PH10006 - PHYSICS											
Subject Code	Subject Nomenclature	Contact Hrs			Maximum Marks				Credits		
		L	T	P	CW	End	SW	End	T	P	Tot
PH10006	Physics	**3**	**1**	**2**	**30**	**70**	**20**	**30**	**4**	**1**	**5**

COURSE OBJECTIVES

CO #1 *To provide knowledge and understanding capacity of basic, applied and modern physics.*
CO #2 *To generate attitude and interest to solve problems at macro, micro to nanoscale level systems.*
CO #3 *To update the knowledge of physics tools, instruments, and techniques incorporating human values and safety measures.*
CO #4 *To identify, conduct, formulate and solve engineering problems with the basics and applied knowledge of Physics.*

COURSE OUTCOME

At the end of one-semester course, the students will be armed with -
CO #1 *the knowledge of multiphysics to understand and solve basic engineering problems.*
CO #2 *able to adopt logic and attitude towards engineering problems with modern physics implementation.*
CO #3 *the ability to use modern techniques and tools including software involving advanced physics to engineering subjects.*
CO #4 *to create engineering solutions for society incorporating human values and safety measures with the applied physics knowledge.*

COURSE CONTENTS

Unit-1. Electromagnetic Waves Propagation *: Introduction, wave packets, Phase and group velocity, wave equation, Gradient, scalar, divergence and curl; physical meaning, Gauss and Stoke's theorems, Maxwell's equations, em wave equations for plane waves in dielectric medium and free space, relation among E, B and k, Poynting theorem.*

Unit-2. Optics: *Principle of superposition. Conditions for sustained interference, Division of wavefront and amplitude, Newton's rings. Fresnel and Fraunhofer class of diffraction, diffraction at single slit, double and N (grating) slits. Rayleigh's criteria and resolving power.*

Unit-3. Quantum Theory : *Planck's radiation formula, Ultraviolet catastrophe, Compton's effect, de Broglie's concept of matter waves, Heisenberg's uncertainty relations, Schrodinger's wave equation, Physical interpretation of wave function, Particle in a one-dimensional potential well.*

Unit-4. Lasers: *Spontaneous and Stimulated emission, components of lasers, optical resonator, Einstein's A & B coefficients, Population inversion, Ruby and He-Ne lasers, applications.*

Unit-5. Fiber Optics : *Classification, acceptance angle, numerical aperture, V-number, attenuation, ray dispersion in fibers, fiber optics sensors, optical fiber communication system.*

Text Books

1. N. Subramanyam and B. Lal : A Text book of Optics, (S. Chand, New Delhi) 2010.
2. A. Beiser, S. Mahajan, S. R. Choudhary : Concepts of Modern Physics, 6th Edition,(SIE, Tata-McGraw-Hill, New Delhi) 2012.
3. A. Ghatak : Optics, 4th Edition, (Tata McGraw-Hill, New Delhi) 2009.

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Reference books

4. H. K. Malik and A. K. Singh : Engineering Physics (Tata McGraw Hill New Delhi) 2010.
5. R.P. Feynman, R.B. Leighton and M.Sands : Feynman Lectures on Physics Vol. 1 -3 (Addison-Wesley, Delhi 1995).
6. W.H. Hayt : Engineering Electromagnetic, 5th Ed. (Tata-McGraw Hill, New Delhi) 1995.
7. M.N.O. Sadiku : Elements of Electromagnetic, 3rd Ed. (Oxford Press, New Delhi) 2000.

LIST OF EXPERIMENTS

Expt #1. Error Analysis in Physics Laboratory.

Expt #2. To determine the wavelength of sodium light by Newton's rings method.

Expt #3. To study the variation of magnetic field along the axis of a circular coil carrying current and to calculate the radius of the coil.

Expt #4. To measure the numerical aperture of given optical fiber.

Expt #5. To measure Planck's constant using light emitting diodes (LED) of various colors and to understand work function.

Expt #6. To study working of laser using PhET Module.

Expt #7. To study the relationship between the length, tension and mass of a string and the frequencies of standing waves on a string using Melde's method.

Expt #8. To study the Dispersion by a triangular prism and to verify the laws of refraction using Raytrace

Expt #9. To understand and confirm Heisenberg's uncertainty principle using single slit diffraction.

Expt #10. To determine the wavelength of prominent spectral lines of mercury light by a plane transmission grating using normal incidence.

Expt #11. To measure the charge to mass ratio of an electron using Thomson method and to find the sign charge of electron.

Reference Manual:

Download Lab Manual from Shri G. S. Institute of Technology and Science, Indore - Syllabus (sgsits.ac.in) Consult the references given in each chapter of the manual for more information. Download Tutorial Sheets from http://dx.doi.org/10.13140/RG.2.2.28342.63044