

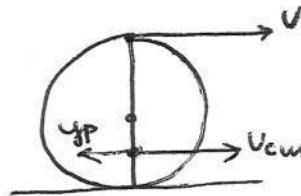
Διαγώνισμα Προσομοίωσης Β' Λυκ 3/11/2019

ΘΕΜΑ Α $A_1 - \gamma$ $A_2 - \gamma$ $A_3 - \beta$ $A_4 - \alpha$ $A_5 \Lambda \Sigma \Lambda \Lambda \Sigma$

ΘΕΜΑ Β

B1 - γ

$U = 2U_{cm}$



$U_z = U_{cm} - \frac{U_{cm}}{2} = \frac{U_{cm}}{2}$

$U_z = \frac{U_{cm}}{4}$

B2 - β

$mU = 2mU_k \Rightarrow U_k = \frac{U}{2} < \begin{cases} K_a = \frac{1}{2} mU^2 \\ K_T = \frac{1}{2} 2m \frac{U^2}{4} = \frac{1}{2} \frac{1}{2} mU^2 = \frac{K_a}{2} \end{cases}$

$Q = K_a - K_T = \frac{1}{2} K_a \rightarrow \pi = 50\%$

B3 - α

$U_B = U_{cm} \sqrt{2 + 2\cos 60^\circ} = U_{cm} \sqrt{2 + 2 \cdot \frac{1}{2}} = \sqrt{3} U_{cm} \quad \left. \begin{array}{l} \\ U_A = \sqrt{2} U_{cm} \end{array} \right\} \frac{U_A}{U_B} = \sqrt{\frac{2}{3}}$

ΘΕΜΑ Γ

$R = 0,1m \quad \alpha_{\gamma w_1} = 4 \text{ rad/s}^2 \quad t_1 \quad X_{cm_1} = 5m, \quad a_{cm_1} = R\alpha_{\gamma w_1} = 0,4 \text{ m/s}^2$
 $\alpha_{\gamma w_2} \quad \Delta t = 2 \text{ sec} \quad v_{cm} = 0, \quad \omega = 0$

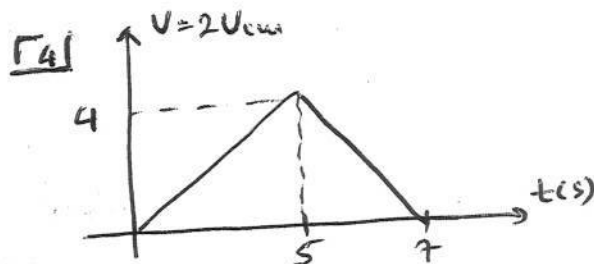
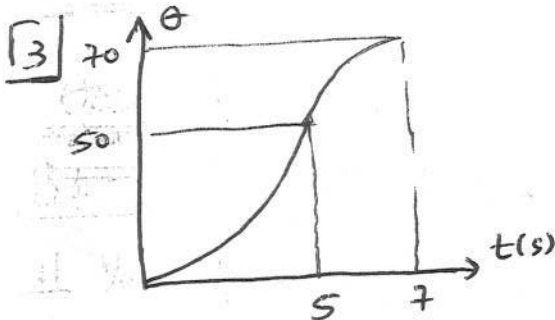
Γ1 $X_{cm_1} = \frac{1}{2} a_{cm_1} t_1^2 \Rightarrow t_1 = \sqrt{\frac{2X_{cm_1}}{a_{cm_1}}} = \sqrt{\frac{2 \cdot 5}{0,4}} = \sqrt{25} \Rightarrow \boxed{t_1 = 5 \text{ sec}}$

Γ2 $v_{cm_1} = a_{cm_1} t_1 = 0,4 \cdot 5 = 2 \text{ m/s} \rightarrow \omega_1 = \frac{v_{cm_1}}{R} = 20 \text{ rad/s}$

$v_{cm} = v_{cm_1} - a_{cm_2} \Delta t \Rightarrow a_{cm_2} = \frac{v_{cm_1}}{\Delta t} = \frac{2}{2} \Rightarrow a_{cm_2} = 1 \text{ m/s}^2 \rightarrow \alpha_{\gamma w_2} = 10 \text{ rad/s}^2$

$\theta_1 = \frac{1}{2} \alpha_{\gamma w_1} t_1^2 = \frac{1}{2} 4 \cdot 25 = 50 \text{ rad}, \quad \theta_2 = \frac{\omega_1^2}{2\alpha_{\gamma w_2}} = \frac{400}{20} = 20 \text{ rad}$

