#### **Course Number and**

BPH101 - Engineering Physics I

#### **Credits and Contact**

3 & 45

#### **Course Coordinator's**

Ms.Lyola

# **Text Books and**

# **Text Books:**

- 1. Sears.F.W, Zemansky.M.W, Young.H.D, 'University Physics; Narosa Publishing House.
- 2. Avadhanulu. M.N.; Engineering Physics-Vol-1; S.Chand And Company Ltd, 2010.

## **References:**

- Rajendran.V and Marikani. A, 'Engineering Physics' Tata McGraw, Hill Publications Ltd, 3rd' Edition, New Delhi (2004).
- 2. Sears. Zemansky. Young. 'College Physics; Addison Wesley Publishing Company.
- 3. Mukundan. A, Usha.S. Lakshmi.V; 'Engineering Physics' Scitech Publications (India) Pvt.Ltd. Chennai, 2006.
- 4. Resnick, R., and Halliday, D. and Walker, J.; Fundamental of Physics; John Wiley and Sons.

Course												
To impart a sound knowledge on the basic concepts of modern sciences like engineering												
applications of ultrasonic, lasers, fundamentals of crystal physics and utility of solar energy.												
Prerequisites						Co-requisites						
+2 level Physics						Nil						
required, elective, or selected elective (as per Table 5-1)												
Required												
Course Outcomes												
CO1: Understand the principles and laws of physics												
CO2: Understand the principle of Laser and its application in Engineering and medicine.												
CO3: Acquire Knowledge on Quantum Physics.												
CO4: Learn the Properties of Electro Magnetic Theory.												
CO5: To understand the impact of Crystal Physics.												
CO6: Understand the concepts on Ultrasonic and its application in NDT.												
Student Outcomes (SOs) from Criterion 3 covered by this												
COs/SOs	a	b	с	d	e	f	g	h	i	j	k	1
CO1	Н						М			Н		
CO2		L	Н		М				М		L	Н
CO3												
CO4	Н		М	L						L		Μ
CO5		L	L								L	L
CO6												

#### List of Topics Covered

## UNIT I CRYSTAL PHYSICS

Lattice – Unit cell – Bravais lattice – Lattice planes – Miller indices – d spacing in cubic lattice – Calculation of number of atoms per unit cell – Atomic radius – Coordination number – Packing factor for SC, BCC, FCC and HCP structures – Diamond and graphite structures (qualitative treatment)- Crystal growth techniques –solution, melt (Bridgman and Czochralski) and vapour growth techniques (qualitative)

# UNIT II PROPERTIES OF MATTER AND THERMAL PHYSICS

Elasticity-Hooke's law - Relationship between three moduli of elasticity (qualitative) – stress - strain diagram – Poisson's ratio –Factors affecting elasticity –Bending moment – Depression of a cantilever –Young's modulus by uniform bending- I-shaped girders Modes of heat transfer-thermal conductivity- Newton's law of cooling - Linear heat flow – Lee's disc method – Radial heat flow – Rubber tube method – conduction through compound media (series and parallel).

# UNIT III QUANTUM PHYSICS

Black body radiation – Planck's theory (derivation) – Deduction of Wien's displacement law and Rayleigh – Jeans' Law from Planck's theory – Compton Effect. Theory and experimental verification – Properties of Matter waves – G.P Thomson experiment-Schrödinger's wave equation – Time independent and time dependent equations – Physical significance of wave function – Particle in a one dimensional box - Electron microscope - Scanning electron microscope - Transmission electron microscope.

## UNIT IV ACOUSTICS AND ULTRASONICS

Classification of Sound- decibel- Weber–Fechner law – Sabine's formula- derivation using growth and decay method – Absorption Coefficient and its determination –factors affecting acoustics of buildings and their remedies. Production of ultrasonics by magnetostriction and piezoelectric methods - acoustic grating -Non Destructive Testing – pulse echo system through transmission and reflection modes - A,B and C – scan displays, Medical applications – Sonogram.

# UNIT V PHOTONICS AND FIBRE OPTICS

Spontaneous and stimulated emission- Population inversion –Einstein's A and B coefficients - derivation. Types of lasers – Nd: YAG, CO2, Semiconductor lasers (homo junction & hetero junction) - Industrial and Medical Applications. Principle and propagation of light in optical fibres – Numerical aperture and Acceptance angle - Types of optical fibres (material, refractive index, mode) – attenuation, dispersion, bending - Fibre Optical Communication system (Block diagram) - Active and passive fibre sensors- Endoscope.

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