

HEMCHANDRACHARYA NORTH GUJARAT UNIVERSITY, PATAN
CBCS - Semester - Grading Pattern
B.Sc. Semester-III
PHYSICS SYLLABUS

CC:PHY-301

UNIT - I

Heat and Thermodynamics:

Characteristic functions, Enthalpy (11.1), The Helmholtz and Gibbs function (11.2), Two Mathematical Theorems (11.3), Maxwell's equations (11.4), The T-ds equations (11.5), Energy equation (11.6), The Thermal Expansivity (11.9), Compressibility (11.10), Joule-Kelvin effect (Porous plug Experiment) (12.1), Liquefaction of Gases by Joule-Kelvin effect (12.2).

Basic Reference :

Heat and Thermodynamics by Mark W. Zemansky (5th Edition)

Kinetic Theory of Gases:

Maxwell's Distribution Law of Velocities, Deduction of Maxwell – Boltzmann law , Determination of the values of constants 'a' and 'b' (6.5), Experimental Test of Maxwell's Law (6.6).

Basic Reference:

Thermodynamics and Statistical Physics by Singhal- Agarwal-Prakash PragtiPrakashan, Meerut.

Other References:

1. University Physics by Sears, Zemansky and Young. (6th Edition)
Narosa Publication, New Delhi.
2. Heat Thermodynamics and Statistical Physics by Brijlal, Dr. Subrahmanyam, P.S.Hemne
S.Chand.
3. Waves and Oscillations by N Subramanyam, Brijlal.

UNIT – II : Optics

Diffraction:

Fresnel's Diffraction: Introduction (17.1), Fresnel's Assumptions (17.3), Rectilinear Propagation of light (17.4), Zone Plate (17.5), Action of a zone plate for an incident spherical wave front (17.5.1), Difference between zone plate and a convex lens (17.5.2), Distinction between Interference and diffraction (17.6), Fresnel and Fraunhofer types of diffraction (17.7), Fraunhofer diffraction at a double slit (18.4), Fraunhofer diffraction at double slit (Calculus method),(18.4.1), Distinct between single slit and double slit diffraction pattern (18.4.2), Fraunhofer diffraction at N slit (18.6& 18.6.1), Plane diffraction grating (18.7), Theory of plane transmission grating (18.7.1), Dispersive power of Grating (18.7.7).

Basic Reference :

A text book of OPTICS by Dr. N, Subrahmanyam, Brijlal, Dr, M,N, Avadhanulu - S.Chand.

Other References:

1. A Text book of Light by D.N.Vasudeva - S. Chand & Co.
2. Fundamentals of Optics by Jonkin's and White
3. Optics by AjoyGhatak
4. Principles of Optics by B.K. Mathur

Special theory of Relativity:

Newtonian Relativity (14.1), Michelson-Morley experiment (14.2), Special theory of relativity (14.3), Lorentz Transformation (14.4), Consequences of Lorentz Transformation (14.5)-(a) Relativity of Simultaneity (b) the Lorentz-Fitz Geraldlength Contraction (c) Time Dilation, Addition of Velocities (14.6), Mass-energyrelation (14.8), Space time (14.9).

Basic Reference:

Introduction to Classical Mechanics by Takwale&Puranik Tata McGraw-Hill Publication (7th reprint-1986)

Other Reference:

1. Concept of Modern Physics by Besier McGraw-Hill
2. Elements of Special Relativity by S.P.Singh&M.K.Bagde S. Chand & Co. New Delhi.
3. Properties of Matter by Brijlal, N.Subrahmanyam, S.Chand.

UNIT - III: Solid State Physics***Crystal Structure:***

Crystalline and Amorphous Solids (1.1), Crystal Lattice and Crystal Structure (1.2), Translational Symmetry, Space, Unit Cell and Primitive Cell (1.3), Symmetry Elements in Crystals (1.4 [1.4.1 to 1.4.6]), The Seven crystal Systems (1.5), Coordination Number (1.5.1), Some importance crystal structure (1.6), Simple Cubic Structure (1.6.1), Body Centered Cubic Structure (1.6.2), Face Centered Cubic Structure (1.6.3), Wigner-Seitz Cells (1.7), Miller Indices (1.8), The spacing of a set of crystal planes (1.11),Point Groups (1.12).

Basic reference:

Solid State Physics By Ajay Kumar Saxena (Macmillan India Limited)

Other reference:

- 1.Introduction to Solid State Physics By C.Kittle (John Willey)
- 2.Fundamental of Solid State Physics By Saxena, Gupta, Saxena (Pragati Prakashan)
- 3.Elements of Solid State Physics by J.P.Srivastava(PHI).

