ΠΑΝΕΛΛΑΔΙΚΕΣ ΕΞΕΤΑΣΕΙΣ Γ΄ ΤΑΞΗΣ ΗΜΕΡΗΣΙΟΥ ΓΕΝΙΚΟΥ ΛΥΚΕΙΟΥ

ΦΥΣΙΚΗ ΠΡΟΣΑΝΑΤΟΛΙΣΜΟΥ (ΝΕΟ ΣΥΣΤΗΜΑ)

ΘΕΜΑ Α

Α1) β Α2) γ Α3) β Α4) δ Α5) Σ – Λ – Σ – Λ – Λ

ΘΕΜΑ Β

Β1

α) σωστό (iii)

β)

$$f_1 = \frac{U}{U+U_s}\cdot f_s = \frac{U}{U+\frac{U}{10}}\cdot f_s \rightarrow f_1 = \frac{10}{11}\cdot f_s$$

$$f_2 = \frac{U}{U-U_s}\cdot f_s = \frac{U}{U-\frac{U}{10}}\cdot f_s \rightarrow f_2 = \frac{10}{9}\cdot f_s$$

$$\frac{f_1}{f_2} = \frac{\frac{10}{11}\cdot f_s}{\frac{10}{9}\cdot f_s} \rightarrow \frac{f_1}{f_2} = \frac{9}{11}$$

Β2

α) σωστό (i)

β) $$U_O = \omega \cdot A' = \frac{2\pi}{T}2A\sigma\upsilon\nu\frac{2\pi\chi}{\lambda} = \frac{2\pi}{T}2A\sigma\upsilon\nu\frac{2\pi 9\lambda}{8\lambda} = \frac{2\pi}{T}2A\sigma\upsilon\nu\frac{9\pi}{4} = \frac{2\pi}{T}2A\sigma\upsilon\nu\frac{\pi}{4} = \frac{2\pi A\sqrt{2}}{T}$$

Β3

α) σωστό (ii)

β) $\frac{1}{2}\cdot p\cdot u_A^2 = \Lambda$

$$\frac{1}{2}\cdot p\cdot u_B^2 = \frac{1}{2}\cdot p\cdot 4\cdot u_A^2 = 4\cdot\Lambda$$

$$\Pi_A = \Pi_B \rightarrow A_A\cdot U_A = A_B\cdot U_B \rightarrow 2A_B\cdot U_A = A_B\cdot U_B \rightarrow U_B = 2\cdot U_A$$

$$\Delta P = P_B - P_A = \frac{1}{2}\cdot p\cdot u_B^2 - \frac{1}{2}\cdot p\cdot u_A^2 = 4\Lambda - \Lambda \rightarrow \Delta P = 3\Lambda$$

ΘΕΜΑ Γ

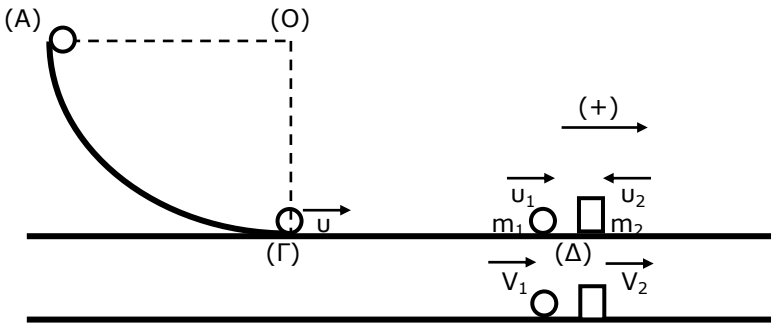
Γ1

Α.Δ.Ε. (Α) – (Γ) :

$$m_1\cdot g\cdot R = \frac{1}{2}\cdot m_1\cdot\upsilon^2 \Rightarrow$$

$$\Rightarrow \upsilon = \sqrt{2\cdot g\cdot R} = \sqrt{2\cdot 10\cdot 5} \Rightarrow$$

$$\Rightarrow \upsilon = 10\ m/\sec$$



Γ2

ΑΔΕ(Γ,Δ) : $\frac{1}{2}\cdot m_1\cdot u^2=\frac{1}{2}\cdot m_1\cdot u_1^2+\mu\cdot m_1\cdot g\cdot S\Rightarrow\frac{1}{2}\cdot 100=\frac{1}{2}\cdot u_1^2+0{,}5\cdot 10\cdot 3{,}6\Rightarrow$

