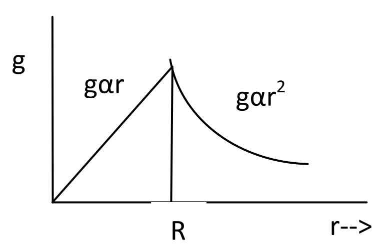
FIRST YEAR HIGHER SECONDARY EXAMINATION PHYSICS-DECEMBER 2018
ANSWER KEY

Qstn no	Value point	Score
1	Nuclear force	1
2	a)2 b)2	1
3	Impulse	
4	$\boldsymbol{\theta}=90^0$	
5	Moment of inertia	
6	a)Displacement= area under the graph =10X(4-0)+-10(6-4) =40-20 =20m b)Distance= 40+20=60m	 1 1
7	a)statement b)Fαdp/dt f=ma	1 1
8	a)Statement b)MV=mv V=mv/M $=\frac{3x10^{-3}x100}{2}$ =1.5m/s	1 1
9	a) $\vec{\zeta} = \vec{r}X\ \vec{F}$ b) increase the distance from axis of rotation	1 1
10	a)$g = \frac{GM}{r^2}$ b) 	1 1
11	a)body A. large slope b) body B. breaking point is far	1 1
12	a)$a_{mean} = \frac{1.37+1.36+1.39+1.42+1.36}{5}$ = 1.38 b)$\Delta a_1 = a_{mean} - a_1$ =0.01 Δa_2=0.02, Δa_3=-0.01, Δa_4=-0.04, Δa_5=0.02 $\Delta a_{mean} = 0.02$	 1 1 1

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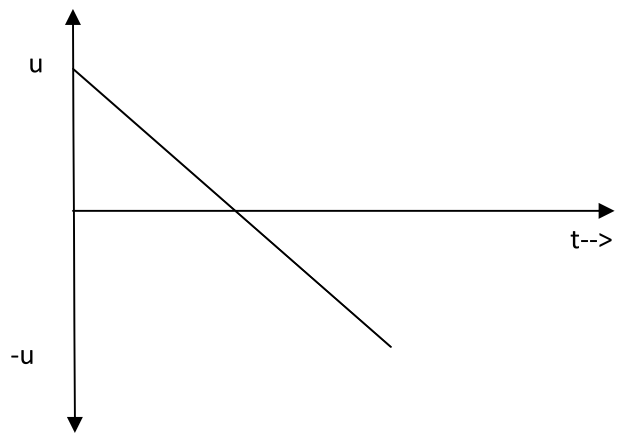
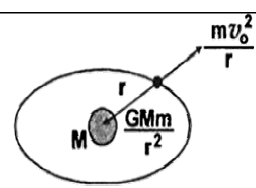
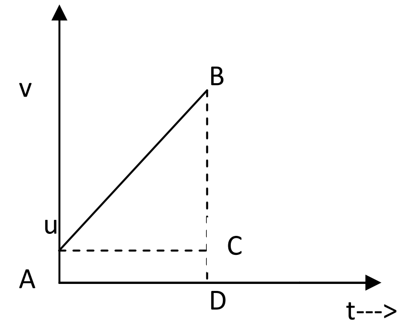
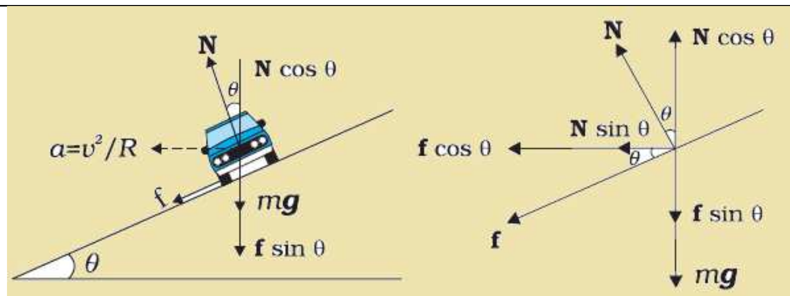
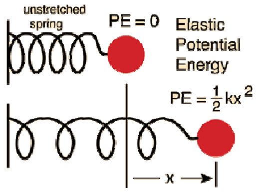
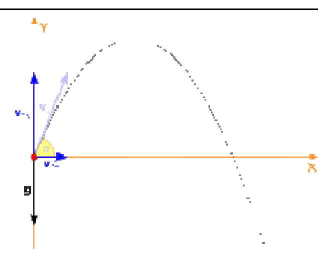
13	a)  b)v=$\sqrt{2gh}$	2 1
14	a)direction of tangent of the circle at that point b)$\Delta\boldsymbol{\theta}=\frac{\Delta r}{r}$ $\omega=\frac{\Delta\theta}{\Delta t}$ ie, $\omega=\frac{\Delta r}{r\Delta t}$ $=\frac{v}{r}$ V=rω	1 1 1
15	a)statement $v^2-u^2=2as$ $mv^2-mu^2=2mas$ $k_f-k_i=W$ b)i) increases ii) increases	1 1 1
16	**a)** $\frac{GM}{(R+h)^2}=\frac{mv^2}{R+h}$  $V_0=\sqrt{\frac{GM}{R+h}}$ b)h=0 $V_0=\sqrt{\frac{GM}{R}}$ $=\sqrt{gR}$	1 1 1
17	a)N/m^2 or Pa b) force=stress X Area for a similar wire stress is equal $F_1/A_1=F_2/A_2$ $F_2=\frac{F1A2}{A1}=\frac{4X10^5}{4}=1X10^5N$	1 1 1

