Roll No. ....

PAPER ID −10112

B.Sc. EXAMINATION, 2024

(Second Semester)

PHYSICS

Code : PHY 201 Paper I

Properties of Matters, Kinetic Theory And Relativity

Time : 3 Hours

Maximum Marks : 45

Before answering the question-paper candidates should ensure that they have been supplied to correct and complete question-paper. No complaint, in this regard, will be entertained after the examination.

Note : Attempt *Five* questions in all, selecting at least *one* question from each Unit. All questions carry equal marks.

Unit I

1. (a) Define Poisson's ratio. Derive relation $\sigma = \dfrac{3K - 2\eta}{6K - 2\eta}$, where K is bulk modulus, σ is Poisson's ratio and η is modulus of Rigidity. 5

   (b) Prove that hollow shaft is much stronger than solid shaft of same length mass and material. 4

2. (a) Define Elasticity. Derive an expression for work done per unit volume in elongation strain. 7

   (b) A wire 0.5 m long and 1 mm² in cross-section has Young's Modulus 1.24×10^{11} Nm⁻². How much work is done in stretching it through 1mm ? 2

3. Define Cantilever. Derive an expression for depression in cantilever loaded at the free end, considering cantilever has negligible weight. 9

Unit II

4. Discuss transport phenomenon in gases. Deduce an expression for coefficient of viscosity on the basis of kinetic theory of gases. **9**

5. (a) Derive an expression for mean free path in terms of absolute temperature and pressure of the gas. **7**

   (b) The diameter of the molecule of a gas is 4×10^{-10} m. Calculate the mean free path. **2**

Unit III

6. (a) Describe Michelson Morley's Experiment. What inferences can we draw from the results obtained from this experiment ? **7**

   (b) Discuss the postulates of special theory of relativity. **2**

7. (a) Derive an expression for variation of mass with velocity. Show that no material body can move with a velocity greater than that of light in vacuum. **7**

   (b) If the total energy of a particle is exactly twice its rest energy, calculate the velocity of the particle. **2**

8. What are Galilean transformations ? Show that under Galilean transformations, velocity is variant while acceleration is invariant. **9**