Atomic Spectra:

Franck-Hertz experiment (2.16), Critical potentials (2.17) Shortcomings of Bohr's Theory (2.19), Summerfield extension of Bohr theory (2.20)

Basic reference:

Atomic and Molecular Physics By Raj Kumar (Campus Books)

B.Sc. Semester-III

PHYSICS SYLLABUS

CC: PHY-302

UNIT-I : Electrostatics and Magnetostatics

Electrostatics in Dielectric:

Gaseous Non-Polar Dielectrics (2.11), Gaseous Polar Dielectrics (2.12), Non-Polar Liquids (2.13), Solid Dielectrics-Electrets (2.14).

Magnetostatics:

The Magnetic Potentials (4.9 – a & b), Magnetic Vector Potential due to Small Current Loop (4.12), An alternative method for finding the Vector Potential A and the Field B due to Current Loop (4.13), Magnetization (4.15), Magnetic Field Vector (4.16), Magnetic Susceptibility and Permeability (4.17), Boundary Conditions (4.18), Uniformly Magnetized Sphere in External Magnetic Field (4.19), A Comparison of Static Electric and Magnetic Fields (4.20).

Basic Reference :

Electromagnetics by B.B. Laud, New Age Int. Publisher (For Chapt. a & b)

Other Reference:

1. Electricity and Magnetism by Maharajan and Rangwala, THM
2. Electricity and Magnetism Berkeley Physics course Vol.-II by EDWARD M PURCELL, McGraw Hill Pub.

UNIT-II : Electronics

Transistors Biasing and Stabilization:

Bias Stabilization (Operating point stabilization) (8.7, 8.7.1 & 8.7.2), Stability factor (8.8), Stabilization by Collector Base Resistance (8.9) Stabilization by potential divider and Emitter resistor (8.10)

Basic Transistor Amplifier:

Transistor as a four pole (9.2), h-parameters with h-parameters equivalent circuit (9.5 complete), Grounded Emitter Circuit - Mathematical analysis using h- parameters only (9.6), Comparative Study of three types of Amplifiers (9.9).

Solid state Devices:

JFET (12.1 to 12.6), UJT (26.6, 26.6.1 to 26.6.3).

Basic Reference :

Hand book of Electronics by Gupta & Kumar 30th Revised Edition,2002 Pragati Prakashan
Electronics and Radio Engineering by M.L. Gupta (9th Edition-2002) D Raj & Sons.(For Ch-(C))

Other References:

1. Electronic Devices and Circuits by A.Mottershead Prentice – Hall of India.
2. Integrated Electronics by Millman&Halkias
3. Basic Electronics and Linear Circuits by N.N.Bhargava, D.C.Kulshreshtha, S.C.Gupta.

UNIT-III Mathematical Physics***Fourier series:***

Introduction (7.1), Periodic functions (7.2), Application of Fourier series (7.3), Average values of a function (7.4), Fourier Co-efficient (7.5), Diriclet's conditions (7.6), Complex form of Fourier series (7.7), Other interval even and odd function (7.8), Perseval Theorem (7.11).

Co-ordinate Transformation:

Curvilinear Coordinates (10.6), Scale factors and basis vectors for orthogonal systems (10.7)

Basic References:

- 1.Mathematical method for physical sciences by M. L. Boss John Wiley Publication.

Other Reference:

Mathematical Physics by B.D.Gupta

Schrodinger equation:

A free particle in one dimension (2.1), Generalization to three dimensions (2.2), The operator correspondence and the Schrodinger equation for a particle subject to forces (2.3), Normalization and Probability Interpretation (2.4), Non-Normalizable Wave functions and Box Normalization (2.5).

Basic reference:

Quantum Mechanics by John L. Powell and Bernd Crasemann (for Arti.1.1,1.3,&1.17)
A Textbook of Quantum Mechanics By P.M.Mathews and K.Venkatesan (TMH)
(for Arti. 2.1,to 2.5)

Other reference:

- 1.Atomic Physics by Rajam (S. Chand New Delhi)
- 2.Quantum mechanics by Powell and Creaseman
- 3 Nuclear Physics by Kaplan

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PC: PHY-301

LABORATORY EXPERIMENTS

1. Coaxial Viscometer
2. To determine wave length of bright lines of mercury light using grating.
3. R.P. of Telescope
4. Searl's Goniometer. Determination of cardinal points and 'do'
5. Kundt's tube. Determination of 'y'
6. Diffraction by Adser 'A' Pattern
7. e/k by Power Transistor

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LABORATORY EXPERIMENTS

1. Absolute value of capacity using B.G. or S.G.
2. Low resistance by method of Projection
3. Comparison of capacity (C_1/C_2) by Desauty method
4. To determine self inductance by Anderson Bridge
5. Characteristics of a C.B. Transistor (PNP)
6. Characteristics of JFET & Determination of μ , r_d , g_m
7. Construction of AND, OR, NOT Gates using NAND & NOR Universal gates.

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