

2016-2017

SECOND YEAR THEORY

Paper-II

THERMODYNAMICS AND OPTICS

UNIT - I

1. Kinetic theory of gases: Introduction - Deduction of Maxwell's law of distribution of molecular speeds, Experimental verification Tothed Wheel Experiment, Transport Phenomena -Viscosity of gases - thermal conductivity - diffusion of gases.

2. Thermodynamics: Introduction - Reversible and irreversible processes - Carnot's engine and its efficiency - Carnot's theorem - Second law of thermodynamics, Kelvin's and Clausius' statements - Thermodynamic scale of temperature - Entropy, physical significance - Change in entropy in reversible and irreversible processes - Entropy and disorder - Entropy of universe - Temperature- Entropy (T-S) diagram - Change of entropy of a perfect gas- change of entropy when ice changes into steam.

3. Thermodynamic potentials and Maxwell's equations: Thermodynamic potentials - Derivation of Maxwell's thermodynamic relations -Clausius-Clayperon's equation - Derivation for ratio of specific heats - Derivation for difference of two specific heats for perfect gas. Joule Kelvin effect - expression for Joule-Kelvin coefficient for perfect and Vanderwals gas.

UNIT – II

4. Low temperature Physics: Introduction - Joule-Kelvin effect - liquefaction of gas using porous plug experiment. Joule expansion - Distinction between Jouleadiabatic and Joule- Thomson expansions - Expression for JouleThomson cooling - Liquefaction of helium, Kapitza's method - Adiabatic demagnetization - Production of low temperatures - Principle of refrigeration, vapour compression type. Working of refrigerator and air conditioning machines. Effects of Chloro and Fluro Carbons on Ozone layer; applications of substances at lowtemperature. 59

5. Quantum theory of radiation: (10) Black body-Ferry's black body - distribution of energy in the spectrum of Black body - Wein's displacement law, Wein's law, Rayleigh-Jean's law - Quantum theory of radiation - Planck's law -

deduction of Wein's law, Rayleigh-Jeans law, from Planck's law - Measurement of radiation - Types of pyrometers - Disappearing filament optical pyrometer - experimental determination - Angstrom pyroheliometer - determination of solar constant, effective temperature of sun.

6. Statistical Mechanics: Introduction to statistical mechanics, concept of ensembles, Phase space, Maxwell-Boltzmann's distribution law, Molecular energies in an ideal gas, Bose-Einstein Distribution law, Fermi-Dirac Distribution law, comparison of three distribution laws. Black body radiation, Rayleigh-Jeans formula, Planck's radiation Law, Wien's displacement, Stefan's Boltzmann's Law from Planck's formula. Application of Fermi-Dirac statistics to white dwarfs and Neutron stars.

UNIT - III

7. Interference: Principle of superposition - coherence - temporal coherence and spatial coherence - conditions for Interference of light Interference by division of wave front: Fresnel's biprism - determination of wavelength of light. Determination of thickness of a thin transparent material using Biprism - change of phase on reflection - Lloyd's mirror experiment: Interference by division of amplitude: Oblique incidence of a plane wave on a thin film due to reflected and transmitted light (Cosine law) - Colours of thin films - Non reflecting films - interference by a plane parallel film illuminated by a point source - Interference by a film with two non-parallel reflecting surfaces (Wedge shaped film) - Determination of diameter of wire - Newton's rings in reflected light with and without contact between Lens and glass plate, Newton's rings in transmitted light (Haidinger fringes). Determination of wavelength of monochromatic light - Michelson Interferometer - types of fringes - Determination of wavelength of monochromatic light, Difference in wavelength of sodium D₁, D₂ lines and thickness of a thin transparent plate. 8. Diffraction: Introduction - Distinction between Fresnel and Fraunhofer diffraction Fraunhofer diffraction:- Diffraction due to single slit and circular aperture - Limit of resolution - Fraunhofer diffraction due to double slit - Fraunhofer diffraction pattern with N slits (diffraction grating) Resolving Power of grating - Determination of wavelength of light in normal and oblique incidence methods using diffraction grating. Fresnel diffraction:- Fresnel's half period zones - area of the half period zones - zone plate - Comparison of zone

2018-2019

B.Sc. (Physics) Syllabus, Kakatiya University, Warangal CBCS pattern in Semester System (w. e. from 2016-2017) Dr. B. Venkatram Reddy Chairman, Board of Studies in Physics, KU, Wgl

2017 B.Sc. (Physics)- III Year Semester – VI Paper – VIII(A):: Basic Electronics (DSC – Elective-2) (w.e.f the academic year 2018-2019)

Unit-I: (10 Hrs)

Network Elements and Network Theorems Passive elements, Power sources, Active elements, Network models: T and π Transformations, Superposition theorem, Thevenin's theorem, Norton's theorem. Reciprocity theorem and Maximum power transfer theorem (Simple problems). Two-port Networks – Introduction - Z-parameters, Y-parameters, h-parameters and ABCDparameters (Simple problems).