$N = \frac{\theta_1 + \theta_2}{2\pi} = \frac{50 + 20}{2\pi} \Rightarrow \boxed{N = \frac{35}{\pi} \text{ στροφ}}$



Γ5 $t_2 = 2 \text{ sec} \rightarrow \theta_2 = \frac{1}{2} \alpha_{\gamma w_1} t_2^2 = \frac{1}{2} 4 \cdot 4 = 8 \text{ rad}$
 $t_3 = 3 \text{ sec} \rightarrow \theta_3 = \frac{1}{2} \alpha_{\gamma w_1} t_3^2 = \frac{1}{2} 4 \cdot 9 = 18 \text{ rad}$
 $\left. \begin{array}{l} \Delta \theta = 18 - 8 = 10 \text{ rad} \\ N = \frac{\Delta \theta}{2\pi} = \frac{10}{2\pi} \Rightarrow \boxed{N = \frac{5}{\pi}} \end{array} \right\}$

ΘΕΜΑ Δ

$$\Delta_1 \quad v = \sqrt{2gR} = \sqrt{25} = 5 \text{ m/s.}$$

$$\text{ΘΕΜΕ } m_1: \frac{1}{2} m_1 v_1^2 - \frac{1}{2} m_1 v^2 = -\mu m_1 g \cdot d \Rightarrow v_1^2 - v^2 = -2\mu g d$$

$$\Rightarrow 16 - 25 = -45\mu \Rightarrow 45\mu = 9 \Rightarrow \boxed{\mu = 0,2}$$

$$\Delta_2 \quad \left| \frac{dP}{dt} \right| = |\Sigma F_x| = T = \mu m_1 g = 0,2 \cdot 1 \cdot 10 = 2 \text{ N}$$

$$\Delta_3 \quad \text{ΑΔΟ } m_1 v_1 = (m_1 + m_2) v_k \Rightarrow 4 = 4 v_k \Rightarrow v_k = 1 \text{ m/s}$$

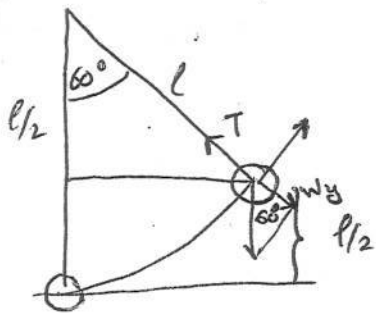
$$\left. \begin{aligned} K_{\text{πειν}} &= \frac{1}{2} m_1 v_1^2 = \frac{1}{2} \cdot 1 \cdot 16 = 8 \text{ J} \\ K_{\text{μετα}} &= \frac{1}{2} m_{\text{ολ}} v_k^2 = \frac{1}{2} \cdot 4 \cdot 1 = 2 \text{ J} \end{aligned} \right\} \varphi = K_{\text{πειν}} - K_{\text{μετα}} = 6 \text{ J}$$

$$\pi = \frac{\varphi}{K_{\text{πειν}}} 100\% = \frac{6}{8} 100\% \Rightarrow \boxed{\pi = 75\%}$$

$$\Delta_4 \quad \Delta P_i = P_{iT} - P_{i\alpha} = m_1 v_k - m_1 v_1 = m_1 (v_k - v_1) = 1 - 4 \Rightarrow \boxed{\Delta P = -3 \text{ kg m/s}}$$

$$\Delta p = \Delta P = 3 \text{ kg m/s} \quad (\leftarrow)$$

Δ5



$$\frac{1}{2} m_{\text{ολ}} v^2 - \frac{1}{2} m_{\text{ολ}} v_k^2 = -m_{\text{ολ}} g \frac{l}{2}$$

$$v^2 - v_k^2 = -gl$$

$$v^2 = v_k^2 - gl = 1 - 0,5 = 0,5$$

$$v = \frac{\sqrt{2}}{2} \text{ m/s.}$$

$$\sin \phi = \frac{l/2}{l} = \frac{1}{2} \rightarrow$$

$$\underline{\underline{\phi = 60^\circ}}$$

$$T - W_y = \frac{m_{\text{ολ}} v^2}{l} \Rightarrow T = m_{\text{ολ}} g \sin 60^\circ + \frac{m_{\text{ολ}} v^2}{l}$$

$$T = 40 \frac{1}{2} + \frac{4 \cdot \frac{1}{2}}{5 \cdot 10^{-2}} = 20 + 40$$

$$\boxed{T = 60 \text{ N}}$$