

SOLUCIONES EXAMEN FINAL VU10 2014 FISIKA I

10

a) $v_y = v_{oy} - g \cdot t = 0 \Rightarrow v_{oy} = g \cdot t$

$y = v_{oy}t - \frac{1}{2} g t^2 \Rightarrow$

$0,8 = g \cdot t^2 - \frac{1}{2} g t^2 = \frac{1}{2} g t^2 \Rightarrow t = 0,4 \text{ s}$

$v_o \text{ de } (30^\circ) = g \cdot t \Rightarrow v_o = 8 \text{ m/s}$

b) Autor del choque: Proyectil $\Rightarrow v = v_{ox} = 4\sqrt{3} \text{ m/s}$

Choque: $\vec{p} = cte \Rightarrow m v_{ox} = (m + M) \cdot v_f$

$v_f = \frac{m \cdot v_{ox}}{m + M} = \frac{20 \times 4\sqrt{3}}{70} = 1,98 \text{ m/s}$

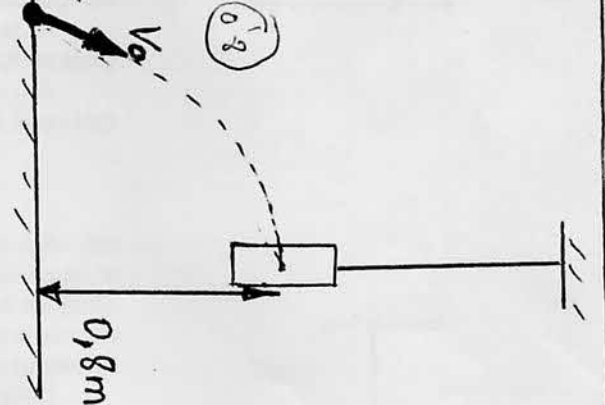
$E_{uci} = \frac{1}{2} m v_{ox}^2 = 0,4 \text{ J}, E_{uf} = \frac{1}{2} (m + M) v_f^2 = 0,14 \text{ J}$

$\Delta E_u = -0,34 \text{ J}$

$E_{uci} = E_{uf} \Rightarrow \frac{1}{2} (m + M) v_f^2 = (m + M) g h \Rightarrow h = 0,19 \text{ m}$



0,5



20

a) Nov. del c.u.: $W - T = m \cdot a_{cu}$
Rotación: $T \cdot R = I \cdot \alpha$
 $a_{cu} = \alpha \cdot R$

For. cinemática: $s = v_o t + \frac{1}{2} a t^2$

$a_{cu} = \frac{2s}{t^2} = 0,88 \text{ m/s}^2$

$T = -m \cdot a_{cu} + W = m \cdot (g - a_{cu}) = 250 \times 10^{-3} (9,8 - 0,8)$

b) $T = \frac{T \cdot R}{d} = \frac{T \cdot R^2}{a_{cu}} = \frac{1,01 \times 10^{-3} \text{ kg} \cdot \text{m}^2}{0,063 \text{ m}} = 2,23 \text{ N}$

Radio de giro: $I = m \cdot k^2 \Rightarrow k = \sqrt{\frac{I}{m}} = 0,063 \text{ m}$

c) $E_{c,b} = E_{p,b} = m g h = 0,98 \text{ J}$

d) $\omega^2 = \omega_o^2 + 2 \alpha \theta = 2 \frac{a}{R}$

$v_{cu} = \omega \cdot R = \sqrt{2 a \cdot \theta \cdot R} = 0,47 \text{ m/s}$

0,5

30

a) $E = p_{atm} \cdot g \cdot V_{sum}$
 $E_1 = p \cdot g \cdot S \cdot h = 10^3 \times 10 \times 80 \times 10^{-4} \times 1,5 = 120 \text{ N}$

$E_2 = p \cdot g \cdot L^3 = 10^3 \times 10 \times (0,1)^3 = 10 \text{ N}$

$\Sigma \vec{F} = m \cdot \vec{a} \Rightarrow E_1 + E_2 - (W_1 + W_2) = (m_1 + m_2) a$

$W_1 = p \cdot V = p \cdot g \cdot h = 0,3 \times 10^3 \times 5 \text{ h} = 3,6 \text{ Kg}$

$W_2 = 6 \text{ Kg}$

$a = \frac{E_1 + E_2 - (W_1 + W_2)}{m_1 + m_2} = \frac{120 + 10 - (36 + 60)}{9,6} = 3,75 \text{ m/s}^2$

b) $\Sigma \vec{F} = 0 \Rightarrow E_1' + E_2 = W_1 + W_2$

$E_1' = p_{atm} \cdot g \cdot V_{sum} = p \cdot g \cdot S \cdot x$

$x = \frac{E_1'}{p_{atm} \cdot g \cdot S} = 1,07 \text{ m}$

1,15

40

1) $F_{rozMAX} = \mu_e N = \mu m g = 0,25 \cdot 2 \cdot 10 = 5 \text{ N}$

2) $F_{rozMAX} = 5 \text{ N} = m_2 a_{MAX} = 2 \cdot a_{MAX} \Rightarrow a_{MAX} = 2,5 \text{ m/s}^2$

3) $a_{MAX} = \omega^2 A \Rightarrow A = \frac{a_{MAX}}{\omega^2} = \frac{a_{MAX}}{(2\pi/T)^2} = \frac{0,5^2 \cdot 2,5}{4\pi^2} = 0,0158 \text{ m}$

$\frac{0,5^2 \cdot 2,5}{4\pi^2} = 0,0158 \text{ m}$

4) $f = \frac{1}{T} = \frac{1}{0,5} = 2 \text{ Hz}$

0,1