Unit – II: (10 Hrs)

Band theory of P-N junction

1. Energy band in solids (band theory), valence band, conduction band and forbidden energy gap in solids, insulators, **semi conductors** and pure or intrinsic semiconductors and impure or extrinsic semiconductors. **N-type semi-conductors**, **P-type semi-conductors**, Fermi level, continuity equation.
2. Diodes: **P-N junction diode**, Half-wave, full-wave and bridge rectifier. Zener diode & its characteristics. Zener diode as voltage regulator.

Unit-III: (11 Hrs)

1. Bipolar Junction Transistor (BJT) – p-n-p and n-p-n transistors, current components in transistors, CB, CE and CC configurations – transistor as an amplifier - RC coupled amplifier – Frequency response (Qualitative analysis).
2. Feedback concept & Oscillators: Feedback, General theory of feedback – Concepts of oscillators, Barkhausen's criteria, Phase shift oscillator – Expression for frequency of oscillation.

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Unit-IV: (11 Hrs)

1. Digital Electronics Binary number system, conversion of binary to decimal and vice-versa. Binary addition and subtraction (1's and 2's complement methods). Hexadecimal number system. Conversion from binary to hexadecimal and vice-versa, Decimal to hexadecimal and vice-versa.

2. **Logic gates**: OR, AND, NOT gates, truth tables, realization of these gates using discrete components. NAND, NOR as universal gates, Exclusive – OR gate (EX-OR). De Morgan's Laws – Statement and proof.

NOTE: Problems should be solved from every chapter of all units.

Textbooks 1. Electronic devices and circuits – Millman and Halkias. Mc.Graw-Hill Education. 2. Principles of Electronics by V.K. Mehta – S. Chand & Co. 3. Basic Electronics (Solid state) – B. L. Theraja , S. Chand & Co. 42 hrs (3 hrs / week).

2020-2021

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Unit – II: (10 Hrs)

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1. Energy band in solids (band theory), valence band, conduction band and forbidden energy gap in solids, insulators, **semi conductors** and pure or intrinsic semiconductors and impure or extrinsic semiconductors. N-type semiconductors, P-type semi-conductors, Fermi level, continuity equation.

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Unit-III: (11 Hrs)

2020-21

B.Sc. (Physics) Semester I-Theory Syllabus
Paper – I: Mechanics

56 hrs

(w. e. from academic year 2019-20)
(CBCS)

Unit – I

1. Vector Analysis (14)

Scalar and vector fields, gradient of a scalar field and its physical significance. Divergence and curl of a vector field and related problems. Vector integration, line, surface and volume integrals. Stokes, Gauss and Greens theorems-simple applications.

Unit – II

2. Mechanics of Particles (07)

Laws of motion, motion of variable mass system, motion of a rocket, multi-stage rocket, conservation of energy and momentum. Collisions in two and three dimensions, concept of impact parameter, scattering cross-section.

3. Mechanics of rigid bodies (07)

Definition of Rigid body, rotational kinematic relations, equation of motion for a rotating body, angular momentum and inertial tensor. Euler's equation, precession of a top, Gyroscope.

Unit – III

4. Central forces (14)

Central forces – definition and examples, conservative nature of central forces, conservative force as a negative gradient of potential energy, equation of motion under a central force, gravitational potential and gravitational field, motion under inverse square law, derivation of Kepler's laws, Coriolis force and its expressions.

Unit – IV

5. Special theory of relativity (14)

Galilean relativity, absolute frames, Michelson-Morley experiment, Postulates of special theory of relativity. Lorentz transformation, time dilation, length contraction, addition of velocities, mass-energy relation. Concept of four vector formalism.

NOTE: Problems should be solved at the end of every chapter of all units.

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Chairman
B.Sc. (Physics) Sem I
CBCS
University of Delhi