COURSE CODE	COURSE NAME	L	T	P	CREDIT	YEAR OF INTRODUCTION
101009/PH100E	PHYSICS FOR COMPUTING SCIENCE	2	0	2	3	2021

1. Preamble

The aim of the Engineering Physics Program is to offer students a solid background in the fundamentals of Physics and to impart that knowledge in engineering disciplines. The program is designed to develop scientific attitudes and enable the students to correlate the concepts of Physics with the core programmes.

2. Prerequisite

Higher secondary level Physics, Mathematical course on vector calculus, differential equations and linear algebra

3. Syllabus

Module 1: Oscillations

Periodic motion-simple harmonic motion- characteristics of simple harmonic motion- vibration of simple spring mass system- Resonance-definition- Damped harmonic oscillator – heavy, critical and light damping- Energy decay in a damped harmonic oscillator- quality factor- forced mechanical and electrical oscillators.

Module 2: Fundamental of Wave Optics

Theory of interference fringes-types of interference- Fresnel 's prism-Newton 's rings- Diffraction-Two kinds of diffraction-Difference between interference and diffraction- Fresnel 's half period zone and zone plate-Fraunhofer diffraction at single slit- plane diffraction grating-Temporal and Spatial Coherence- Polarization – Concept of production of polarized beam of light from two SHM acting at right angle; plane, elliptical and circularly polarized light- Brewster 's law- double refraction.

Module 3: Basic Idea of Electromagnetisms, Maxwell's Equations, Quantum Mechanics and Crystallography

Continuity equation for current densities- Maxwell's equation in vacuum and non-conducting medium. Quantum Mechanics- Introduction- Planck's quantum theory- Matter waves, de-Broglie wavelength- Heisenberg's Uncertainty principle- Physical significance of wave function- Time independent and time dependent Schrödinger's wave equation- Particle in a one-dimensional potential box- Heisenberg Picture-

Crystallography- Basic terms-types of crystal systems- Bravais lattices- miller indices- d spacing- Debye Scherrer powder method, laue method- atomic packing factor for SC, BCC, FCC and HCP structures- Semiconductor Physics - conductor, semiconductor and Insulator; Basic concept of Band theory.

Module 4: Laser and Fiber Optics

Einstein's theory of matter radiation interaction and A and B coefficients; amplification of light by population inversion- Different types of lasers: Ruby Laser, CO_2 and Neodymium lasers- Properties of laser beams: monochromaticity, coherence, directionality and brightness- laser speckle- Applications of lasers in engineering- Fibre optics and Applications- Types of optical fibres.

Module 5: Thermodynamics

Zeroth law of thermodynamics- first law of thermodynamics- brief discussion on application of 1st law- Second law of thermodynamics and concept of Engine- Entropy, change in entropy in reversible and irreversible processes- third law of thermodynamics.

4. Text Books

1. A. Beiser, *Concepts of Modern Physics*, 5th Edition, McGraw Hill International, 1995.
2. David Halliday, Robert Resnick and Jearl Walker, *Fundamentals of Physics*, 7th Edition.

5. Reference Books

1. Ajoy Ghatak, *Optics*, 5th Edition, Tata McGraw Hill.
2. Sears and Zemansky, *University Physics*, 11th Edition, Addison-Wesley.
3. Jenkins and White, *Fundamentals of Optics*, 3rd Edition, McGraw-Hill.

6. Course Outcomes

After the completion of the course the student will be able to

CO1: Analyze the behavior of a damped harmonic oscillator

CO2: Explain the phenomenon of interference, diffraction and polarization and utilize it for engineering applications

CO3: Describe and make use of the Maxwell's equation of electromagnetism, use the basic principles of Quantum mechanics to identify the wave function & understand different crystal structures

CO4: Explain the different types of lasers, fiber optic and their applications

CO5**:** Demonstrate different law of thermodynamics, their significance and calculate entropy for a given process

7. Mapping of Course Outcomes with Program Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2							1	1		
CO2	3	2							1	1		
CO3	3	2							1	1		
CO4	3	2							1	1		
CO5	3	2							1	1		

8. Assessment Pattern

Learning Objectives	**Continuous Internal Evaluation (CIE)**		**End Semester Examination (ESE out of 100)**
	Internal Examination 1 (50)	**Internal Examination 2 (50)**	
Remember	15	15	30
Understand	25	25	50
Apply	10	10	20
Analyse			
Evaluate			
Create			

9. Mark Distribution

Total	**CIE**				**ESE**
	Attendance	**Internal Examination**	**Assignment/Quiz/ Course Project**	**Total**	
150	10	25	15	50	100

10. End Semester Examination Pattern

There will be two parts; Part A and Part B. Part A contain 10 questions with a maximum of 2 questions from each module, having 3 marks for each question. Students should answer all questions. Part B contains 2 questions from each module of which student should answer any one. Each question can have maximum 2 sub-divisions and carry 14 marks.

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