

**College of Engineering Pune**  
**Department of physics**  
**Course Title: Foundation of Physics (AS-205/PH-16001)**

Teaching Scheme :  
Lectures:3 hrs /week

Examination scheme:  
Test 1 & 2: 20 marks each  
End Sem exam: 60 Marks

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**Unit 1 Thermodynamics (6)**

- i) Heat as a form of energy , mechanical equivalent of heat, thermodynamic systems,
- ii) Zeroth law and concept of temperature, first law & its mathematical statement,
- iii) Second law and concept of entropy, third law of thermodynamics,
- v) Concept of free energy; Gibbs and Helmholtz free energy.

**Unit 2 Waves motion & Optics (6)**

- i) Logitudinal and transeverse waves, Light as an EM wave and it's graphical representation,
- ii) General equation of traveling wave,
- iii) Superposition principle, formation of stationary waves (with derivation),
- iv) Huygen's Principle, Young's double slit experiment,
- v) Interference of light due t`o thin film of uniform thickness and conditions for darkness and brightness,
- vi) Diffraction due to a single slit; conditions of maxima and minima.

**Unit 3 General Mechanics (6)**

- i) Kinetic energy and potential energy,
- ii) Work done (single particle system only); work energy theorem,
- iii) Conservative and non conservative forces, concept of central force, properties of central force,
- iv) Laws of planetary motion (with mathematical statement).

**Unit 4 Introduction to Quantum Mechanics (6)**

- i) Drawbacks of classical mechanics, Plank's quantum hypothesis, Dual nature of matter,
- ii) De Broglie's hypothesis, de Broglie's wavelength,

- iii) Photoelectric effect, Davisson-Germer's experiment,
- iv) Heisenberg's uncertainty principle
- v) Illustrations of Heisenberg's uncertainty principle; electron diffraction at a single slit

### **Unit 5 Electrostatics (6)**

- i) Coulomb's law in integral form, the electric field intensity ,
- ii) Continuous charge distribution (Line, Surface & Volume),
- iii) Introduction to Gauss's law, integral form of Gauss's law,
- iv) Applications of Gauss's Law to simple 2D-3D problems ,
- v) Line integral of electric field, concept of electric potential (V),
- vi) Potential (V) due to continuous charge distribution.

### **Unit 6 Magnetostatics (6)**

- i) Steady currents ( line current ,surface current,volume current) & current densities,
- ii) Magnetic field due to steady currents (Biot-Savart's law) and its applications,
- iii) Line integral of B over a closed loop,
- iv) Ampere's Law and its applications to simple problems,
- v) Closed surface integral of B (Non-existence of magnetic monopole).

### **References:**

Unit 1: Classical Mechanics by P.V. Panat, H.C.Verma, Halliday -Resnick( Sixth edition )  
Unit 2: Halliday-Resnick (Sixth edition ) "Optics" by Brij Lal ( S. Chand publication )  
Unit 3 &4: Classical Electrodynamics by David Griffith(Pearson India limited)  
Unit 5 H .C. Verma &Halliday-Resnick (Sixth edition ) ,B.B.Laud  
Unit 6 Halliday-Resnick (Sixth edition

### **Course Outcomes**

#### **Student should be able to:**

- To solve the classical and wave mechanics problems
- To develop the understanding of laws of thermodynamics and their application in various processes
- To formulate and solve the engineering problems on Electromagnetism

- To aware of limits of classical physics & to apply the ideas in solving the problems in their parent streams