

**Unit-1 Wave & Oscillation & Properties of Matter:** Simple harmonic motion, Damped & forced oscillation (Resonance), Rotational motion, Radius of gyration, Compound Pendulum, Elastic properties of matter, bending of beam.

**Unit-2 Electrostatic and Electromagnetic theory:** Elementary vector calculus, Gradient, Divergence, Curl and Laplacian Operators; Divergence Theorem and Stokes Theorem; Vector identities; Gauss Law, Ampere's Law & Faradays Law, Displacement current. Electric polarization in dielectric media, Maxwell's Field equation in vacuum & in dielectric media, Properties of electromagnetic waves, Boundary conditions for electric field vector ( $\vec{E}$ ) & displacement current ( $\vec{D}$ ) vectors across dielectric media, Propagation of electromagnetic wave in dielectric & conductors, Poynting theorem and Poynting vector.

**Unit-3 Optics:** Spatial & temporal coherence, Interference, Interference due to division of Amplitude, Stoke's Phase Law, Interference in thin film & thin wedges, Newton's Ring, Fraunhofer diffraction by single slit and grating.

**Unit-4 Lasers:** Einstein's A and B coefficient, Spontaneous and Stimulated emission, Population-inversion, Components of laser, Ruby laser, He-Ne Laser.

**Unit-5 Quantum Physics:** Planck's theory of black body radiation, Compton effect. Wave particle duality, de-Broglie waves. Wave and group velocity, Davisson and Germer experiment, Heisenberg uncertainty principle, Applications of the uncertainty principle. Physical interpretation of wave function and their normalization, Quantum mechanical operators & their expectation values, Schrodinger equation: Time dependent & Time-independent form in one dimension, Particle in a box.

#### Reference Books:

1. A. Beiser- Prospective of Modern Physics
2. D. S mathur- Properties of Matter
3. Mallick and Singh- Engineering Physics
4. A. Ghatak- Optics
5. D. J. Griffith- Introduction to electromagnetic Theory