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 ½	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 ± 0.7) Cm Diff = (5 ± 0.7) Cm OR Any One Correct give 2 marks. OR $\Delta l = \Delta l_1 + \Delta l_2$	1 1 1	2

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Qn No	Sub Qns	Answer Key/Value Points	Score	Total
8.		Torque (τ) = $\vec{r} \times \vec{F}$ Angular Momentum = $\perp^r$ to $\vec{r}$ & $\vec{p}$ Rotational equilibrium = $\Sigma \vec{\tau} = 0$ 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.		$\frac{2\pi}{\lambda} = 80$ $\lambda = 0.0785\ m$ $2\pi f = 3$ $f = 0.48\ Hz$ OR $2\pi/\lambda = K$ / $K = 80$	1/2 1/2 1/2 1/2 1/2	2

Qn No	Sub Qns	Answer Key/Value Points	Score	Total
		$\omega = 2\pi f$ / $\omega = 3$	½	
		OR		
		$2\pi/\lambda = 80$ & $2\pi f = 3$	1+1	
11.	a.	Any one diagram	1	
		OR		
		Any Two diagrams	2	2
	b.	$v = \frac{V}{4L}$	1	
12.	a.	Any related attempt	1	
	b.	If b Part is Correct	3	
		OR		
		$[PV] = ML^2T^{-2}$	1	3
		$[Fx] = ML^2T^{-2}$	1	
		OR		
		Equation is dimensionally Correct	1	
13.		Figure showing Resultant	1	
		OR		
		Parallelogram Law OR Triangle law		3
		Derivation of $R = \sqrt{A^2+B^2+2AB\cos\theta}$	2	
		OR		
		Final equation only	1	

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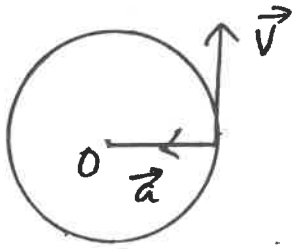
14.	a.		1	
		OR		
		$\vec{a}$ - Towards Centre		
		$\vec{V}$ - Along Tangent		
	b.	$\omega = 2\pi f = 0.44$ rad/s	1	3
		$V = r\omega = 0.053$ m/s	1	
		OR.		
		Correct Substitution 1 Mark Each		
		OR		
		Equation only ½ Mark each		
		final answer only ½ Mark each		
15.	a.	(ii)	1	
	b.	Correct derivation	2	
		OR		
		Law of Conservation of Momentum/Statement	1	3
		OR		
		$V = -\frac{mv}{M}$	1	

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

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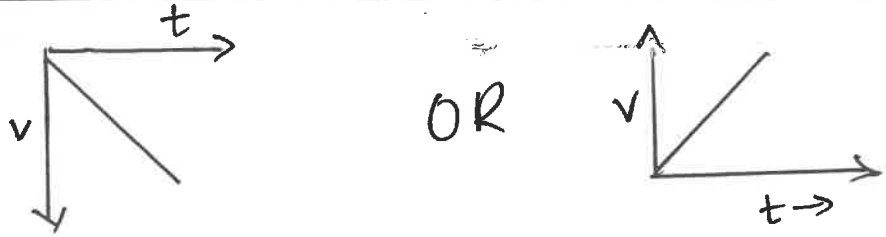
18.	a.		1	
	b.	Any one Part Correct give full marks.	3	
		OR		
	(i)	$v^2 - v_0^2 = 2ay$ / Any Correct eqn.	1	4
		Correct Substitution	1	
		Answer only	1	
		OR		
	(ii)	$y = v_0 t + \frac{1}{2} a t^2$ / Any Correct eqn	1	
		Correct Substitution	1	
		Answer only	1	
19.	a.	$P = \vec{F} \cdot \vec{v}$ OR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

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20.	a.	$I = \frac{2}{5} MR^2$	1	
	b.	$\frac{1}{2} Mv^2 \left(1 + \frac{K^2}{R^2}\right) = mgh$		
		OR		
		$\frac{1}{2} Mv^2 + \frac{1}{2} I\omega^2 = mgh$	1	
		OR		4
		$v = \sqrt{\frac{2gh}{1 + K^2/R^2}}$ OR $v = \sqrt{\frac{10}{7} gh}$		
		$K^2 = \frac{2}{5} R^2$	½	
		OR		
		Correct Substitution and Proof	2	
	c.	Different velocity	1	
21.	a.	24 hrs / Same as that of earth / 1 day	1	
	b.	$\frac{mv^2}{R+h} = \frac{GMm}{(R+h)^2}$	½	
		$v^2 = \frac{GM}{R+h}$	½	
		$T = \frac{2\pi (R+h)^{3/2}}{\sqrt{GM}}$	1	

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

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Qn No	Sub Qns	Answer Key/Value Points	Score	Total
23.	a.	Diagram for Refrigerator	1	
	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	4
		OR		
		$\eta = 1 - \frac{T_2}{T_1}$ / $\eta = 1 - \frac{Q_2}{Q_1}$		
		$Q_2 = 2133$ J/cycle	1	
24	a.	$f_{s\,max} = \mu_s N$	1	
	b.	(i)	1	
	c.	figure with direction of force	2	
		Equation only	1	5
		OR		
		Correct derivation	3	
		OR		
		$mg \sin\theta = f_s$	1	
		$mg \cos\theta = N$	1	
		$\tan\theta = \mu_s$	1	

Qn No	Sub Qns	Answer Key/Value Points	Score	Total
25-	a.	figure	1	
		Derivation	3	
		OR		
		Correct derivation with out figure	4	
		OR		5
		Statement only	1	
		OR Final equation only	1	
	b.	figure a		
26.	a.	Correct derivation (fig: not necessary)	4	
		OR		
		figure a with marking of forces	2	
		Final equation	1	5.
		$a = -\omega^2 x$ / $F = -kx$	1	
	b.	Any Related attempt	1	

(10/10)

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