24PH102

ENGINEERING PHYSICS (Common to ECE,EEE & EIE)

Course Category:	Institutional Core	**Credits:**	3
Course Type:	Theory	**Lecture -Tutorial-Practice:**	3 - 0 - 0
Prerequisites:		**Continuous Evaluation:** **Semester end Evaluation:** **Total Marks:**	40 60 100

Course Objectives:

Engineering physics refers to the study of the combined disciplines of science and engineering, particularly electrical, electronic, aerospace, materials or mechanical engineering and it bridges the gap between basic science and engineering. The concepts of physics such as electrostatics, magnetostatics, semiconductors, lasers, optical fibers and quantum mechanics play an important role in identifying and solving engineering problems.

COURSE OUTCOMES	
Upon successful completion of the course, the student will be able to:	
CO1	Explain the fundamental principles of electrostatics and their applications (K2).
CO2	Illustrate the laws of magnetostatics and their applications (K3).
CO3	Describe the basic concepts of quantum mechanics and its mathematical frame (K2).
CO4	Identify different types of lasers & optical fibers and their applications. (K2)
CO5	Apply the concepts of semiconductors towards the classification of materials based on energy band (K3).

Contribution of Course Outcomes towards achievement of Program Outcomes (1 – Low, 2 - Medium, 3 – High)

	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**
CO1	**3**	**1**										
CO2	**3**	**1**										
CO3	2											
CO4	**3**		**2**									
CO5	**3**		**1**									

COURSE CONTENT

UNIT I Electrostatics **(8 periods)**

Electrostatics: Coulomb's law and electric field intensity, Gauss's law in electricity, applications of Gauss law - line of charge, sheet of charge, sphere of charge, electric potential, relation between E and V, potential and electric field due to electric dipole, application of electrostatics.

UNIT II Magnetostatics (8 periods)

Magnetostatics: Biot-Savart's Law, Ampere's circuit law, applications of Ampere's law, infinite line of current, infinite sheet of current, Maxwell's equation for static magnetic field, Faraday's law in electromagnetic induction, force due to magnetic field on a current element, force between two parallel current elements, Maxwell's equations in integral and differential forms.

UNIT III Dielectric and Magnetic Materials (8 periods)

Quantum Mechanics: Dual nature of light, matter waves, properties and Debroglie's hypothesis, G.P.Thomson experiment, Heisenberg's uncertainty principle and its applications (non-existence of electron in nucleus) and physical significance of wave function – Schrodinger's time independent wave equation– particle in a one-dimensional infinite potential box.

UNIT IV Lasers and Optical Fibers (8 periods)

- **Lasers**: Introduction, characteristics of laser, basic principles of lasers (absorption, spontaneous emission and stimulated emission), requirements of lasers (pumping, population inversion, and resonance cavity), solid state laser (Ruby), applications of lasers.
- **Optical Fibers**: Introduction, fundamentals of optical fiber, propagation of light through optical fiber, types of optical fiber, numerical aperture, fractional refractive index change, losses in optical fibers, optical fibers in communication and its advantages.

UNIT V Semiconductor physics (8 periods)

- Semiconductors: Introduction, formation of energy bands, classification of crystalline solids, Fermi level in intrinsic semiconductors, Fermi level in extrinsic semiconductors, large band gap semiconductors, drift, and diffusion currents, Einstein's equation, Hall effect and its applications.

Textbooks:

1. Avadhanulu, M. N. (2019). A textbook of engineering physics (11th ed.). S. Chand Publishing.
2. Halliday, D. Resnick, R., & Walker, J. (2020). Fundamentals of physics (10th ed.). John Wiley & Sons.
3. Matthew N. O. Sadiku, "Principles of Electromagnetics", 4thedition, Oxford University Press, New Delhi, 2009.

Reference Books:

1. Pandey, B. K., & Chaturvedi, S. (2021). *Engineering Physics* (1st ed.). Cengage Learning.
2. Sharma, S., & Sharma, J. (2018). *Engineering Physics* (1st ed.). Pearson Education India.
3. Srinivasan, M. R. (2009). *Physics for Engineers* (1st ed.). New Age International.
4. Bhattacharya, D. K., & Poonam Tandon. (2015). *Engineering Physics* (1st ed.). Oxford press.

Web Resources: https://www.loc.gov/rr/scitech/selected-internet/physics.html