

FIRST YEAR HIGHER SECONDARY EXAMINATION MARCH 2019

SUBJECT : PHYSICS

CODE. NO: FY 24

Qn No	Sub Qns	Answer Key/Value Points	Score	Total
1.		True	1	1
2.		3 Sec	1	1
3.		Any one Property / Any one example	1	1
4.		Statement / equation OR Conservation of energy	1 $\frac{1}{2}$	1
5.		Correct graph OR Anomalous expansion and 4°C OR Anomalous expansion / 4°C	2 2 1	2
6.		Definition only OR Definition / example	2 1	2
7.		Sum = $(35 \pm 0.7) \text{ cm}$ Diff = $(5 \pm 0.7) \text{ cm}$ OR Any one correct give 2 marks. OR $\Delta L = \Delta L_1 + \Delta L_2$	1 1 1	2

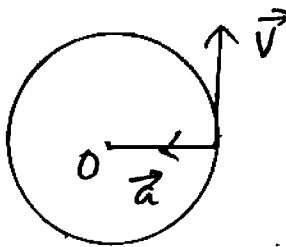
(1/10)

Qn No	Sub Qns	Answer Key/Value Points	Score	Total
8.		Torque (τ) = $\vec{r} \times \vec{F}$ Angular Momentum = $\perp$ to $\vec{r}$ & $\vec{p}$ Rotational equilibrium = $\sum \vec{\tau} = 0$ Linear Velocity $\vec{v} = \vec{\omega} \times \vec{r}$ OR Any two correct answer give 2 Marks	$4 \times \frac{1}{2}$	2
9.		$\frac{1}{2} m v_e^2 = \frac{GMm}{R+h}$ $v_e = \sqrt{\frac{2GM}{R+h}}$ OR Any correct derivation 2 Marks OR $v_e = \sqrt{2gR} / v_e = \sqrt{2} \cdot v_0$	1 1 1	2
10.		$\frac{2\pi}{\lambda} = 80$ $\lambda = 0.0785 \text{ m}$ $2\pi f = 3$ $f = 0.48 \text{ Hz}$ OR $2\pi/\lambda = k / k = 80$	$\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$	2

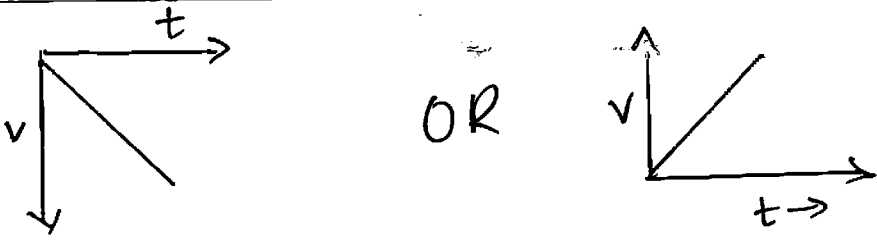
3.

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		$w = 2\pi f$ / $w = 3$ OR $2\pi/\lambda = 80$ & $2\pi f = 3$	$\frac{1}{2}$ 1+1	
11.	a.	Any one diagram OR Any Two diagrams	1 2	2
	b.	$v = \frac{v}{4L}$	1	
12.	a.	Any related attempt	1	3
	b.	If b part is correct OR $[PV] = ML^2 T^{-2}$ $[Fx] = ML^2 T^{-2}$ OR Equation is dimensionally correct	3 1 1 1	
13.		Figure showing resultant OR Parallelogram Law OR Triangle law Derivation of $R = \sqrt{A^2 + B^2 + 2AB \cos \theta}$ OR Final equation only	1 2 1	3

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14.	a.	 OR $\vec{a}$ - Towards Centre $\vec{v}$ - Along Tangent	1	3
	b.	$\omega = 2\pi f = 0.44 \text{ rad/s}$ $V = r\omega = 0.053 \text{ m/s}$	1	
		OR. Correct Substitution 1 Mark Each OR Equation only $\frac{1}{2}$ Mark each final answer only $\frac{1}{2}$ Mark each	1	
15.	a. (ii)		1	3
	b. Correct derivation		2	
		OR Law of Conservation of Momentum/Statement	1	
		OR $V = -\frac{mv}{M}$	1	

