PHYSICS
(Part – I)
(Fresh / New Course)

Sig. of Supdt. ....

Roll No. ....

هال میں موبائل فون لانا بالکل منع ہے

Fic. # ....

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Time Allowed : 3 Hrs.

PHYSICS
(Part – I)
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Total Marks: 85

NOTE : There are THREE sections in this paper i.e. Section A, B and C.

Time : 20 Mins.

Section "A"

Marks: 18

NOTE : Use this sheet for this section. No mark will be awarded for cutting, erasing or over writing.

Q. 1 Write the correct option i.e. A, B, C and D int eh empty box provided opposite to each part.

i) The dimensions of frequency are ;
(a) $[MLT^{-1}]$ (b) $[ML^0T]$ (c) $[ML^0T^{-1}]$ (d) $[M^0L^0T^{-1}]$ — **d** (i)

ii) The number of significant figures in the measurement 0.00035 m is ;
(a) Two (b) Three (c) Four (d) Five — **a** (ii)

iii) Addition of vectors by rectangular components method is some how ;
(a) Mathematical (b) Graphical (c) Geometrical (d) None of these — **a** (iii)

iv) The sum of magnitudes of two forces is 16N. If the resultant force is 8N and its direction is perpendicular to minimum force, then the forces are ;
(a) 2 N and 14 N (b) 4 N and 12 N (c) 6 N and 10 N (d) All of these — **c** (iv)

v) Area under velocity – time graph is called ;
(a) Distance (b) Velocity (c) Acceleration (d) Momentum — **a** (v)

vi) Which pair of the following have the same dimensions?
(a) Force and momentum (b) Force and impulse
(c) Impulse and angular momentum (d) Impulse and change of linear momentum — **d** (vi)

vii) A projectile travels the same range for the pair of angles ;
(a) 10°,85° (b) 8°,82° (c) 8°,90° (d) 10°.95° — **a** (vii)

viii) What does not change when force is applied on a body?
(a) Velocity (b) Position (c) Acceleration (d) None of these — **d** (viii)

ix) The power of generating stations and that of grid stations is expressed in ;
(a) Kw (b) Horse power (c) Mw (d) mw — **c** (ix)

x) Numerical value of escape velocity from the moon's surface is ;
(a) 11.2 Kms⁻¹ (b) 10.2 Kms⁻¹ (c) 8.2 Kms⁻¹ (d) 2.3 Kms⁻¹ — **d** (x)

xi) A wheel of a machine rotating at a steady rate of 120 rev m⁻¹. Its angular velocity is ....
(a) 120 rev m⁻¹ (b) 240 π rad m⁻¹ (c) 4 π rad / s (d) All of these — **c** (xi)

xii) A rain drop of radius 'r' falls in air with a terminal speed V_T. What is the terminal speed of a rain drop of radius 2r?
(a) V_T (b) $2V_T$ (c) $3V_T$ (d) $4V_T$ — **d** (xii)

xiii) The time period of S.H.O. is 0.2 s. Its frequency is ;
(a) $\frac{1}{2}$Hz (b) 2Hz (c) 5Hz (d) 10Hz — **c** (xiii)

xiv) The restoring force of S.H.M. is maximum when particle is at
(a) Extreme position (b) Midway between extreme and mean position
(c) Mean position (d) None of these — **a** (xiv)

xv) The speed of sound in air at 0°C is 332 ms⁻¹. The speed of sound in air at 10°C is approximately ;
(a) 336 ms⁻¹ (b) 338 ms⁻¹ (c) 348 ms⁻¹ (d) 350 ms⁻¹ — **b** (xv)

xvi) A sound source is moving towards a stationary listener with $\frac{1}{10}$ th of the speed of sound. The ratio of apparent to real frequency is ;
(a) $\frac{11}{10}$ (b) $\left(\frac{11}{10}\right)^2$ (c) $\left(\frac{9}{10}\right)^2$ (d) $\frac{10}{9}$ — **d** (xvi)

xvii) The principle of Michelson interferometer is based on the division of ;
(a) Wave front (b) Amplitude (c) Frequency (d) None of these — **b** (xvii)

xviii) If the temperature of the heat source is increased, the efficiency of a Carnot's engine
(a) Increases (b) Decreases (c) Remains constant (d) First increase and then decrease — **a** (xviii)

Total Marks : 67

Time Allowed : 2:40 Hrs.   Section – B   Marks : 40

Q. 2   Answer any Ten parts. Each part carries equal marks.

(i)   Define the number π and show that 2π radians $= 360^\circ$.

(ii)   Carry out the following conversions.
        a. Convert the density 1.33×10^{-7} g cm^{-3} into kg m^{-3}.
        b. Convert a speed of 20 ms^{-1} in kmh^{-1}.

(iii)   The resultant of two vectors, one is double in magnitude than the other, is perpendicular to the smaller vector. What is the angle between the two vectors?

(iv)   Can the velocity of a body reverse the direction when acceleration is constants. if you think so, give an example?

(v)   What is the angle for which the maximum height reached and the corresponding range are equal? Explain.

(vi)   Define power. Show that $P = \vec{F} \cdot \vec{V}$. What are various units of power? Explain.

(vii)   What is meant by escape velocity? Derive a relation for it and show that the numerical value of escape velocity from earth's surface is 11.2 kms^{-1}.

(viii) State and explain the law of conservation of angular momentum.

(ix)   Smoke rises in a chimney faster when a breeze is blowing. Use Bernoulli's principle to explain this phenomenon.

(x)   Give two applications in which resonance plays an important role.

(xi)   Why does a sound wave travel faster in solids than in gases?

(xii)   What is meant by polarization of light? Explain polarization of light by reflection.

(xiii) In the light of the first law of thermodynamics describe the processes.
        a. Isothermal process
        b. Adiabatic process

Section – C   Marks : 27

NOTE :   Attempt any THREE questions. Each question carries equal marks.

Q. 3 a)   What does rectangular components of a vector mean? Explain addition of vectors by rectangular components method.

      b)   The magnitude of dot and cross product of two vectors are 6 and $6\sqrt{3}$ respectively. Find the angle between the vectors.

Q. 4 a)   What is meant by geo-stationary orbit? Show that radius of geo stationary orbit is 4.23×10^{7} m.

      b)   What should be the orbital speed to launch a satellite in a circular orbit 900 km above the surface of the earth?

Q. 5 a)   Prove that the projection of a body moving in a circle describes S.H.M.

      b)   Calculate the length of a second, pendulum having time period 2 Seconds at a place where $g = 9.8$ ms^{-2}.

Q. 6 a)   What is meant by Carnot engine and Carnot cycle? Explain in detail.

      b)   Calculate the change in entropy when 10kg water is heat from 90°C to $100\,^\circ$C. For water specific heat $= 4180$ J kg^{-1}k^{-1}.