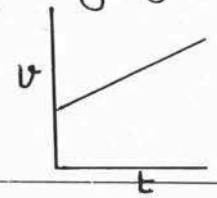
FIRST YEAR HIGHER SECONDARY EXAMINATION, MARCH 2016.
(Finalised Scheme of Valuation)

Subject: Part III Physics **Code No: 315**

Qn.No	Sub Qns	Scoring Indicators	Split Score	Total Score
1	(c)	Gravitational force	1	1
2	a	$A = \pi r^2$ ($\frac{1}{2}$ Score) $\frac{\Delta A}{A} \times 100 = 2\left(\frac{\Delta r}{r} \times 100\right)$ ($\frac{1}{2}$ Score) $= 2 \times 0.6$ $= 1.2\%$ (1 score) Final answer only (1 score)	2	4
	b	Principle of Homogeneity OR Dimensions of LHS = Dimensions of RHS	1	
	c	3	1	
3	a	Uniform acceleration	1	
	b	Displacement $s = \left(\frac{v_0 + v}{2}\right) t$ ($\frac{1}{2}$ Score) Substituting $v = v_0 + at$ in the above equation (1 score) $s = v_0 t + \frac{1}{2} a t^2$ ($\frac{1}{2}$ Score) OR Derivation using graphical method shown below  (2 Score)		

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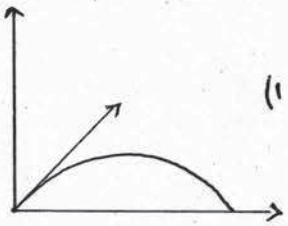
Qn.No	Sub Qns	Scoring Indicators	Split Score	Total Score
		OR Derivation $S = \frac{1}{2}at^2$ from the graph shown in the question (2 Score)	2	4
	c	(iv) Either less than one or equal to one (1 score)	1	
4	a	Vertical Component $= V_0 \sin\theta$ ($\frac{1}{2}$ Score) Horizontal Component $= V_0 \cos\theta$ ($\frac{1}{2}$ Score)	1	
	b	Diagram  (1 Score)		
		(i) Derivation of $H = \frac{V_0^2 \sin^2\theta}{2g}$ (1½ Score) (ii) Derivation of $T = \frac{2V_0 \sin\theta}{g}$ (1½ Score) Final equations only (i) ½ Score (ii) ½ Score	4	6
	c	(iv) follows a parabolic path	1	
5	a	Newton's First law OR Law of Inertia (1 Score) OR Inertia at rest Statement (1 Score)	2	
	b	Statement OR Initial momentum = Final momentum		

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Qn.No	Sub Ans	Scoring Indicators	Split Score	Total Score
		OR Total momentum before collision = Total momentum after collision (1 score)	2	
		$F_{ext} = \frac{dP}{dt}$ (½ Score)		
		If $F_{ext} = 0$		5
		$0 = \frac{dP}{dt}$		
		$\therefore P$ = Constant (½ Score)		
	C	False	1	
6	a	Potential energy (1 score)	2	
		PE = mgh (1 score)		
	b	Force = mg		
		= (60+20) 9·8 (1Score)		
		Work = mgh = 80×9·8×50	2	4
		= 39200 J (1Score)		
		OR If m is taken as 60 or 20 and work is calculated (1Score)		
		OR Work = mgh only (1 score)		
7	a	90° OR perpendicular OR π/2	1	
	b	$\alpha = \frac{\omega - \omega_0}{t}$ OR $\alpha = \frac{\omega}{t}$		
		OR $\alpha = \frac{d\omega}{dt}$ (½ Score)		

