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END SEMESTER EXAMINATION – 2019

Semester : 1st (Old)

Subject Code : Sc-104

APPLIED PHYSICS - I

Full Marks –70

Time – Three hours

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

PART – A

Marks – 25

Answer *all* the questions

1. Fill in the blanks : 1×10=10

   (a) Momentum is a _____ quantity.

   (b) The dimension of power is _____.

   (c) Newton's 2nd law of motion gives the _____ of force.

   (d) Gravity is the special case of _____.

   (e) The product of mass and the velocity of a body is called its _____.

[Turn over

(f) The latent heat of fusion of ice is _____.

(g) Echo is due to the _____ of sound.

(h) Water equivalent is measured in _____.

(i) Sound moves faster in _____ air than dry air.

(j) Thermal capacity is the product of mass and _____ of the substance.

2. Write whether the following statements are true or false : 10×1=10

(a) Weight is the measure of force of gravity on a body.

(b) Displacement is a scalar quantity.

(c) The principle of hydraulic press depends on Pascal's law.

(d) Evaporation is a process of change of state from liquid to gas at all temperature.

(e) Sound is pressure matter wave.

(f) Thermometer is a device to measure the heat of a body.

(g) Horse-Power (H.P) is the practical unit of power.

(h) Steel is more elastic than rubber.

(i) The melting point of ice decreases with the decrease of pressure.

(j) Weight of a body at the centre of the earth is zero.

3. Choose the correct answer from the following : 1×5=5

(a) Which of the following is not a fundamental unit ?

(i) Ampere (ii) Hertz

(iii) Meter (iv) Second

(b) Water is used in hot water bags because

(i) it has the lowest specific heat

(ii) it has the highest specific heat

(iii) it is not related to specific heat

(iv) None of the above

(c) Time period of a simple pendulum varies

(i) directly as its length

(ii) inversely as its length

(iii) directly as the square root of its length

(iv) inversely as the square root of its length

(d) Velocity of sound in a medium depends on

(i) wind flowing

(ii) density of the medium

(iii) temperature of the medium

(iv) All of the above

(e) A gap is left between two rails to allow

(i) surface expansion

(ii) linear expansion

(iii) None of the above

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PART – B

Marks – 45

Answer any *five* questions.

4. (a) Distinguish between a scalar quantity and a vector quantity. Is displacement a vector quantity ? 2+1=3

(b) State Newton's second law of motion. Deduce a relation between force and acceleration it produced. 1+3=4

(c) Define angular velocity. Write down the relation between linear velocity and angular velocity. 1+1=2

5. (a) Define co-efficient of linear expansion and co-efficient of volume expansion of solid and hence establish a relation between them. 2+2=4

(b) What are the different modes of transmission of heat ? Define them in brief. 1+2=3

(c) State Newton's laws of Gravitation. Explain why G is called universal gravitational constant ? 1+1=2

6. (a) Define- specific heat, thermal capacity and water equivalent. Mention their SI units. 4

(b) A hot ball of iron (sp heat = 0.08) weighting 200gm is dropped into 500gm of water at 10°C. The resulting temperature is 22.8°C. Calculate the temperature of the hot ball. 3

(c) Distinguish between evaporation and boiling. 2

7. (a) Define : stress, strain and Hook's law of elasticity. 3

(b) Calculate the force required to double the length of a wire of diameter 2mm. Given, Young's modulus of elasticity, $Y = 12 \times 10^{11}$ Nm^{-2} mm. 2

(c) State the characteristics of simple harmonic motion. 4

8. (a) Deduce an expression of pressure at any point inside any liquid. 3

(b) State Pascal's law of transmission of pressure through liquid. Explain the principle of multiplication of force. 1+2=3

(c) A force of 50kgf is applied to a smaller piston of a hydraulic machine. Neglecting friction, find the force exerted on the large piston, the diameters of the pistons being 2 cm and 10 cm. 3

9. (a) Define work, power and energy mentioning the SI unit of each of them. 3

(b) Show that $K.E = \frac{1}{2}mv^2$ where 'm' and 'v' represents mass and initial velocity of the body. 3

(c) State Joule's law of heat and hence define mechanical equivalent of heat. 3

10. (a) State Newton's formula for velocity of sound in air and explain how Laplace corrected this formula. 1+3=4

(b) Define : wave velocity, frequency and wave-length of a wave and establish a relation between them. 3

(c) A note of sound of wavelength 160 meter is moving in air with velocity 320 m/sec. Determine the frequency of the note. 2

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