(HI)

1/5

ANSWER KEY

FIRST YEAR HIGHER SECONDARY EXAMINATION June 2022

PART ~~I/II~~/III

SUBJECT: PHYSICS

CODE NO: FY 63 VERSION: B

60 SCORES 2 HOURS

Qn. No	Sub Qns	Answer Key/Value Points	Score	Total Score
1.		(i) Strong nuclear force.	1	1
2.		(iii) Thermodynamic temperature.	1	1
3		(iii) null vector	1	1
4		(iv) Moment of inertia	1	1
5		turbulent	1	1
6		(i) Mean free path	1	1
7		(a) 4 (b) 3	1 1	2
8		any one differentiation or definitions of average velocity and average speed,	2	2.
9.		derivation of $K = \frac{1}{2} I \omega^2$	2	2
10.		Statement of first law of thermodynamics. 1 Equation. 1	2	2.
11		$V_{(t)} = \frac{dx_{(t)}}{dt}$ $= -\omega A \sin(\omega t + \phi)$	2	2

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12.		derivation of $V = \sqrt{\frac{B}{\rho}}$	2	2.
13.		derivation of $R = \sqrt{A^2 + B^2 + 2AB\cos\theta}$	3	3.
14	a	definition of work.	1	3
	b.	Any one condition for zero work.	1	2
		Any one example for zero work.	1	
15.	a	definition of escape speed.	1	3
	b.	derivation of $V_{min} = \sqrt{\frac{2GM_E}{(R_E+h)}}$.	2	
16.		Proof of $\frac{E}{N} = \frac{3}{2}k_B T$.	3	3
17.		derivation of $T = 2\pi\sqrt{\frac{L}{g}}$	3	3.
18.		mass per unit length, $\mu = \frac{5.0\times10^{-3}}{0.72}$	½	3
		$= 6.9\times10^{-3}\ kg\ m^{-1}$.		
		Tension $T = 60\ N$.	1	
		speed $v = \sqrt{\frac{T}{\mu}}$	½	
		$= \sqrt{\frac{60}{6.9\times10^{-3}}}$		
		$= 93\ ms^{-1}$.	1	
19.	a	Principle of homogeneity of dimensions	1	4
	b	dimensions of LHS $= M(LT^{-1})^2$	3	
		$= ML^2T^{-2}$		
		dimensions of RHS $= MLT^{-2}L$		
		$= ML^2T^{-2}$		
		$\therefore$ Equation is correct.		

Qn. No	Sub Qns	Answer Key/Value Points	Score	Total Score
20.	a.	definition of projectile	1	
	b.	derivation of $H = \frac{(V_0 \sin\theta_0)^2}{2g}$ $1\frac{1}{2}$	3	4.
		and $R = \frac{V_0^2 \sin 2\theta_0}{g}$ $1\frac{1}{2}$		
21	a	Statement of Newton second law	2	4
	b	derivation of $f = ma$	2	
22.	a	definition of longitudinal Stress.	1	
	b.	Stress $= \frac{F}{A} = \frac{F}{\pi r^2}$. $= \frac{100 \times 10^3}{3.14 \times (10^{-2})^2}$. $= 3.18 \times 10^8 \ N m^{-2}$	3	4
23	a.	$\alpha_V = \left(\frac{\Delta V}{V}\right) \frac{1}{\Delta T}$.	1	4
	b	Proof of $\alpha_V = \frac{1}{T}$	3	
24.	a	definition of isothermal process.	1	4.
	b.	derivation of $W = \mu RT \ln \frac{V_2}{V_1}$	3	

Qn. No	Sub Qns	Answer Key/Value Points	Score	Total Score
25	a	displacement	1	
	b.	derivation of $s = v_0 t + \frac{1}{2} a t^2$ 2	4	5
		derivation of $v^2 = v_0^2 + 2as$. 2		
26.	a	weight of the car. normal reaction frictional force.	1½	
	b.	derivation of $v_{max} = \left[Rg\left(\frac{\mu_s + \tan\theta}{1 - \mu_s \tan\theta}\right)\right]^{1/2}$	2½	5
	c.	$\mu_s = 0$ in the above equation, $v = (Rg\tan\theta)^{1/2}$.	1	
27.	a.	statement of law of conservation of energy	1	
	b	Proof of the law in the case of a freely falling body	3	5
	c.	ML^2T^{-2}.	1	
28.	a.	Statement of perpendicular and parallel axes theorem.	2	
	b	$I_{tangent} = I_{diameter} + MR^2$ $= \frac{MR^2}{2} + MR^2$ $= \frac{3}{2} MR^2$	3	5.
29.	a.	derivation of $g_h = g\left[1 - \frac{2h}{R_E}\right]$	3	
	b.	$h = \frac{R_E}{4}$ $g_h = g\left[1 - \frac{2R_E}{4R_E}\right]$ $g_h = \frac{g}{2}$	2	5

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30		Statement of Bernoulli's principle. 1. Proof of Bernoulli's principle 4		5.