R Chand's

Computer Programming Thermodynamics and Optics

R CHAND & CO, NEW DELHI

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COMPUTER PROGRAMMING AND THERMODYNAMICS

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- Do loop
- If statement
- Implicit / Explicit
- write / Read statement.
- Go To

- odd/even, quadratic eqn., Maximal/ Minima, Standard/ average, Trapezoidal, Simpson rule

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SYLLABUS

PHYSICS

SEMESTER III

PAPER I

PHY 301: COMPUTER PROGRAMMING, THERMODYNAMICS

Max. Marks
Time: 3 Hours

Note:

1. *The syllabus is divided into 4 units. 9 questions will be set.*
2. *Question no 1 will be compulsory, it contains 6 parts and answer should be brief but not in yes no.*
3. *Rest 4 questions are to be attempted, selecting one question from each unit. Questions 2-9 may contain two or more parts.*
4. *20% numerical problems are to be set.*
5. *Use of scientific (non-programmable) calculator is allowed.*

UNIT–I

Computer Programming: Computer organisation, Binary representation, Algorithm development, flow charts and their interpretation.FORTRAN Preliminaries; Integer and floating point arithmetic expression, built in functions executable and non executable statements, input and output statements, Formats, IF, DO and GO TO statements, Dimension arrays statement function and function subprogram.

UNIT–II

Applications of FORTRAN programming: Print out of natural numbes, Range the set of given numbers, Ascending and descending order, Mean and standard deviation, Least square fitting of curve, Roots of quadratic equation, Product of two matrices, Numerical integration (Trapezoidal rule and Simpson 1/3 rule).

UNIT–III

Thermodynamics-I: Second law of thermodynamics and its different statements Carnot theorem, Absolute scale of temperature, Absolute zero, Derivation of Clausius Clapeyron and Clausius latent heat equations, Entropy, T-S diagram, Nernest heat law, Clausius theorem, Calculations of entropy of reversible and irreversible processes, Development of Maxwell thermodynamics relations.

UNIT–IV

Thermodynamics-II: Thermodynamic functions: Internal energy (U), Helmholtz function (F), Enthalpy (H), Gibb's function (G) and the relations between them. Applications of Maxwell relation in the derivation of relations between entropy, specific heats and thermodynamical variables, Phase diagram and triple point of substance, Joule, free expansion, Joule-Thomson (Porous plug) experiment Joule Thomson effect. Liquification of gases (air, hydrogen, helium), solidification of helium below 4K. Cooling by adiabatic demagnetisation.

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SYLLABUS

PHYSICS

SEMESTER III

PAPER-II

PHY 302: OPTICS-I

Max. Marks: 45
Time: 3 Hours

Note:

1. *The syllabus is divided into 4 units. 9 questions will be set.*
2. *Question no 1 will be compulsory, it contains 6 parts and answer should be brief but not in yes no.*
3. *Rest 4 questions are to be attempted, selecting one question from each unit. Questions 2-9 may contain two or more parts.*
4. *20% numerical problems are to be set.*
5. *Use of scientific (non-programmable) calculator is allowed.*

UNIT–I

Interference I: Interference by Division of Wave front: Young's double slit experiment, Coherence, Conditions of interference, Fresnel's biprism and its applications to determination of wavelength of sodium light and thickness of a mica sheet, Lloyd's mirror, Difference between Bi-prism and Llyod mirror fringes, phase change on reflection.

UNIT–II

Interference II: Interference by Division of Amplitude: Thin film, Plane parallel film, Interference due to transmitted light, wedge shaped film, Newton's rings. Interferometers: Michelson's interferometer and its applications to (i) standardization of a meter (ii) determination of wavelength.

UNIT–III

Diffraction I: Huygens-Fresnel's theory, Fresnel's assumptions, rectilinear propagation of light, Fresnel's half period zones, zone plate, diffraction at a straight edge, rectangular slit and diffraction at a circular aperature.
Diffraction due to a narrow slit, dirraction due to a narrow wire.

UNIT–IV

Diffraction II: Fraunhoffer diffraction: one-slit diffraction, two slit diffraction, N-slit diffraction, plane transmission granting spectrum, dispersive power of grating, limit of resolution, Rayleigh's criterion, resolving power of telescope and a grating.

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