الأزهر الشريف
قطاع المعاهد الأزهرية

نموذج رقم (١)

نموذج إجابة لامتحان الشهادة الثانوية الأزهرية

للعام الدراسي ١٤٤١هـ - ٢٠١٩ / ٢٠٢٠م

الدور الثاني

القسم : العلمي(نظام حديث)

مادة : الديناميكا(مترجم)

عدد الأسئلة (٥)

علما بأن النموذج استرشاديا

Q1 (3 marks)

	Solution	mark
1	2	$\frac{1}{2}$
2	960	$\frac{1}{2}$
3	$\frac{6}{5}$ ⟌ 39	$\frac{1}{2}$
4	]366[	$\frac{1}{2}$
5	5	$\frac{1}{2}$
6	0	$\frac{1}{2}$

Question (2) [2 marks]

(a) $\therefore V = \int 3\,dt = 3t + C$ ½

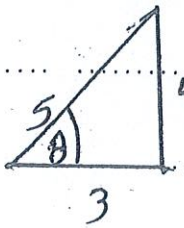
$\therefore V_0 = -1$ at $t = 0$ $\therefore C = -1$ ½

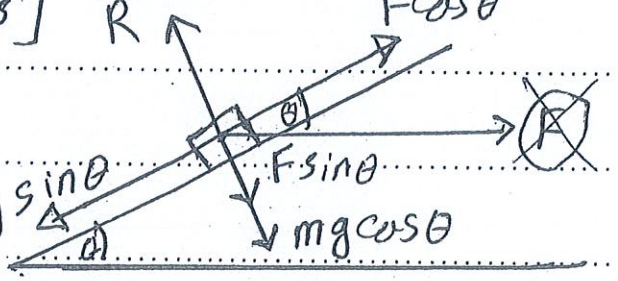
$\therefore V = 3t - 1$ ½

$\therefore$ The Coverd distance $= \int_0^2 |3t - 1|\,dt$

$= \left[t - \frac{3t^2}{2}\right]_0^{\frac{1}{3}} + \left[\frac{3t^2}{2} - t\right]_{\frac{1}{3}}^{2} = \frac{13}{3}$ ½

(b) [2marks]





$\therefore F\cos\theta = 30 \times \frac{3}{5} = 18$ Kg.wt

$W\sin\theta = 25 \times \frac{4}{5} = 20$ Kg.wt } ½

$\therefore F\cos\theta < W\sin\theta$ $\therefore$ The motion is downward with a Uniform acceleration a ½

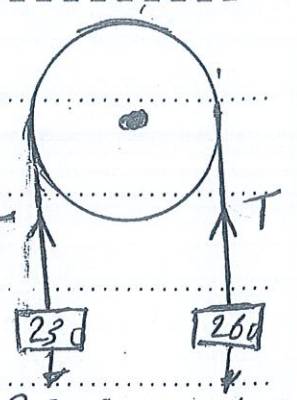
$\therefore ma = mg\sin\theta - F\cos\theta$

$\therefore a = \frac{98}{125}$ m/sec² ½

$\therefore R = F\sin\theta + mg\cos\theta$

$\therefore R = 39$ Kg.wt ½

Question (3) (2 marks)



(a) $260a = 260g - T$

$230a = T - 230g$ } by adding $\frac{1}{2}$

$\therefore 490a = 30g$

$\therefore a = 60\ cm/sec^2$ $\frac{1}{2}$

After one second from cutting the string

$\therefore V = V_0 + at$ $\therefore V = 0 + 60 \times 1 = 60\ cm/sec.$

$\therefore S = V_0 t + \frac{1}{2} a t^2$ $\therefore S = 0 + \frac{1}{2} \times 60 \times (1)^2 = 30\ cm$

$\therefore$ The mass 260 is at distance $70 - 30 = 40\ cm$ from the surface of the ground

$\therefore V^2 = V_0^2 + 2as = (60)^2 + 2 \times 980 \times 4$

$\therefore V = 20\sqrt{205}\ cm/sec = \frac{\sqrt{205}}{5}\ m/sec$ $\frac{1}{2}$

The mass 230 is at distance $70 + 30 = 100\ cm$ from the ground surface $\therefore V^2 = V_0^2 + 2as$

$\therefore V^2 = (60)^2 + 2 \times 980 \times 100$

$\therefore V = 20\sqrt{499}\ cm/sec = \frac{\sqrt{499}}{5}\ m/sec$ $\frac{1}{2}$

(2 marks)

(b) The Impulse $= F \cdot t$ $\frac{1}{2}$ $\therefore I = 40\ Newton.sec$ $\frac{1}{2}$

The Impulse = Change in momentum $= m(V - V_0)$ $\frac{1}{2}$

$\therefore V = 10\ m/sec$ $\frac{1}{2}$

Question (4) (2 marks)

(a) $\because R \propto V^2$

$\therefore \frac{m_1}{m_2} = \frac{(V_1)^2}{(V_2)^2}$ ½

$\therefore \frac{1920}{4320} = \frac{(72)^2}{V_2^2}$ 1

$\therefore V_2 = 108$ Km/h ½

(b) (first) (2 marks)

when the lift moves upwards with an acceleration $a = 1.4$ m/sec²

$\therefore R = m(a + g)$ ½

$\therefore m = 63$ kg ½

(second) when the lift moves downwards with acceleration $a = 1.4$ m/sec²

$\therefore R = m(g - a)$ ½

$\therefore R = 54$ Kg.wt ½

Question (5)

(a) $\Delta H = m \int_{t_1}^{t_2} a \, dt$ (1/2)

$\therefore \Delta H = 8 \int_{3}^{5} (2t - 6) \, dt$ (1/2)

$= 8 \left[t^2 - 6t \right]_3^5$ (1/2)

$= 32 \text{ Kg m/sec}$ (1/2)

(b) $\because \vec{R} = \vec{F_1} + \vec{F_2} + \vec{F_3}$

$= (a+2)\hat{i} + (b+3)\hat{j} + (3+c)\hat{k}$ (1/2)

$\because \vec{V} = \frac{d\vec{s}}{dt} = \hat{i} + (t+1)\hat{j}$

$\therefore \vec{a} = \frac{d\vec{V}}{dt} = \hat{y}$ (1/2)

$\because \vec{R} = m\vec{a}$ and by Comparison (1/2)

$\therefore \boxed{a = -2} \quad \boxed{b = -2} \quad \boxed{c = -3}$ (1/2)