

PH 101: ENGINEERING PHYSICS (3-1-2: 5)-Revised

Electromagnetism

Gauss's law and its applications, Divergence and Curl of Electrostatic fields, Electrostatic Potential, Laplace's equation. Lorentz force, Biot-Savart and Ampere's laws and their applications, Divergence and Curl of Magnetostatic fields, Force and torque on a magnetic dipole. Motional EMF, Faraday's law, Lenz's law, Maxwell's equations, Wave solution of Maxwell Equations.

Wave Optics

Interference- Introduction to waves, Coherence (Spatial and Temporal), Principle of Superposition, Young's double slit experiment, Interference due to thin parallel films, wedge shaped film, Newton's rings. Diffraction- Fresnel and Fraunhofer diffraction, Fraunhofer diffraction due to double slit. Diffraction grating and its usages; Polarization- Introduction, Malus' law, Polarization by reflection and Brewster's law.

Special Theory of Relativity

Postulates of Special Theory of Relativity, Galilean transformation, Lorentz transformation, Simultaneity, Length Contraction, Time dilation, Relativistic addition of velocities, Energy-momentum relationships.

Quantum Mechanics

Historical remarks, Double-slit experiment; De Broglie's hypothesis; uncertainty Principle, wave function and wave packets, phase and group velocities, Schrödinger Equation, Probabilities and Normalization, Expectation values, Eigenvalues and eigenfunctions, Applications in one dimension: Particle in a box, Harmonic oscillator.

Lasers

Laser operation, Absorption, Spontaneous Emission and Stimulated Emission, Population & Inversion, Two-, Three- and Four-Level Laser Systems, Laser Characteristics- Types of Lasers: Solid-State Lasers, Gas Lasers, Semiconductor Lasers, Laser Applications.

Textbooks:

1. R. A. Serway and J. W. Jewett, "Physics for Scientists and Engineers with Modern Physics", Cengage Learning Custom Publishing.
2. P. Khare and A. Swarup, "Engineering Physics: Fundamentals and Modern Applications", Jones and Bartlett Publishers.

References:

1. R. Eisberg and R. Resnick, "Quantum Physics of Atoms, Molecules, Solids, Nuclei and Particles", John Wiley.
2. D. J. Griffiths, "Introduction to Electrodynamics", Prentice Hall of India.
3. A. K. Ghatak, "Optics", Tata McGraw Hill.
4. R. Resnick, "Introduction to Special Relativity", John Wiley.
5. A. K. Maini, "Lasers and Optoelectronics: Fundamentals, Devices and Applications", John Wiley.