K.S. SCHOOL OF ENGINEERING AND MANAGEMENT, BANGALORE - 560109

DEPARTMENT OF SCIENCE AND HUMANITIES

CO-PO Mapping

Course: Engineering Physics			
Type: Fundamental		**Course Code: 18PHY12**	
No of Hours			
Theory (Lecture Class)	Practical/Field Work/Allied Activities	Total hours/Week	Total teaching hours
4	0	4	50
Marks			
Internal Assessment	Examination	Total	Credits
40	60	100	4

Aim/Objectives of the Course

1. Engineering Physics is one of a basic subject for all engineering course. In this course, principles of Physics are taught to build strong foundation of knowledge required for engineering courses.
2. Learning the basic concepts in Physics which are very much essential in understanding and solving engineering related challenges.
3. Gaining the knowledge of newer concepts in modern physics for the better appreciation of modern technology.

Course Learning Outcomes

After completing the course, the students will be able to

CO1	**Utilizing** the knowledge of simple harmonic motion, derive the expressions for various types of oscillations and to understand the role of shock waves in various fields.	**Applying (K3)**
CO2	**Apply** the knowledge of basic quantum mechanics, to set up one-dimensional Schrodinger's wave equation and to study the construction and working of different types of laser and its application in different fields.	**Applying (K3)**
CO3	**Determine** the various electrical and thermal properties of materials like conductors, semiconductors and dielectrics using different theoretical models.	**Applying (K3)**
CO4	**Identify** the elastic properties of materials for engineering applications.	**Applying (K3)**
CO5	**Understand** the interrelation between time varying electric field and magnetic field, the transverse nature of EM waves and **applying** the concepts of EM waves in optical fibers.	**Applying (K3)**

Syllabus Content

Module 1: Oscillations and Waves **Free Oscillations:** Definition of SHM, derivation of equation for SHM, Mechanical and electrical simple harmonic oscillators (mass suspended to spring oscillator), complex notation and phasor representation of simple harmonic motion. Equation of motion for free oscillations, Natural frequency of oscillations. **Damped and forced oscillations:** Theory of damped oscillations: over damping, critical & under damping, quality factor. Theory of forced oscillations and resonance, Sharpness of resonance. One example for mechanical resonance. **Shock waves:** Mach number, Properties of Shock waves, control volume. Laws of conservation of mass, energy and momentum. Construction and working of Reddy shock tube, applications of shock waves.	**CO1** 10 hrs PO1-3 PO2-3 PO6-2 PO7-2 PO12 -1 PSO1-3 PSO2-1

Module 4: Elastic properties of materials **Elasticity:** Concept of elasticity, plasticity, stress, strain, tensile stress, shear stress, compressive stress, strain hardening and strain softening, failure (fracture/fatigue), Hooke's law, different elastic moduli: Poisson's ratio, Expression for Young's modulus (Y), Bulk modulus (K) and Rigidity modulus (n) in terms of α and β. Relation between Y, n and K, Limits of Poisson's ratio. **Bending of beams:** Neutral surface and neutral plane, Derivation of expression for bending moment. Bending moment of a beam with circular and rectangular cross section. Single cantilever, derivation of expression for young's modulus **Torsion of cylinder:** Expression for couple per unit twist of a solid cylinder (Derivation), Torsional pendulum-Expression for period of oscillation. Numerical problems **LO:** At the end of this module, the students will be able to 1. Explain the terminologies related to elasticity. 2. Define bending of beams, single cantilever and torsion of a cylinder. 3. Derive the expressions for bending moment, Young's modulus of single cantilever and couple for unit twist for a solid cylinder.	**CO4** 10hrs PO1-3 PO2-3 PO6-3 PO7-1 PO12-1 PSO1-3 PSO2-2
Module 5: Maxwell's equations, EM waves and Optical fibers **Maxwell's equations:** Fundamentals of vector calculus. Divergence and curl of electric field and magnetic field (static), Gauss' divergence theorem and Stokes' theorem. Description of laws of electrostatics, magnetism and Faraday's laws of EMI. Current density & equation of Continuity; displacement current (with derivation) Maxwell's equations in vacuum **EM Waves:** The wave equation in differential form in free space (Derivation of the equation using Maxwell's equations), Plane electromagnetic waves in vacuum, their transverse nature, polarization of EM waves(Qualitative) **Optical fibers:** Propagation mechanism, angle of acceptance. Numerical aperture. Modes of propagation and Types of optical fibers. Attenuation: Causes of attenuation and Mention of expression for attenuation coefficient. Discussion of block diagram of point to point communication. Merits and demerits Numerical problems **LO:** At the end of this module, the students will be able to 1. State Gauss' divergence theorem, Stokes' theorem and Faraday's laws of electromagnetic induction and transverse nature of EM waves. 2. Derive the wave equation in terms of E using Maxwell's equations. 3. Explain the mechanism of optical fiber and attenuation.	**CO5** 10hrs PO1-3 PO2-3 PO6-2 PO7-2 PO10-1 PO12-1 PSO1-3 PSO2-2

Text Books

1. M N Avadhanulu and P G Kshirsagar, "**A textbook of Engineering Physics**", 10th revised Ed, S Chand & Company Ltd, New Delhi
2. Gaur and Gupta, "**Engineering Physics**", 2017, Dhanpat Rai Publications
3. Arthur Beiser, "**Concepts of Modern Physics**", 6th Ed, 2006, Tata McGraw Hill Edu Pvt Ltd, New Delhi

Reference Books (specify minimum two foreign authors text books)

1. MK Verma, "**Introduction to Mechanics**", 2nd Ed, 2009, University Press(India) Pvt. Ltd.,

CO to PO Mapping

PO1: Science and engineering Knowledge **PO2:** Problem Analysis **PO3:** Design & Development **PO4:**Investigations of Complex Problems **PO5:** Modern Tool Usage **PO6:** Engineer & Society	**PO7:**Environment and Society **PO8:**Ethics **PO9:**Individual & Team Work **PO10:** Communication **PO11:**Project Mgmt. & Finance **PO12:**Lifelong Learning

PSO1: Ability to understand the basic principles, laws, theories and problem solving skills of Engineering Physics and their application in engineering and technology.

PSO2: Ability to apply the concepts of physics to design a process to address the real world challenges.

CO	PO	PO1	PO2	PO3	PO 4	PO5	PO6	PO 7	PO8	PO9	PO10	PO1 1	PO12	PS O1	PS O 2
18PH Y12	K-level														
CO1	K3	3	3	-	-	-	2	2	-	-	-	-	1	3	1
CO2	K3	3	3	-	-	-	3	1	-	-	-	-	1	3	2
CO3	K3	3	3	-	-	-	2	1	-	-	-	-	1	3	1
CO4	K3	3	3	-	-	-	3	1	-	-	-	-	1	3	2
CO5	K3	3	3	-	-	-	2	2	-	-	1	-	1	3	2

Course In charge

Head - Dept

Principal