EC/CE/ChE/CS/ EE/IT/ME-102	ENGINEERING PHYSICS	L	T	P	C
		4	-	-	3

COURSE OBJECTIVES:

1. To impart knowledge and understanding of basic principles of Ultrasound and its applications in imaging and industry
2. To understand about basic phenomena of light waves.
3. To understand about fundamentals of Laser, its types and applications. 3-D photography , principle and applications of optical fiber..
4. To understand Essential formulation of physics in the micro world.
5. To understand development of Electromagnetic wave equations.

COURSE OUTCOMES:

After successful completion of the course, the students are able to

1. demonstrate Ultrasonic waves, production and applications in NDT.
2. discuss the interference in thin films and its application, diffraction and grating, birefringence and production and detection of different polarized lights.
3. analyze the characteristics of lasers, holography and optical fibers.
4. illustrate Schrodinger wave equation and its applications in 1-D with respect to the domain of quantum world.
5. analyze the nature of electromagnetic radiation and matter in terms of the particles with appropriate expressions.

UNIT I **(12)**

Ultrasonics : properties, production of ultrasonics by magnetostriction, piezo electric oscillator methods, detection by acoustic grating method, General applications of ultrasonics in industry and medicine.

NDT: Normal beam pulse echo testing, Ultrasonic scanner (A & B modes).

UNIT II **(12)**

Physical Optics : Interference: Introduction, Stoke's principle (change of phase on reflection), interference in thin films due to reflected light (Cosine law), theory of air wedge (fringes produced by a wedge shaped thin film), theory of Newton's rings(reflected system).

Diffraction: Introduction, Fraunhofer diffraction due to a single slit (quantitative), theory of plane transmission diffraction grating.

Polarization: Introduction, double refraction, construction and working of a nicol prism, quarter wave plate, production and detection of circular and elliptical polarizations(qualitative).

UNIT III **(12)**

Lasers : characteristics, spontaneous and stimulated emissions, Einstein coefficients and Relation between them, population inversion, pumping, active system, gas (He-Ne) laser, Nd: YAG laser and semiconductor (GaAs) laser, applications of lasers.

Holography: basic principle, recording, reproduction and applications.

Fiber optics: Principle & structure of an optical fiber, numerical aperture, acceptance angle and acceptance cone, fractional index change, types of optical fibers, fiber optics in communication system and its advantages. Applications of optical fibers.

UNIT IV **(12)**

Principles of Quantum Mechanics : de Broglie's concept of matter waves, Davisson and Germer experiment, Heisenberg's uncertainty principle-experimental verification (electron diffraction - single slit)

Schrodinger equation and application : Time independent Schrodinger's wave equation, physical significance of the wave function, particle in a box (one dimensional), tunneling effect, expression for transition probability (Qualitative treatment).

UNIT V **(12)**

Electromagnetism : induced electric fields, displacement current and conduction current, Maxwell's equation - qualitative (differential & integral forms) - significance, velocity of electromagnetic wave equation in free space, Poynting Theorem, LC oscillations (quantitative).

LEARNING RESOURCES:

TEXT BOOK(s):

1. M.N.Avadhanulu & P.G. Kshirasagar - Engineering Physics, S.Chand & Co.Ltd.
2. V. Rajendran - Engineering Physics

REFERENCE BOOK(s):

1. Resnick & Halliday - Fundamentals of Physics, John Wiley sons.
2. SL Kakani & Shubhra kakani - Engineering Physics, 3rd Edition, CBS Publications Pvt. Ltd. Delhi.
3. B. K. Pandey & S. Chaturvedi - Engineering Physics, Cengage Learning India Pvt. Ltd., Delhi.
4. Hitendra K. Malik & A.K.Singh - Engineering Physics, TMH, New Delhi.
5. P.K.Palanisamy - Engineering Physics, Scitech Publications.

WEB RESOURCES:

http://nptel.iitm.ac.in/courses/