

Devi Ahilya University, Indore, India Institute of Engineering & Technology				BE - I Year (Common to all branches) Semester- 2			
Subject Code & Name	Instructions Hours per Week			Credits			
APR2C2: Applied Physics	L	T	P	L	T	P	Total
Duration of Theory Paper: 3 Hours	3	1	2	3	1	1	5

Learning Objectives:

- To introduce the basics concepts of physics and make a bridge between basics and their application.
- To introduce the concept of the modern science like Laser, Optical fire, X-rays and quantum physics.
- To introduce fundamental physics like wave optics, interference, diffraction polarization, and semiconductor physics.

Pre requisites: Basic knowledge of Optics, Crystal Structure and Semiconductors.

COURSE OF CONTENTS

UNIT-I

Optics-I: Interference of Light Waves: Thin film, Newton's Ring experiment, Michelson interferometer; Diffraction of Light Waves: Fresnel's & Fraunhofer diffraction, Zone plate, Single slit experiment, diffraction by double slit, Diffraction at Circular aperture, Plane transmission Grating.

UNIT-II

Optics-II: Polarization of Light Waves, Double refraction, Nicol Prism, Half Wave & Quarter Wave plates, Circularly & elliptically polarized light, Polarimeter; LASER: Stimulated & spontaneous emission, Population Inversion, Optical Resonator, Einstein's coefficients, He-Ne Laser, CO₂ Laser, Semiconductor Laser; Optical Fiber: types of Fibers (material, refractive index, mode), Acceptance angle, Numerical aperture, V-Number, Propagation of Light through Fibers, Applications.

UNIT-III

Crystal Structure and Semiconductors: Symmetry & properties of Simple crystal structure, Miller's Indices, Interplanar spacing, production and properties of x-ray, Bragg's law; Semiconductors: Band theory of Semiconductors, Intrinsic & extrinsic semiconductors, Fermi level, pn junction diode, LED, Zener diode, npn & pnp Transistors.

UNIT-IV

Electromagnetism: Continuity equation for Charge & Current, Inconsistency of Ampere's law for time varying field, Concept of Displacement current, Maxwell's equations; Wave equations for E & H, Propagation of one dimensional electromagnetic waves in dielectric medium, Energy density in electromagnetic field: Poynting Vector.

UNIT-V

Quantum Physics: Planck's law, Compton's effect, Concept of Matter Waves, Devison & Germer's experiment, Phase velocity & Group velocity, Heisenberg's Uncertainty

Principle; Schrodinger 's Wave Equation, Interpretation of Wave function Ψ , Time dependent & Time Independent equations, Schrodinger's Wave equation for a free particle in a box.

Learning Outcomes:

- The student will demonstrate the ability to use concepts of Modern physics to their engineering applications.
- The course aims at developing the fundamentals of wave optics, crystal structure, structure of atoms and their application to obtain quantitative solutions of problems in physics.

BOOKS RECOMMENDED:

- [1] R K Gaur & S L Gupta, Engineering Physics, DhanpatRai& Sons, 2006
- [2] H.K. Malik &A.K.Singh, Engineering Physics, Tata McGraw Hill, 2011
- [3] N. Gupta & S.K. Tiwary , A Text Book of Engineering Physics, DhanpatRai& Co. 2009.
- [4] W. T. Silfast, Laser FundamentalsCambr. Un. Press, 1996,
- [5] D Halliday & R Resnick, Physics Vol-II, Wiley Eastern, 1993
- [6] H White, Modern Physics: Van Nostrand; 15/e.
- [7] D P Khandelwal, Optics and Atomic Physics.
- [8] R Feynman,Feynman Lectures on Physics, /e, Narosa Publication, 1998.
- [9] S.O. Pillai, Solid State Physics, New Age International Publication, 2010.
- [10] R.S. Sedha, A Text Book of Applied Electronic, S. Chand & company Lmt. 2005.
- [11] R.P. Goyal, Unified Physics-II,,and III Shivlal Agrawal & Co. ,1994.