Course Code:	24PH101	Course Title:	ENGINEERING PHYSICS
Credits:	4	L – T – P	3-0-2

COURSE OBJECTIVES

- To make the students effectively to achieve an understanding of Mechanics
- To enable the students to gain knowledge of Elasticity.
- To enable the students to gain knowledge of Maxwell's Equation and Electromagnetic waves.
- To introduce the basics of optics and lasers.
- Equipping the students to be successfully understand the importance of quantum physics.

UNIT- I MECHANICS	9

Multiparticle dynamics: Center of mass (CM) – Rotation of rigid bodies: Rotational kinematics – Rotational kinetic energy and moment of inertia - Theorems of M .I –M.I of Uniform rod-M.I of a diatomic molecule - Torque– Rotational energy state of a rigid diatomic molecule - Gyroscope – Torsional stress and deformation-Torsional pendulum- Double pendulum.

Practical Topics:

1. Torsional pendulum – Determination of rigidity modulus of wire and moment of inertia of disc.
2. Compound pendulum – Determination of rigidity modulus

UNIT- II ELASTICITY	9
Elasticity – Factors affecting Elasticity –Different types of Modulus- Moduli of elasticity and its relation -Stress - strain diagram and its applications - Bending of beams - Bending moment – Cantilever - Young's modulus : Uniform & Non-uniform bending-theory and experiment-I Shaped Girders.	
Practical Topics: 1. Determination of Young's modulus of a given material- Non uniform bending method 2. Uniform bending – Young's modulus determination.	

UNIT- III MAXWELL'S EQUATIONS AND ELECTROMAGNETIC WAVES	9
The Maxwell's equations - wave equation- Plane electromagnetic waves in vacuum - properties of electromagnetic waves - Producing electromagnetic waves - Energy and momentum in EM waves - Cell-phone reception. Reflection and transmission of electromagnetic waves from a non-conducting medium vacuum interface for normal incidence..	
Practical Topics: 1. Spectrometer – Determination of wavelength of Hg spectrum using grating. 2. Spectrometer – Angle of the prism 3. Spectrometer – Dispersive power of the prism	

UNIT- IV LASERS &FIBER OPTICS	9
Lasers:-Einstein coefficients and their relations –-characteristics of laser - Types of Laser - Nd-YAG laser -semiconductor laser- Applications -Industrial, Medical, laser based military weapons Fiber optics: principle and classification of optical fibers – propagation of light in optical fiber - Numerical aperture and Acceptance angle– Fiber optic communication system - Applications - Displacement and pressure sensors – Endoscopy	
Practical Topics: 1. Determination the acceptance angle and numerical aperture of the given optical fiber. 2. Determination of the particle size of the given powder using laser 3. Determination of wavelength of a given laser source - Grating method	

UNIT-V QUANTUM MECHANICS	9
Photons and light waves - Electrons and matter waves- Dual Nature of Light –-De Broglie Waves-Compton effect - The Schrodinger equation (Time dependent and time independent forms) - Physical Significance of wave function - Normalization –Free particle - particle in a infinite potential well: 1D,2D and 3D Boxes- Normalization-quantum computation.	
Practical Topics: 1, Young's Double Slit Experiment to demonstrate the wave nature of particles	

Laboratory component: (30 Hours)

Any ten experiments have to be completed from the following list ofExperiments

No	Name of the experiment
1.	Apply parallel axis theorem to find the resultant of system of concurrent coplanar forces.
2.	Torsional pendulum – Determination of rigidity modulus of wire and moment of inertia of disc
3.	Compound pendulum- Determination of moment of inertia of a rigid rod.
4.	Apply the concept of bending of beams to find the Young's modulus of a given material- by Non uniform bending method
5.	Apply the concept of bending of beams to find the Young's modulus of a given material- by Uniform bending method.
6.	Determination of V-I characteristics of a solar cell.
7.	Using Ohm's law verify the laws of resistances .
8.	Using optical fiber find the acceptance angle and numerical aperture.
9.	Make use of the laser source find the particle size of the given powder.
10.	Determination of wavelength of a given laser source - Grating method
11.	Spectrometer – Determination of wavelength of Hg spectrum using grating
12.	Spectrometer – Dispersive power of the prism
13.	Determination of magnetic Induction due to long current carrying conductor.
14.	Make use of the Young's Double Slit Experiment, demonstrate the wave nature of particles.
15.	Spectrometer – Angle of the prism

Course outcomes: On completion of the course, the student will have the ability to:

CO No	Corse Outcomes	Level
CO1	Apply the concepts of Mechanics in materials.	K3
CO2	Apply the concept of elasticity in beams.	K3
CO3	Apply the concept of electromagnetic waves in communication.	K3
CO4	Illustrate the applications of different lasers &Calculate the acceptance angle and numerical aperture of an optical fiber .	K2
CO5	Explain the quantum concepts and quantum computation.	K2

TEXT BOOKS:

1.D.Kleppner and R.Kolenkow. An Introduction to Mechanics. McGraw Hill Education (Indian Edition), 2017.

2E.M.Purcell and D.J.Morin, Electricity and Magnetism, Cambridge Univ.Press, 2013.

3.Bhattacharya, D.K. & Poonam, T. "Engineering Physics". Oxford University Press, 2015

REFERENCES:

1. R.Wolfson. Essential University Physics. Volume 1 & 2. Pearson Education (Indian Edition),2009.

2. Paul A. Tipler, Physic – Volume 1 & 2, CBS, (Indian Edition), 2004.

3. K.Thyagarajan and A.Ghatak. Lasers: Fundamentals and Applications, LaxmiPublications,(Indian Edition), 2019.

4. D.Halliday, R.Resnick and J.Walker. Principles of Physics, Wiley (Indian Edition), 2015.