17102

21314

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

Instructions – (1) All Questions are *Compulsory.*

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

(3) Figures to the right indicate full marks.

(4) Assume suitable data, if necessary.

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

(6) 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) State elastic body and plastic body.

b) A material wire elongates by 1% of it's original length when loaded. Calculate tensile strain for the wire.

c) A water tank of 10 m height is filled half. Calculate pressure at the bottom.
(Take: Density of water = 10^3 kg/m^3, g = 10 m/s^2)

d) State unit of velocity gradient in viscosity.

e) What is absolute scale of temperature?

f) Give one example each of convection and radiation process in nature.

g) Draw a neat labelled ray diagram showing TIR phenomenon of a light.

Marks

h) A light ray enters water medium making an angle of 60° with the water surface. If it suffers deviation of 15° in water. Calculate refractive index of water.

i) Define longitudinal wave. Give one example.

j) Wavelength of light emitted by a source is 5800 AU. Find the frequency if 'C' velocity of light is 3×10^8 m/s.

k) Write formula for critical velocity for a flow of fluid through a pipe.

l) State use of bad conductor in heat transfer.

2. Attempt any <u>FOUR</u> of the following: **16**

a) Define three modulii of elasticity. Y, K and η.

b) Calculate Young's modulus of elasticity for material wire 2 m long, 0.4 mm diameter, if weight applied is 100N which elongates the wire by 0.001 mm.

c) State Newton's Law of viscosity. Define 1 poise. State SI unit for coefficient of viscosity.

d) A capillary tube with diameter 2 mm when dipped in an organic liquid, the liquid rises to 2 cm in it. Calculate height of rise when a capillary tube of diameter 1.5 mm is dipped in same liquid.

e) Define Isothermal process and adiabatic process. Give their examples in engineering.

f) Define:

i) Amplitude (a)

ii) Path length Wavelength (λ)

iii) Phase angle and

iv) Epoch in S.H.M.

Marks

3. Attempt any <u>FOUR</u> of the following: **16**

a) Why the free liquid assume spherical shape in nature? Explain using molecular theory of surface tension.

b) State Boyle's law, Charle's law and Gay Lussac's law. What is an Ideal gas?

c) Difference between specific heats for a gas is 4000 kcal/kg/°k. Calculate the two specific heats if the ratio of principal specific heats is 1.41.

d) Derive prism formula.

e) Define free oscillations and forced oscillations. Hence state resonance effect giving examples.

f) $Y = 10 \sin \left(2\pi t + \pi/6\right)$ SI unit is equation of displacement for particle performing S.H.M. State amplitude, phase angle epoch and period of S.H.M. particle.