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**END SEMESTER EXAMINATION – 2021**

Semester : 1st (New)

Subject Code : Sc-104

**APPLIED PHYSICS – I**

Full Marks : 70

Time – Three hours

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

**Instruction :**

All questions of PART-A and PART-B are compulsory.

**PART – A**

Marks – 25

1. Fill in the blanks : 1×10=10
- (a) Dimensional formula for force is \_\_\_\_\_.
- (b) Impulse is the product of force and \_\_\_\_\_.
- (c) The value of  $g$  \_\_\_\_\_ with increasing height from the earth's surface.

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- (d) The SI unit of Young's modulus is \_\_\_\_\_.
- (e) The change in pressure while going from the surface to a depth  $h$  in a pond is \_\_\_\_\_.
- (f) As we go upwards from the earth's surface, atmospheric pressure \_\_\_\_\_.
- (g) From  $0^{\circ}\text{C}$  to  $4^{\circ}\text{C}$  volume of water \_\_\_\_\_.
- (h) The frequency range of audible sound is \_\_\_\_\_.
- (i) \_\_\_\_\_ is the process of change of state from solid to liquid.
- (j) During the transmission of heat by the \_\_\_\_\_ mode no medium is required.
2. Write whether true or false :  $1 \times 10 = 10$
- (a) Action and reaction forces act on two different bodies.
- (b) Plane angle is a dimensionless quantity.
- (c) Evaporation takes place at any temperature.
- (d) Latent heat of fusion of ice is  $90 \text{ kcal/g}$ .
- (e) Doppler effect is observed due to relative motion between source and observer.

- (f) As pressure increases melting point increases.
- (g) Temperature is a form of energy.
- (h) Barometer is used to measure temperature.
- (i) Mass is a derived quantity.
- (j) SI unit of strain is meter.

3. Choose the correct answer :

$1 \times 5 = 5$

- (a) Watt is SI unit of
- (i) Power (ii) Force
- (iii) Energy (iv) Work
- (b) Dimensional formula for kinetic energy is
- (i)  $[\text{LT}^{-1}]$  (ii)  $[\text{MLT}^{-2}]$
- (iii)  $[\text{ML}^2\text{T}^{-2}]$  (iv) None of these
- (c) Which one is not a vector quantity ?
- (i) Distance (ii) Force
- (iii) Velocity (iv) Displacement

(d) The rotational analogue of force is

- (i) Momentum
- (ii) Angular momentum
- (iii) Torque
- (iv) None of these

(e) If the temperature in Celsius scale is  $20^{\circ}\text{C}$ , in the Kelvin scale it is

- (i) 290 K                      (ii) 320 K
- (iii) 293.15 K              (iv) 293 K.

PART - B

Marks - 45

4. (a) Define accuracy and precision. 2
- (b) Check whether the following equation is dimensionally correct or not 2
- $v = u + at$ .
- (c) Find the dot product between  $\vec{A} = \hat{i} + \hat{j} + \hat{k}$  and  $\vec{B} = -\hat{i} + \hat{j} + \hat{k}$ . 3
- (d) Show that in case of a freely falling body total mechanical energy is conserved. 3

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5. (a) Find the expression for variation of  $g$  with depth. 3

(b) Define escape velocity and orbital velocity. What is a geostationary satellite? 3

(c) A wire of 2 m length and cross-sectional area  $2 \text{ mm}^2$  elongates by 1 mm when a load of 15 kg is applied to it. Find the Young's modulus of the material of the wire. 4

6. (a) Find the expression for pressure at a depth  $d$  from the surface of a liquid. 4

(b) Write the Archimedes principle. What is siphon? 2

(c) Find the amount of heat required to increase the temperature of 100g water at  $10^{\circ}\text{C}$  to vapour at  $100^{\circ}\text{C}$ . Specific heat of water is  $1 \text{ cal/g}^{\circ}\text{C}$  and latent heat of vaporisation of water is  $540 \text{ cal/g}$ . 4

7. (a) Find the Laplace's expression for velocity of sound in air. 3

(b) Write the differences between longitudinal and transverse waves. 2

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- (c) What is echo and reverberation ? 2
- (d) Write the first and the second laws of thermodynamics. 2
8. (a) A ball of 200 g is moving with a speed of 20 m/s. Find its momentum. 2
- (b) If the time period of a simple pendulum is 2s, find the length of the string. 2
- (c) Show that coefficient of superficial expansion is twice the co-efficient of linear expansion. 2