21PCM106T					Engineering Physics					
Teaching Scheme					Examination Scheme					
L	T	P	C	Hours/Week	Theory			Practical		Total Marks
					MS	ES	IA	LW	LE/Viva	
2	0	0	2	2	25	50	25	--	--	100

COURSE OBJECTIVES

- To understand basic concepts of properties of matter and principle stress and strain
- To develop the fundamental understanding of optoelectronic devices
- To understand the heat transfer mechanism in solids and fluids.
- To get accustomed to the quantum and crystal physics fundamentals

UNIT I PROPERTIES OF MATTER **8 Hrs.**

Elasticity - Stress-strain diagram and its uses - factors affecting elastic modulus and tensile strength – torsional stress and deformations - twisting couple - torsion pendulum: theory and experiment - bending of beams - bending moment - cantilever: theory and experiment – uniform and non-uniform bending: theory and experiment - I-shaped girders - stress due to bending in beams.

UNIT 2 WAVES AND FIBER OPTICS **8 Hrs.**

Oscillatory motion - forced and damped oscillations: differential equation and its solution - plane progressive waves - wave equation. Lasers: population of energy levels, Einstein's A and B coefficients derivation - resonant cavity, optical amplification (qualitative) - Semiconductor lasers: homojunction and heterojunction - Fiber optics: principle, numerical aperture and acceptance angle - types of optical fibres (material, refractive index and mode) losses associated with optical fibers - fibre optic sensors: pressure and displacement.

UNIT III THERMAL PHYSICS **8 Hrs.**

Flexural stresses: Theory of simple bending, Assumptions, Derivation of bending equation, Neutral axis, Determination bending stresses, section modulus of rectangular and circular sections (Solid and Hollow), T, I, Angle, Channel sections, Design of simple beam sections.

Deflection of beams: Bending into a circular arc, slope, deflection and radius of curvature, Differential equation for the elastic line of a beam, Double integration and Macaulay's methods, Determination of slope and deflection for cantilever, overhanging and simply supported beams subjected to point loads, U.D.L. Uniformly varying load.

UNIT IV QUANTUM AND CRYSTAL PHYSICS **8 Hrs.**

Black body radiation - Planck's theory (derivation) - Compton effect: theory and experimental verification - wave particle duality - electron diffraction - concept of wave function and its physical significance - Schrödinger's wave equation - time independent and time dependent equations - particle in a one-dimensional rigid box - tunnelling (qualitative) - scanning tunnelling microscope.

Single crystalline, polycrystalline and amorphous materials - single crystals: unit cell, crystal systems, Bravais lattices, directions and planes in a crystal, Miller indices - inter- planar distances - coordination number and packing factor for SC, BCC, FCC, HCP and diamond structures - crystal imperfections: point defects, line defects - Burger vectors, stacking faults - role of imperfections in plastic deformation - growth of single crystals: solution and melt growth techniques.

Max. 32 Hrs.

COURSE OUTCOMES

On completion of the course, student will be able to

CO1: Gain knowledge on the basics of properties of matter and its applications

CO2: To understand the concepts of waves and optical devices and their applications in fibre optics

CO3: Interpret the concepts of thermal properties of materials and their applications in expansion joints and heat exchangers

CO4: To understand concepts the advanced physics concepts of quantum theory and its applications in tunneling microscopes
CO5: To understand the basics of crystals, their structures and different crystal growth techniques
CO6: To apply knowledge of concepts of engineering physics to solve real world problems

TEXT/REFERENCE BOOKS

1. Bhattacharya, D.K. & Poonam, T. "Engineering Physics". Oxford University Press, 2015.
2. Gaur, R.K. & Gupta, S.L. "Engineering Physics". Dhanpat Rai Publishers, 2012.
3. Pandey, B.K. & Chaturvedi, S. "Engineering Physics". Cengage Learning India, 2012.
4. Halliday, D., Resnick, R. & Walker, J. "Principles of Physics". Wiley, 2015.
5. Serway, R.A. & Jewett, J.W. "Physics for Scientists and Engineers". Cengage Learning, 2010.
6. Tipler, P.A. & Mosca, G. "Physics for Scientists and Engineers with Modern Physics'. W.H.Freeman, 2007.

END SEMESTER EXAMINATION QUESTION PAPER PATTERN

Max. Marks: 100	**Exam Duration: 3 Hrs.**
Part A: 10 Questions of 2 marks each-No choice	20 Marks
Part B: 5 Questions from each unit with internal choice, each carrying 16 marks	80 Marks