTS .....	301
17.2.1	Parallel Port (LPT) .....	301
17.2.2	Serial Port (COM) .....	301
17.2.3	USB (Universal Serial Bus) Port .....	301
17.2.4	PS/2 Ports .....	302
17.2.5	SCSI (Small Computer System Interface) Port .....	302
17.2.6	PCI/MCI Socket .....	303
17.2.7	Keyboard Socket .....	303
17.2.8	Infrared Port (IR) .....	303
17.2.9	Audio/speaker Socket .....	304
17.2.10	Mic Socket .....	304
17.3	DATA BUS .....	304
17.4	EXTERNAL STORAGE DEVICES CONNECTED USING I/O PORTS .....	304
	REVIEW QUESTIONS WITH ANSWERS .....	305
	DESCRIPTIVE TYPE QUESTIONS .....	305
	<b>Chapter 18. Power Supply</b> .....	<b>306</b>
18.1	INTRODUCTION .....	306
18.2	SMPS (SWITCHED MODE POWER SUPPLY) .....	306
18.3	ELEMENTARY CONCEPTS OF POWER SUPPLY .....	306
18.3.1	Voltage .....	307
18.3.2	Current .....	307
18.3.3	Power .....	307
18.4	SMPS SUPPLY TO MOTHERBOARD .....	308
18.5	SUPPLY TO HARD DISK DRIVE .....	308
18.6	SUPPLY TO FLOPPY DISK DRIVE .....	308
18.7	CD/DVD (COMPACT-DISK/DIGITAL VERSATILE DISK) DRIVE .....	308
18.8	POWER CONDITIONING DEVICES .....	308
18.8.1	Voltage Stabilizer .....	309
18.8.2	Constant Voltage Transformer .....	309
18.8.3	Uninterrupted Power Supply (UPS) .....	310
	REVIEW QUESTIONS WITH ANSWERS .....	311
	DESCRIPTIVE TYPE QUESTIONS .....	311

*Glossary, 313*

*Index, 319*