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16.		Equipartition energy Statement OR $C_v = \frac{3}{2} R$ $C_p = \frac{5}{2} R$ OR $\gamma = \frac{C_p}{C_v} \quad \text{OR} \quad C_p - C_v = R$ OR Degrees of freedom = 3 OR $\gamma = \frac{5}{3}$ OR Any correct derivation	2 1½ 1½ 1 3	3
17.	a.	$\gamma = \frac{\text{Stress}}{\text{Strain}}$ OR Slope of the graph = γ OR $\gamma = 7.5 \times 10^{10} \text{ N/m}^2$	2 2 2	3
	b.	Copper wire OR $\gamma = \frac{F \cdot L}{A \cdot \Delta L}$ OR $\gamma \propto F$ OR Stress = F/A	1	

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18.	a.		1	
	b.	Any one Part correct give full marks. 3 OR (i) $v^2 - v_0^2 = 2ay$ / Any correct eqn. 1 Correct Substitution 1 Answer only 1 (ii) $y = v_0 t + \frac{1}{2}at^2$ / Any correct eqn. 1 Correct Substitution 1 Answer only 1	4	
19.	a.	$P = \vec{F} \cdot \vec{v}$ OR $P = Fv$	1	
	b.	$F = mg + f_s$ OR $P = Fv$ $P = (1800 \times 10 + 4000) 2$ $P = 44000 \text{ W}$ OR Take $g = 9.8 \text{ m/s}^2$ $P = 43280 \text{ W}$	1	
	c.	$P = 58.9 \text{ Hp}$ OR 58.02 Hp OR $1 \text{ Hp} = 746 \text{ W}$	1	4

7.

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20.	a.	$I = \frac{2}{5} M R^2$	1	4
	b.	$\frac{1}{2} M v^2 \left(1 + \frac{K^2}{R^2}\right) = mgh$ OR $\frac{1}{2} M v^2 + \frac{1}{2} I \omega^2 = mgh$ OR $v = \sqrt{\frac{2gh}{1 + K^2/R^2}}$ OR $v = \sqrt{\frac{10}{7} gh}$	1	
		$K^2 = \frac{2}{5} R^2$	$\frac{1}{2}$	
		OR Correct Substitution and Proof	2	
	c.	Different velocity	1	
21.	a.	24 hrs / Same as that of earth / 1 day	1	
	b.	$\frac{mv^2}{R+h} = \frac{GMm}{(R+h)^2}$	$\frac{1}{2}$	
		$v^2 = \frac{GM}{R+h}$	$\frac{1}{2}$	
		$T = \frac{2\pi (R+h)^{3/2}}{\sqrt{GM}}$	1	

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		OR. $T = \frac{2\pi r}{V_0}$ $T = \frac{2\pi r}{\sqrt{GM/r}} \quad (r = R+h)$ $V_0 = \text{orb: vel.}$	1 1	4
	C.	OR $V = \sqrt{\frac{GM}{R+h}}$ only 1 mark. $T^2 \propto r^3$ or Keplers 3 rd law Statement	1	
22.	a.	Definition / figure showing θ	1	4
	b.	Large	1	
	c.	$\Delta P = \frac{2S}{R}$ $= \frac{2 \times 72 \times 10^{-3}}{10^{-3}} = 144 \text{ N/m}^2$	1 1	
		OR	1	
		$\Delta P = \frac{4S}{R}$ Substitution and Answer	1	
		OR Final Answer only give 1 mark.		

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23.	a.	Diagram for Refrigerator	1	4
	b.	$\alpha = \frac{Q_2}{Q_1 - Q_2} / \alpha = \frac{Q_2}{W} /$	1	
		$\alpha = \frac{T_2}{T_1 - T_2}$		
	c.	$\frac{Q_1}{Q_2} = \frac{T_1}{T_2}$ OR Correct Substitution OR $\eta = W/Q_1$	1	
		OR $\eta = 1 - \frac{T_2}{T_1} / \eta = 1 - \frac{Q_2}{Q_1}$ $Q_2 = 2133 \text{ J/cycle}$	1	
24	a.	$f_s \max = \mu_s N$	1	5
	b. (i)		1	
	c.	figure with direction of force	2	
		Equation only	1	
		OR		
		Correct derivation	3	
		OR		
		$mg \sin \theta = f_s$	1	
		$mg \cos \theta = N$	1	
		$\tan \theta = \mu_s$	1	

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25-	a.	Figure Derivation OR Correct derivation with out figure OR Statement only OR Final equation only	1 3 4 1 1	5
	b.	Figure a		
26-	a.	Correct derivation (fig: not necessary) OR Figure a with marking of forces Final equation $a = -\omega^2 x$ / $F = -kx$	4 2 1 1	5
	b.	Any Related attempt	1	