18	a)  b)(i) a = $\frac{v-u}{t}$ => at=v-u displacement=av velocityXtime $=\frac{v+u}{2}Xt$ v+u= 2S/t (v-u)(v+u)= 2as $V^2-u^2=2as$ (ii) displacement=Area under the graph =area of triangle ABC+ Area of rectangle OACD $=\frac{1}{2}t(v-u)+ut$ $S=ut+\frac{1}{2}at^2$	1 1 ½ 1 ½
19	 b)without taking friction $\frac{mv2}{r}$=Nsin$\boldsymbol{\Theta}$ mg= Ncos$\boldsymbol{\Theta}$ Tan$\boldsymbol{\Theta}=\frac{v^2}{Rg}$ $V=\sqrt{Rgtan\Theta}$	2 1 1
20	a)KE=½mv^2 PE= $\frac{GMm}{R}$ To escape from earth, KE=PE $V_e=\sqrt{\frac{2GM}{R}}$ $=\sqrt{2gR}$ b)$v_e=\sqrt{v_o}$	1 1 1 1
21	a)$I=mr^2/2$ $I_z=I_X+I_Y$ $2I_D=I_z$ $I_D= mr^2/4$ b) M=20kg, R=0.5/2=0.25m, ϑ=1200/60=20 (i)L=Iω $= mr^2/2 X2\pi\vartheta$ $= 1256kgm^2/s$ ii) KE_{rot}=½$I\omega^2$ $=7.88x10^4$ J	1 1

22	a)From Hooke's law, F=-kx b)  $W = \int_0^x kx\,dx = k\frac{x^2}{2}$ PE=½kx^2	1 1 1 1
23	a)principle of homogeneity b)[F]=[$\frac{mv^2}{R}$] [MLT^{-2}]=[ML^{2}T^{-2}/L] =[MLT^{-2}] c) Tαm^{a}l^{b}g^c According to principle of homogeneity [T]=[M]^a[L]^b[LT^{-2}]^C [T]= [M^{a}L^{b+c}T^{-2c}] Equating the powers, ⇒a=0 ⇒ Time period of oscillation is independent of mass of the bob -2c=1 ⇒c=-1/2 b+c = 0 - 1/2+ b =0 b=1/2 Giving values to a,b and c in first equation T=k$\sqrt{\frac{l}{g}}$	1 1 1 1 1
24	a)  b)at maximum height u_y=0 u_x=usin$\boldsymbol{\theta}$ S=H, a=-g V^2-u^2=2as becomes,	1 1 1

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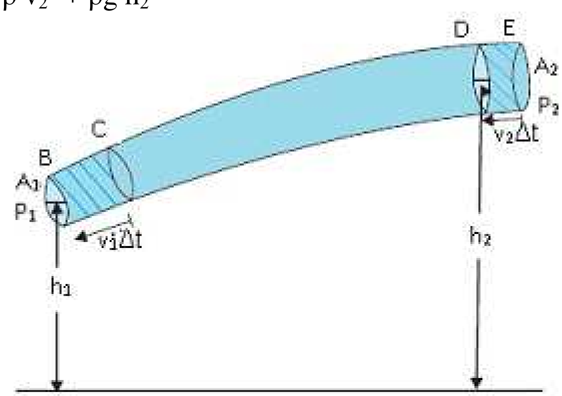
	$H=\frac{u^2 sin^2\theta}{2g}$ c)$\boldsymbol{\Theta}=45^0$	1 1
25	a)statement b)$\zeta=\frac{dL}{dt}$ c)mass increases, moment of inertia increases. L=Iω, or ω decreases with moment of inertia ω=2π/T thus T increases.	1 1 1 1 1
26	a) streamline flow, the flow is steady, and there is no friction b) Initial distance moved by fluid from B to C=$v_1\Delta t$. In the same interval Δt fluid distance moved by D to E = $v_2\Delta t$. Net work done on the fluid is $W_1 - W_2 = (P_1A_1v_1\Delta t - P_2A_2v_2\Delta t)$ By the Equation of continuity Av=constant. Therefore Work done = $(P_1 - P_2)\ \Delta V$ $\Delta K = (½)m\ (v_2^2 - v_1^2)$, $\Delta U = mg\ (h_2 - h_1)$. The total change in energy $\Delta E = \Delta K + \Delta U$ $\Delta m = \rho\Delta V$ $\Delta E = 1/2\ \rho\Delta V\ (v_2^2 - v_1^2) + \rho g\Delta V\ (h_2 - h_1)$ By using work-energy theorem: W = ΔE $(P_1-P_2)\ \Delta V = (1/2)\ \rho\Delta V\ (v_2^2 - v_1^2) + \rho g\Delta V\ (h_2 - h_1)$ $P_1 + (1/2)\ \rho\ v_1^2 + \rho g\ h_1 = (1/2)\ \rho\ v_2^2 + \rho g\ h_2$  ○ $P + (1/2)\ \rho v^2 + \rho g\ h$ = constant.	1 1 1 1 1 1