15BS1102 PHYSICS – I (1st year)

Module – I (15 hrs)

Unit- I **Oscillation and Waves**

		Lectures Hours
	The aim of this unit is to familiarize the students with basic features of different oscillatory systems waves in general. The topics included in this unit should be treated qualitatively.	
(a)	Oscillatory systems: Simple harmonic oscillation, damped harmonic oscillation, forced vibration, resonance, coupled oscillation.	3 hrs
(b)	Waves as periodic variation quantity in space and time, wave equation, Reflection and transmission of waves at boundary of two media.	3 hrs

Unit - 2 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.	2 hrs
(a)	Superposition of waves: Two beam superposition, Multiple-beam superposition, coherent and incoherent superposition.	2hrs
(b)	Two source interference pattern, Intensity distribution, Biprism, Determination of wavelength of light. Newton's rings: Determination of wavelength of light, refractive index of liquid.	

Unit - 3 **Diffraction**

	Diffraction of light waves at some simple obstacles are to be covered in this unit. Both Fresnel and Fraunhofer pattern are included.	
(a)	Huygen's principle, Fresnel and Fraunhofer diffraction, zone plate.	2 hrs
(b)	Fraunhofer diffraction due to a single slit, Plane transmission grating- diffraction spectra, determination of wave length of light.	3hrs

Module : II (11 hour)

Unit- 4 Polarization

	The unit covers elementary features of polarization of light waves.	
(a)	Polarization of transverse waves, plane, circular and elliptically polarized light. Polarization by reflection, refraction and scattering.	2 hrs
(b)	Double refraction; Nicol prism, Quarter – wave plate, half – wave plate- construction and use.	2 hrs
(c)	Production and analysis of circular and elliptically polarized light, Optical rotation (Only concepts)	1 hrs

Unit – 5 **Electromagnetism**- 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.

(a) Vector calculus: gradient of scalar field, divergence, curl of vector field (Only Physical significance) Gauss divergence theorem, Stoke's theorem, Green's theorem (Only Statements) — 2 hrs

(b) Gauss's law of electrostatics in free space and in a medium(Only statements) electric displacement(**D)**magnetic Induction (**B**),Amperes circuital law (Only statements), displacement current, Faraday's law of electromagnetic induction(Only statements). — 2 hrs

(c) Maxwell's electromagnetic equation in differential form and in integral form(Only statements). Electromagnetic energy density, poynting vector, poynting theorem, vector potential and scalar potential, electromagnetic wave equation for E and B, transverse nature of EM waves. 4-2 — 2 hrs

Module III (10 hours)

Unit - 6 **Quantum Physics :** This unit deals with elementary concepts of quantum physics formulation to deal with physical systems.

(a) Need for Quantum physics-Historical overviews, Particle aspects of radiation- Black body radiation, photoelectric effect, Compton scattering, pair production.(No derivations), Wave aspect of particles- matter wave, de Broglie Hypothesis, Heisenberg Uncertainty principles- Statement, Interpretation and example. — 3 hrs

(b) 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. — 4 hrs

Unit – 7 Application of Quantum Mechanics- This unit deals with applications of quantum Mechanics to specific one-dimensional problems (Sketch, Schrodinger equation for different regions, Boundary conditions, final expressions and physical interpretations only, no derivations). — 3 hrs

Free particles- continuous states, Potential steps- Reflections, transmissions, Potential Barrier-Tunneling, Infinite deep potential well-energy eigen values, eigen functions.

Text Books :

1. Engineering Physics by D.R. Joshi, Mc Graw Hill
2. Engineering Physics by H.K. Malik and A.K. Singh, Mc Graw Hill.

Reference Book:

1. Quantum Mechanics by Powel & Craseman.
2. Optics- A. K. Ghatak

3. Electricity & Magnetism : E.M. Purecell
4. Introduction to Electrodynamics- David J. Griffiths, PHI Publication
5. Concepts of Modern Physics – Arthur Beiser.
6. Engineering Physics- K.P.Mishra and P. Pattojoshi, Scitech Pub.
7. Concepts in Engineering Physics-I Md. N. khan, Alok Publication.
8. Physics-I for engineering degree students-B.B. Swain and P.K.Jena.
9. An Introduction to Machanics by D.Klippner & R. Kolenkow, TMH