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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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 $2\pi/\lambda = K$ / $K = 80$	$\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$	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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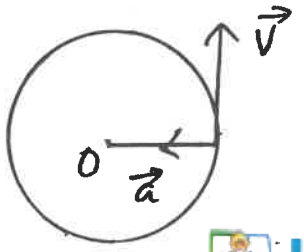
14.	a.		1	3
		OR $\vec{a}$ - Towards Centre $\vec{V}$ - Along Tangent		
	b.	$\omega = 2\pi f = 0.44$ rad/s	1	
		$V = r\omega = 0.053$ m/s	1	
		OR. Correct Substitution 1 Mark Each OR Equation only ½ Mark each final answer only ½ Mark each		
15.	a.	(ii)	1	3
	b.	Correct derivation	2	
		OR Law of Conservation of Momentum/Statement	1	
		OR $V = -\frac{mv}{M}$	1	

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16.		Equipartition energy Statement	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		3
		OR	2	
		$Y = 7.5 \times 10^{10}\ N/m^2$		
	b.	Copper wire OR $Y = \frac{F.L}{A.\Delta L}$	1	
		OR $Y \propto F$ OR Stress = F/A		

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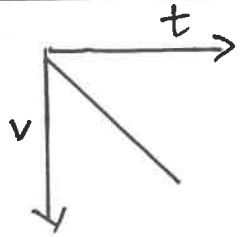
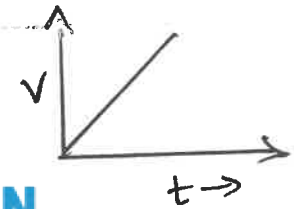
18.	a.	 OR 	1	
	b.	Any one Part Correct give full marks. 3		
		OR		
		(i) $v^2 - v_0^2 = 2ay$ / Any Correct eqn.	1	4
		Correct Substitution	1	
		Answer only	1	
		OR		
		(ii) $y = v_0 t + \frac{1}{2}at^2$ / Any Correct eqn	1	
		Correct Substitution	1	
		Answer only	1	
19.	a.	$P = \vec{F} \cdot \vec{v}$ 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		
		$v = \sqrt{\frac{2gh}{1 + K^2/R^2}}$ OR $v = \sqrt{\frac{10}{7} gh}$		4
		$K^2 = \frac{2}{5} R^2$	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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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	

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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)

1. Roy T. Mathew, GVHSS Eravankara
2. Saiju Philip, GVHSS Ambalathara Karaikod
3. Ranjith.R.D, St Joseph's Boys HSS Kozhikode (9447646416)
4. Dinesh Kumar.K CJHSS Chemnad Kasaragod 8921597383
5. Rasseena.S, NVT Physics, GVHSS, Mathirappilly, 9946624274
6. Preetha.C, NVT Physics, KPSMM VHSS, Varda 9746615904
7. Dhanya.K.R, NVT Physics, GVHSS (G) Thrissur (9495226588)
8. Susan Varghese, Balikamatom H.SS. Thiruvalla, Pathanamthitta (9747718692)
9. Arun.A, NSS HSS Koothar, Idukki 8281159610
10. Vipin.R, HSST Physics GHSS Ezhippuram South, Alwa, 9846078703
11. Liju Anna John, ASMMHSS Alathur Palakkad 9745564004
12. Prasad Kumar.T.K, NVT Physics GVHSS Parroly (9446255139)
13. Harikrishnan.PR HSST physics (9947277554) Govt. Town HSS Kannur
14. Biju R.L New Higher Secondary School, Nellimood, TVPM (9495901256)
15. Lekha.C.L K.R.G.P.M. HSS. Odanavattom, Kollam (9495483396)
16. Princy.K SNHSS, Poochakkal, Alappuzha 9349862019

17. Dalijon. S , GVHSS Kadakkal, Kollam, 9895735403.

18 Smitha D.V., GVHSS Poovachal 9495204069

19. Dr. Benoy Zakariah
Govt H.S.S. Kadappoor
Kottayam
9447105361

20 K. SENSON VARGHESE GSHSS THRISSUR 9446447184.

21. Binu. P.J. St. Mary's HSS Mullankolly Wayanad 9961006844