17102

11718

2 Hours / 50 Marks Seat No. | | | | | | | | |

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

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

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

(4) Figures to the right indicate full marks.

(5) Assume suitable data, if necessary.

(6) Use of Non-programmable Electronic Pocket Calculator is permissible.

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

Marks

1. Attempt any NINE of the following : **18**

(a) Why in gases, Cp is greater than Cv ?

(b) State the pressure depth relation. Give the meaning of all symbols in it.

(c) Define time period of a wave. State the values of time period of minute hand and hour hand of a clock.

(d) Define the terms-Molecular range & Sphere of influence.

(e) Convert 55 °C to °F.

(f) State and explain Hooke's law of elasticity.

(g) The refractive index of the material of glass prism is 1.51. Calculate the angle of refraction if the angle of incidence is 45°.

(h) State any two characteristics of stationary wave.

(i) Calculate the viscous force acting on a raindrop of diameter 0.5 mm travelling with constant velocity of 6 m/sec through air if the coefficient of viscosity of air is 1.8×10^{-5} N–sec/m^2.

(j) State any two applications of radiation.

(k) Define bulk modulus of elasticity, Poisson's ratio.

(l) Derive the relation $v = n\lambda$ for wave motion where all symbols have usual meanings.

2. Attempt any FOUR of the following : **16**

(a) Derive the expression for velocity of sound in air by resonance tube experiment.

(b) Determine the force required to stretch a steel wire to 1.5 times its original length if the area of cross section is 1.2 cm^2 & Young's modulus for steel is 2×10^{11} N/m^2.

(c) (i) Define velocity gradient. Also state its MKS & CGS unit.

(ii) Distinguish between streamline flow and turbulent flow. (any two points)

(d) A glass sheet of area 1m^2 & thickness 2.5 mm has its opposite faces at 25 °C & 12 °C respectively. If the coefficient of thermal conductivity for glass is 0.2 cal/m °C-sec, calculate the quantity of heat conducted in one & a half hour.

(e) (i) Define acceptance angle & numerical aperture with reference to optical fibre.

(ii) State any two applications of optical fibre.

(f) (i) State & explain Boyle's law for gases.

(ii) Distinguish between isothermal process and adiabatic process. (any two points)

3. Attempt any FOUR of the following : **16**

(a) A body performs S.H.M. such that its velocity at the mean position is 2 m/sec & the acceleration at one of the extremities is 3.14 m/sec^2. Calculate the time period & hence the frequency of vibration.

(b) Define the terms-free vibrations & forced vibrations. Give one example each.

(c) Explain the behaviour of the wire under continuously increasing load.

(d) A liquid of density 1050 kg/m^3 & surface tension 35×10^{-3} N/m rises to a height of 0.15 cm in a capillary tube of diameter 1.4 mm. Determine the angle of contact for the liquid.

(e) State & explain Newton's law of viscosity & hence define coefficient of viscosity.

(f) Calculate the temperature in degree celcius required to change 12 litres of helium at 150 °K & 0.6 atmosphere to 36 litres at 1.2 atmosphere.
