PHYSICS

Module I(9hrs)

Oscillation and Waves

Oscillatory systems: Simple harmonic oscillation, damped harmonic oscillation, forced vibration, resonance, coupled oscillation. Waves as periodic variation quantity in space and time, wave equation, longitudinal and transverse waves, progressive and stationary waves, examples of different types of waves.

Module II(10hrs)

Interference

The principle of superposition of waves is extended to the interference of light of waves. Some systems for production of observable interference patterns are covered. Superposition of waves: Two beam superposition, Multiple-beam superposition, coherent and incoherent superposition. Two source interference pattern (Young's double slit), Intensity distribution. Newton's rings: Determination of wavelength of light, refractive index of liquid.

Diffraction

Diffraction of light waves at some simple obstacles are to be covered in this unit. Both Fresnel and Fraunhofer pattern are included. Huygen's principle, Fresnel and Fraunhofer diffraction, zone plate. Fraunhofer diffraction due to a single slit. Plane transmission grating-diffraction spectra, determination of wave length of light, dispersion

Polarization

The unit covers elementary features of polarization of light waves. Polarization of transverse waves, plane, circular and elliptically polarized light. Polarization by reflection, refraction and scattering. Double refraction; Nicol prism, Quarter - wave plate, half - wave plate-construction and use. Production and analysis of circular and elliptically polarized light. Optical rotation, sacharimeter-construction and use.

Module III (10hrs)

Electromagnetism

Vector calculus: gradient, divergence, curl of vector field, Gauss divergence theorem, Stoke's theorem, Green's theorem. Gauss's law of electrostatics in free space and in a medium, electric displacement(D) magnetic Induction (B) and magnetic Intensity (H), Amperes circuital law, displacement current, Faraday's law of electromagnetic induction. Maxwell's electromagnetic equation in differential form and in integral form.

Electromagnetic waves

Some aspects of propagation of em waves are to be covered. Electromagnetic energy density, poynting vector, poynting theorem, vector potential and scalar potential electromagnetic wave equation for E and B, transverse nature and speed of em waves in ionized media.

Module IV (10hrs)

Quantum Physics

Need for Quantum physics-Historical overviews, Particle aspects of radiation-Black body radiation, photoelectric effect, Compton scattering, pair production.(No derivation), Wave aspect of particles- matter wave, de Broglie Hypothesis, Heisenberg Uncertainty principles- Statement, Interpretation and example.

Basic features of Quantum mechanics- Transition from deterministic to probabilistic, States of system- Wave function, probability density, superposition principle, observables and operators, expectation values. Schrodinger equation-Time dependent and time independent, wave packets.

Application of Quantum Mechanics- This unit deals with applications of quantum Mechanics to specific problems solutions of one- dimensional problems, free particles- continuous states, Potential steps- Boundary conditions, reflection, transmission., Potential Barrier-Tunneling, Infinite deep potential well-energy eigen values, eigen functions.

Text Books:

1. Physics-I for engineering degree students-B.B. Swain and P.K.Jena
2. Concepts in Engineering Physics-I Md. N. khan

Reference Books:

1. Engineering Physics- K.P.Mishra and P. Pattojoshi
2. Optics- A. K. Ghatak
3. Geometrical and Physical optics- P.K.Chakraborty
4. Electricity and Magnetism : E.M. Purecell
5. Introduction to Electrodynamics- David J. Griffiths
6. Concepts of Modern Physics - Arthur Beiser
7. Relativity and Quantum Mechanics- P.K.Palanisamy
8. Quantum Mechanics- M.Das and P.K.Jena