

**Physics Part-I**

Fic. No. \_\_\_\_\_

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**Physics Part-I****SECTION "A"**

Time: 20 Min

Marks: 18

Note: Use this Sheet for this Section. No marks will be awarded for cuttings erasing and over writing.

**Q.1 Write the correct option i-e (A,B,C,D) and write it in the given relevant box.**

- (i). Which of the following is a derived quantity.  
 (a). Time (b). Area (c). Mass (d). Length
- (ii). Which of the following is not a unit of length?  
 (a). **cm** (b). Light Year (c). Radian (d). Meter
- (iii).  $\vec{A} \cdot \vec{B} = \vec{A} \times \vec{B}$  if angle between  $\vec{A}$  and  $\vec{B}$  is.  
 (a).  $0^\circ$  (b).  $90^\circ$  (c).  $30^\circ$  (d).  $45^\circ$
- (iv). If a force of 10N is applied parallel to a moment arm of 5m the torque is.  
 (a). 50 N (b). 5 N (c). 10 N (d). Zero
- (v). A body is dropped from a 5m high tower. Its initial velocity is .  
 (a). 5 m/s (b). Zero (c). 10 m/s (d). 50 m/s
- (vi). Dimension of impulse is similar to dimension of .....  
 (a). Force (b). Work (c). Torque (d). Momentum
- (vii). Work done by a centripetal force is.....  
 (a). Positive (b). Zero (c). Negative (d). None
- (viii). The correct expression for escape velocity on earth is.  
 (a).  $gR_e$  (b).  $\sqrt{g R_e}$  (c).  $\sqrt{2g R_e}$  (d).  $2gR_e$
- (ix). The frequency of Second's pendulum is.  
 (a). 0.5 Hz (b). 2 Hz (c). 0.2 Hz (d). 5 Hz
- (x). In transverse wave the distance between crest and trough is equal to.....  
 (a).  $\lambda$  (b).  $2\lambda$  (c).  $\frac{\lambda}{4}$  (d).  $\frac{\lambda}{2}$
- (xi). Expression for angular velocity of a body performing S.H.M is written as.  
 (a).  $w = 2\pi/f$  (b).  $w = f/2\pi$  (c).  $w = 2\pi f$  (d). None
- (xii). One nm is equal to.  
 (a).  $10^{-3}\text{m}$  (b).  $10^{-10}\text{m}$  (c).  $10^{-6}\text{m}$  (d).  $10^{-9}\text{m}$
- (xiii). The ray and wave fronts are mutually.....  
 (a). Parallel (b). Anti Parallel (c). Perpendicular (d). None
- (xiv). Bragg's Law is given by.  
 (a).  $2d \sin \theta = n\lambda$  (b).  $d = n \lambda \sin \theta$  (c).  $d = 2 \lambda$  (d). None
- (xv).  $104^\circ \text{F}$  is equal to.  
 (a).  $82^\circ \text{C}$  (b).  $40^\circ \text{C}$  (c).  $32^\circ \text{C}$  (d).  $323^\circ \text{C}$
- (xvi). Mean translational K.E per molecule of an ideal gas at temperature T is.  
 (a).  $\frac{2}{3}KT$  (b).  $KT^4$  (c).  $\frac{1}{2}KT^2$  (d).  $\frac{3}{2}KT$
- (xvii). The process in which volume of the system remain constant.  
 (a). Iso thermal (b). Iso choric (c). Iso baric (d). None
- (xviii). The rotational analogue of force is.  
 (a). Weight (b). Impulse (c). Torque (d). None

**Physics Part-I**

Time: Allowed: 2.40h

Marks: 67

**SECTION “B”****Q2. Answer in Short any Ten (10) of the following Parts. Each Part has equal marks. (40)**

- (i) Write the principle of the dimensional homogeneity of physical equations.
- (ii)  $(\vec{A} \times \vec{B})^2 + (\vec{A} \cdot \vec{B})^2 = A^2 B^2$  Prove it.
- (iii) The gravitational Force acting on a satellite is always directed towards the centre of the earth does this force exert torque on the satellite?
- (iv) In long jump what factors determine the span of the jump?
- (v) Distinguish between elastic and inelastic collision, giving one example of each.
- (vi) Estimate your muscle power.
- (vii) Why does an astronaut in an orbiting satellite feel weightless?
- (viii) Describe the working of an engine carburetor.
- (ix) Define Free and Forced Oscillations giving one example of each.
- (x) Differentiate between Transverse waves and Longitudinal waves.
- (xi) Explain constructive and destructive interference of light.
- (xii) What are different types of optical fibres?
- (xiii) Is it Possible to cool a room by keeping the refrigerator door open?

**SECTION “C”****Note: Attempt any THREE questions. All questions carry equal marks. (27)**

- Q3. (A) State and explain Scalar Product of two vectors. (5)
- (B) Find the value of “q” for which the following two vectors will become perpendicular to each other.
- $$\vec{A} = 2\hat{i} - 4\hat{j} + \hat{k} \quad \vec{B} = 13\hat{i} - q\hat{j} + \hat{k} \quad (4)$$
- Q4. (A) Show that rate of change of angular momentum is equal to torque  $\frac{\Delta L}{\Delta T} = \tau$ . (5)
- (B) A wheel is revolving at a steady rate of 120 rev/min. what is (a) its angular velocity (b) the linear velocity of point on the wheel 0.25m from the axle. (4)
- Q5. (A) Define diffraction grating and derive an equation for finding the wave length of light. (5)
- (B) The 546.1 nm wave length is observed at an angle of  $81^\circ$  in the third order spectrum of a diffraction grating. Calculate the number of lines per mm of the grating. (4)
- Q6. Write short note on any two of the following.
- (i) Resonance.  $4\frac{1}{2}$
  - (ii) Simple Microscope.  $4\frac{1}{2}$
  - (iii) Reversible and irreversible processes.  $4\frac{1}{2}$
  - (iv) Escape velocity.  $4\frac{1}{2}$