21213

2 Hours / 50 Marks   Seat No.

Instructions : (1) All Questions are *compulsory*.

(2) Attempt **All** Questions including Question No. 1 which is *compulsory*.

(3) Answer each next main Question on a new page.

(4) Illustrate your answers with neat sketches wherever necessary.

(5) Figures to the right indicate full marks.

(6) Assume suitable data, if necessary.

(7) Use of Non-Programmable Electronic Pocket Calculator is permissible.

(8) Mobile Phone, Pager and any other Electronic Communication devices are not permissible in Examination Hall.

Marks

1. **Attempt any NINE of the following :** $2 \times 9 = 18$

   (a) State Elasticity and Plasticity property.

   (b) Give relation between Bulk modulus of elasticity and Compressibility.

   (c) What is atmospheric pressure ? State SI unit of pressure.

   (d) A rain drop with radius 0.2 mm, is falling through air with terminal velocity V. Calculate V if coefficient of viscosity of air is 1.8×10^{-4} NS/m^2 and viscous force is 0.14 dyne.

   (e) Define surface tension. Write down its SI unit.

   (f) What is Kelvin-scale of temperature ? State absolute zero.

   (g) Define the two principal specific heats of gas.

   (h) Define Isothermal change and Adiabatic change.

   (i) Define Phase angle and Epoch in S.H.M.

   (j) State one example each of Longitudinal wave and Transverse wave.

   (k) State how stationary wave is formed.

   (l) Give condition for 'Resonance-effect' in sound.

2. **Attempt any FOUR of the following :** 4 × 4 = 16

   (a) Define :
       (i) Yield point
       (ii) Ultimate stress
       (iii) Breaking stress
       (iv) Factor of safety in Elasticity.

   (b) Calculate Young's modulus of elasticity for a wire having length 100 cm and diameter 5 mm. The wire elongates by 2 mm when subjected to a load of 10 N.

   (c) State significance of Reynold's number in viscosity.

   (d) State (i) Pascal's Law and
              (ii) Archimedes Principle.

   (e) (i) Give two examples of capillarity phenomenon.
       (ii) State the effect of temperature and contamination on surface tension of a liquid.

   (f) A window pane with glass material has a dimension 100 cm × 50 cm × 5 mm. Amount of heat conducted in one hour is Q. Calculate Q if the temperature difference is 5 °C between outside and inside.

       (K for glass = 1 W/m/°K.)

3. **Attempt any FOUR of the following :** 4 × 4 = 16

   (a) Distinguish conduction, convection and radiation process.

   (b) State Boyle's Law, Charle's Law and Gay Lussac's Law. Write general gas equation.

   (c) For a step index optical fiber fractional change of refractive index is 0.0005. If core refractive index is 1.5, calculate the numerical aperture of the optical fiber.

   (d) Draw a neat labelled ray diagram for refraction in case of prism. State the Prism formula.

   (e) Define Progressive wave. State types of Progressive wave. Define the types.

   (f) In resonance experiment the resonance occur for fundamental mode with frequency of tuning fork 512 Hz. If the length of air column is 15.5 cm., calculate the velocity of sound neglecting the end correction.