Foundation of Physics

S.Y. B.Tech. (Direct SY)

Course code: PH16001 (FOP)

Teaching Plan

Teaching Scheme
Lectures : 3hrs/week

Examination Scheme
Mid Sem: 30, Quiz: 20 marks
End-Sem Exam- 50 marks

Unit	Lecture	Topic to be covered
1 Oscillations, Waves & Light [7 Hrs]	**1**	• SHM • characteristics of SHM
	2	• Waves • Travelling waves and wave equation
	3	• Types of waves • Principle of Superposition • Stationary waves
	4	• Light as an EM Wave • Graphical representation of EM wave
	5	• Interference of light due to thin film (uniform thickness),
	6	• Antireflection coating • Total Internal reflection
	7	• Introduction to Optical fiber and its design
2 Atomic Nucleus and Nuclear energy [6 Hrs]	**1**	• Atomic Nucleus • Nuclear force
	2	• Static properties of nucleus • Mass defect and Binding energy
	3	• Law of radioactive decay • Half-life • Applications of radioactivity
	4	• Nuclear reactions • Q-value of nuclear reaction
	5	• Nuclear fission • Chain reaction
	6	• Nuclear energy
3	**1**	• Introduction: electrostatics

Electrostatics		• Coulomb's law in vector form • Concept of the electric field E • problem discussion of E
	2	• Types of Continuous charge distribution (Line λ,Surface σ Volume ρ) & their SI And CGS units with diagrams • problems involving charge densities
	3	• Concept of field lines • Electric flux with diagrammatic presentation • Introduction to Gauss's law • Proof of Gauss's law • Integral form of Gauss's law
	4	• Applications of Gauss's Law to simple 2 D-3D problems involving spherical polar coordinates and cylindrical coordinates $(r, \theta, \emptyset)$ and $(\rho, \emptyset, z)$
	5	• Discussion on Faraday's Law • Integral form of Faraday's law • proof of line integral of E equal to zero for cyclic path • concept of electric potential(V)
	6	• Electric potential due to point charge • Potential(V) due to continuous charge distribution • problem regarding potential (V)
4 **Magneto statics**	**1**	• Introduction about Steady currents (line current, surface current, volume current) • current densities • SI, CGS units of current densities
	2	• Biot-Savert's law • Magnetic field due to steady currents • problems based on Biot-Savart law circular symmetry
	3	• Line integral of B over a closed loop • Numericals
	4	• Proof of closed surface integral of magnetic field B • (Non-existence of magnetic monopole) • physical significance of $\nabla.B = 0$ • Numericals
	5	• Curl of B • Ampere's law • Examples
5. **Elements of Thermodynamics [5Hrs]**	**1**	• Concept of Temperature • Terminology in Thermodynamics • Thermodynamic work
	2	• Caparison for Heat and Work • First Law and its applications • Numericals

	3	• Heat engine and Thermal efficiency • Numericals
	4	• Second law • Entropy • Disorder of system
	5	• Third law and Principle of Unattainability Absolute Zero (Nernst's Theorem) • Numericals
6. Modern physics [7 Hrs]	**1**	• Drawbacks of Classical Mechanics • Plank's quantum hypothesis • Dual nature of matter
	2	• De-Broglie's hypothesis • Properties of Matter waves • Numericals
	3	• Light as a particle (Compton's experiment) • Numericals
	4	• Heisenberg's uncertainty principle (position and momentum) • Numericals
	5	• Wave function • Properties of wave function,
	6	• Normalization conditions • physical significance of wave function • probability density • Numericals
	7	• Free particle solution of wave function.

References:

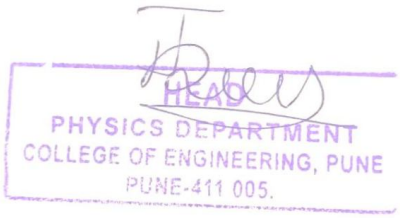
1. Engineering Physics, Avadhanulu and Kshirsagar.
2. Halliday-Resnick (Sixth edition) "Optics", Brij Lal (S. Chand publication)
3. Classical Electrodynamics, David Griffith (Pearson India limited)
4. H .C. Verma & Halliday-Resnick (Sixth edition), B. B. Laud
5. Modern Physics, S. Chand Publication.

6. Concepts of Modern Physics, Arthur Beiser, Tata McGraw – Hill Edition.

Course Outcome:

Students will be able to

- Understand classical and wave mechanics to implement for the problems.
- Understand of the laws of thermodynamics to implement in various thermodynamic systems and processes.
- Understand the basic principles of Electromagnetism and formulate it to solve the engineering problems.
- Aware of limits of classical physics and will be able to use it in the appropriate field in order to solve the problems.



Head

Physics Department