Total number of printed pages: 3

D/1st/DPH101

2021

APPLIED PHYSICS-I

Full Marks: 100

Time: Three hours

The figures in the margin indicate full marks for the questions.

Answer any five questions.

1. a) Fill up the Blanks 1 x 5=5

(i) The C.G.S unit of stress is _____.

(ii) The ratio of stress to strain within the elastic limit is_____.

(iii) The ratio of lateral strain to the longitudinal strain is called_____.

(iv) The reciprocal of bulk modulus is called_____.

(v) If Young's modulus of A is larger than that of B, then A is _____elastic compared to B.

b) (i) Define Hooke's law. What is meant by elastic limit? 2x3 = 6

(ii) Define Poisson's ratio. What is its unit?

(iii) Which is more elastic: steel or rubber? Justify.

c) Define Young's modulus, Bulk modulus and Shear modulus with their mathematical expressions. 6

d) What force is required to stretch a steel wire to double its length when its area of cross section is 1 cm^2 and Young's' modulus is 2×10^{12} dyn cm^{-2}? 3

2. a) Fill up the blanks 1 x 5=5

(i) The unit of co-efficient of thermal expansion is_____.

(ii) 1 B.T.U = _____Calorie

(iii) Heat_____ = Heat gain

(iv) Latent heat of vaporization of water is_____calorie/gm.

(v) The mode of transmission of heat from Sun to Earth is_____.

b) (i) Define co-efficient of linear expansion and co-efficient of cubical expansion. 2x5 = 10

(ii) How does density of a substance vary with rise in temperature?

(iii) Define Heat Capacity and Water Equivalent.

(iv) What do you mean by the statement, "Specific latent heat of fusion of ice is 80cal/gm"?

(v) What is thermopile and on which principle does its working based?

c) (i) A piece of copper wire has length of 200cm at 0°C. Find its length at 100°C. Given that $\alpha = 17 \times 10^{-6} C^{-1}$. 2.5 x 2 = 5

(ii) A piece of lead 500g gives out 1200 calories of heat when it is cooled from 90°C to 10°C. Find its specific heat, thermal capacity and water equivalent

3. a) (i) Sound is _____wave. 1x5 = 5

(ii) The higher is the pitch of sound, the frequency will be_____.

(iii) The loudness or softness of sound depends on

its_____.

(iv) The sound wave having frequency less than 20Hz are called_____.

(v) SONAR is a device used for_____.

b) (i) How does Sound propagate through air? 2x5 =10

(ii) Define Transverse and Longitudinal waves.

(iii) Define ultrasonic and infrasonic.

(iv) What is reverberation?

(v) What is Doppler effect?

c) What is the Newton's formula for velocity of sound? What is Laplace's correction of the formula of the velocity of sound? 5

4. a) What is fundamental and derived units? Write a note with examples. 5

b) Write a short note on MKS, SI unit systems. 5

c) Derive the dimensional formula of work, power, energy, pressure and momentum 5

d) Write a note on scalar and vector quantities with examples. 5

5. a) What is triangle law for addition of vector? 5

b) What is scalar and vector product? 5

c) Write down Newton's 1st, 2nd and 3rd laws of motion. 10

6. a) Write down the definition of angular velocity and angular acceleration. 5

b) What is the banking of the road? Derive the formula for determining the angle of banking of the road. 10

c) What is centre of mass and centre of gravity of a body. 5