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Qn.No	Sub Qns	Scoring Indicators	Split Score	Total Score
		$\alpha = \frac{10-0}{2} = 5$ (½ Score)		
		$\tau = I\alpha$ (1 Score)	3	
		$= 0.4 \times 5 = 2$ Nm (1 Score)		
	c	$\vec{\tau} = \vec{r} \times \vec{F}$ OR $\tau = r F \sin\theta$		
		At Max. Height, r is maximum OR Torque is maximum	1	5
8A	a	$g = \frac{GM_e}{R_e^2}$ (½ Score)		
		At a height h, $g' = \frac{GM_e}{(R_e+h)^2}$ (½ Score)	2	
		$g' = g\left(1 - \frac{2h}{R_e}\right)$ (1 Score)		
	b	Centripetal force is provided by Gravitational force OR		
		$\frac{mv^2}{r} = \frac{GMm}{r^2}$ OR	2	5
		Satellite is a freely falling body		
	c	mass of the body	1	
8B		OR		
	a	Escape velocity	1	
	b	$KE = \frac{1}{2}mv_e^2$ (½ Score)		
		$PE = -\frac{GMm}{R}$ (½ Score)		
		$\frac{1}{2}mv_e^2 + \frac{-GMm}{R} = 0$ (½ Score)		

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Qn.No	Sub Qns	Scoring Indicators	Split Score	Total Score
		$V_e = \sqrt{\frac{2GM}{R}}$ (½ Score)	2	
		OR $V_e = \sqrt{2gR}$ (½ Score)		
	c	On moon, $g_m = \frac{1}{6} g_e$ (2 Score)		
		OR g decreases (2 Score	2	5
		OR No atmosphere in moon (2 Score)		
		OR g is less in moon (2 Score)		
9	a	A	1	
	b	Elastic fatigue OR Load is not proportional to extension		3
		OR Elastic property decreases	2	
		OR Length of spring varies		
10A	a	Statement (1 score)		
		Figure (1 Score)		
		Proof – Work done (½ Score)		
		KE Change (½ Score)		
		PE change (½ Score)	4	
		Total Energy (½ Score)		
		OR fig. with correct derivation (4 Score)		6
	b	Pressure decreases (2 Score)	2	
		OR Ink will come out (1 Score)		

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Qn.No	Sub Qns	Scoring Indicators	Split Score	Total Score
		OR		
10B	a	Viscous force (½ Score) Upthrust (½ Score) Weight (½ Score) $6\pi\eta a v_t + \frac{4}{3}\pi a^3 \sigma g = \frac{4}{3}\pi a^3 \rho g$ (1½ Score) $v_t = \frac{2a^2(\rho-\sigma)g}{9\eta}$ (1 score)	4	
	b	Rain drop falling under gravity is acted upon by weight, upthrust and viscous force. Hence it attains constant velocity. (2 Score) OR Terminal velocity / Constant velocity (1 Score)	2	6
11	a	Heat (½ Score) Mechanical (½ Score)	1	
	b	Name 4 processes ($4 \times ½ = 2$ Score) P.V diagram (2 Score)	4	
	c	$l_2 = l_1(1 + \alpha \Delta t)$ OR $\alpha = \frac{\Delta l}{l \times \Delta t}$ (1 score) $l_2 = 4.24\,(1 + 1.7 \times 10^{-5} \times 200)$ $= 4.2544$ cm (½ Score) $\Delta l = l_2 - l_1 = 0.0144$ cm (½ Score)	2	9
	d	Any four postulates ($4 \times ½$)	2	

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Qn.No	Sub Ans	Scoring Indicators	Split Score	Total Score
12	a	Definition or equation of SHM $F = -k \cdot x$ OR $F \propto -x$ OR $\frac{d^2x}{dt^2} + \omega^2 x = 0$ OR $y = a \sin \omega t$	2	
	b	On the moon $T_m = 2\pi \sqrt{\frac{l}{1.7}}$ (½ Score) On the earth $T_e = 2\pi \sqrt{\frac{l}{9.8}}$ (½ Score) $3.5 = 2\pi \sqrt{\frac{l}{9.8}}$ $T = 8.4$ sec (1 Score) OR $T = 2\pi \sqrt{\frac{l}{g}}$ (1 Score)	2	4
13	a	Correct derivation OR Three correct figures showing harmonics (1 score) OR $\nu_1 = \frac{v}{\lambda} = \frac{v}{4l}$ $\nu_2 = \frac{v}{\lambda} = \frac{3 \times v}{4l}$ $\nu_3 = \frac{v}{\lambda} = 5 \times \frac{v}{4l}$ (2 Score)	2	
	b	In open pipes all harmonics are present	2	4