PHYSICS 3-0-0

For 1st Semester Code (RPH1A001)

Module I

Oscillation & Amp; Waves (8 Hours)

Simple Harmonic Oscillation: velocity of motion, acceleration, time period, frequency, phase; damped harmonic oscillation: Wave equation of damped vibration, logarithmic decrement, quality factor, relaxation time; Forced oscillation, resonance, velocity resonance and amplitude resonance, coupled oscillation, Normal coordinates and normal frequencies, In-phase and out-of-Phase Oscillation, Concept of wave and wave equation,, reflection and transmission of longitudinal waves at boundaries.

Module II

OPTICS (10 Hours)

Concept of interference, two sources interference pattern, Bi-prism, Fringe width, uses of biprism, Newton's ring & measurement of wavelength and refractive index. Diffraction: Huygen's principle, Fresnel's Diffraction and Fraunhoffer's diffraction, Half period zone, Zone plate, construction, principle, multiple foci, comparison ofzone plate with convex lens, Fraunhoper's diffraction of Single slit, intensity distribution

Module III

LASER and Fibre Optics :(6 Hours)

Atomic excitation and energy states, Interaction of external energy with atomic energy states, Absorption, spontaneous emission and stimulated emission, Population inversion, Pumping mechanism, optical pumping, Electrical Pumping, Components of laser system, active medium, population inversion, Ruby laser, Helium-Neon laser, Semiconductor laser (basic concepts, and Engineering application only),Structure of optical fibre, Principle of propagation and numerical aperture, Acceptance angle, classification of optical fibre (Single mode and Multimode, SINand GRIN), FOCL (Fiber Optic Communication Link)

Solid State Physics (4 Hours)

Crystalline and Amorphous solid, unit cell, lattice parameter, Miller Indices, Reciprocal Lattice(Only Concept), Bragg's law, Concept of fermions and Bosons and their distribution Functions, Band theory of Solids(Qualitative),Classification of materials: metals, semiconductor and insulator in terms of band theory.

Module IV

Electromagnetism (8 Hours)

(Student will be familiarized with some basic used in vector calculus prior to Development of Maxwell's electromagnetic wave equations. No proof of theorems and laws included in this unit expected- statement and interpretation should sufficient.)

Introduction; Scalar & vector fields, Gradient Of Scalar Field, divergence and curl of Vector Field, Gauss divergence theorem, Stokes theorem (Only Statements, noproof), Gauss's law of electrostatics in free space and in a medium (Onlystatements), Faraday's law of electromagnetic induction (Only statements)Displacement current, Ampere's circuital law, Maxwell's equation in Differential andIntegral form, Electromagnetic wave equation in E and, Electromagnetic Energy,Poynting theorem and Poynting vector(no derivation)

Module V

Quantum Physics: (10 Hours)

Elementary concepts of quantum physics formulation to deal with physical systems.

Need for Quantum physics- historical overviews (For concept), Einstein equation, de Broglie Hypothesis of matter waves, Compton Scattering, Pair production (no derivation), Uncertainty Principle, Application of Uncertainty Principle, Non-existence of electrons in the Nucleus, Ground state energy of a harmonic oscillator.Basic Features of Quantum Mechanics: Transition from deterministic to Probabilistic,Wave