$\Rightarrow 100=u_1^2+36\Rightarrow u_1^2=64\Rightarrow u_1=8\ \ m/\sec$

$V_1=\frac{m_1-m_2}{m_1+m_2}u_1+\frac{2m_2}{m_1+m_2}u_2=\frac{m_1-3m_1}{m_1+3m_1}\cdot 8+\frac{2\cdot 3\cdot m_1}{m_1+3m_1}(-4)\rightarrow V_1=-10m/sec$

$V_2=\frac{2m_1}{m_1+m_2}u_1+\frac{m_2-m_1}{m_1+m_2}u_2=\frac{2\cdot m_1}{m_1+3m_1}(8)+\frac{3m_1-m_1}{m_1+3m_1}(-4)\rightarrow V_2=2m/sec$

Άρα V_1 = 10 m/sec με κατεύθυνση προς τα αριστερά ,
και V_2 = 2 m/sec με κατεύθυνση προς τα δεξιά .

Γ3

$\Delta P_2=P_2^{\tau\varepsilon\lambda}-P_2^{\alpha\rho\chi}\rightarrow\Delta P_2=-m_2V_2-m_2u_2\rightarrow\Delta P_2=-18kgm/sec$

Άρα με μέτρο $\Delta p_2=18\ \ Kgr\cdot m/\sec$
Κατεύθυνση προς τα δεξιά.

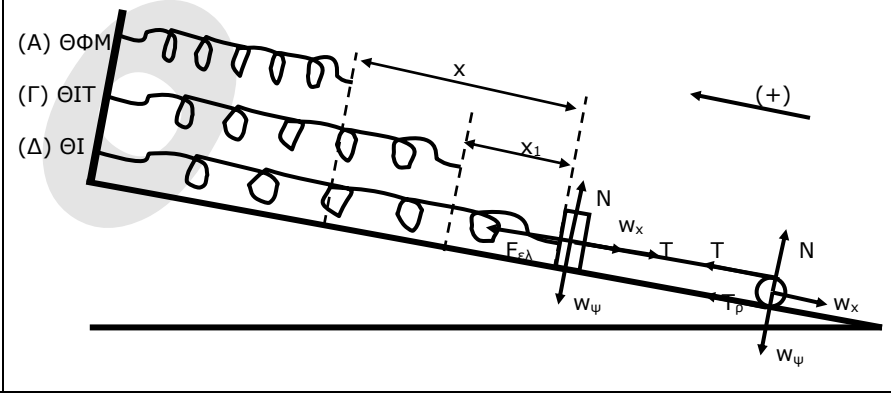
Γ4

$$\Pi\%=\frac{\left|K_1^{\alpha\rho\chi}-K_1^{\tau\varepsilon\lambda}\right|}{K_1^{\alpha\rho\chi}}=\frac{\left|\frac{1}{2}\cdot m_1\cdot u_1^2-\frac{1}{2}\cdot m_1\cdot V_1^2\right|}{\frac{1}{2}\cdot m_1\cdot u_1^2}=\frac{|-36|}{64}=0{,}56\rightarrow\Pi\%=56{,}25\%$$

ΘΕΜΑ Δ

Δ1

$W_{mx}=mg\eta\mu\varphi=5N$
$W_{Mx}=Mg\eta\mu\varphi=10N$



Μ: $\Sigma\tau=0\rightarrow TR-T_\rho R=0\ \rightarrow T=T_\rho$

$\Sigma F_x=0\Rightarrow T+T_\rho=w_{Mx}\Rightarrow 2\cdot T=10\Rightarrow T=5\ \ N$

m: $\Sigma Fx=0\rightarrow F_{\varepsilon\lambda}=W_{mx}+T\rightarrow K\cdot x=5+5\rightarrow 100x=10\rightarrow x=0{,}1m$

Δ2)

(t=0 και x=-A) , άρα $\varphi_o=\frac{3\pi}{2}$ rad .

Θ.Ι.Τ : $\Sigma Fx=0\rightarrow F'_{\varepsilon\lambda}=W_{mx}=K\cdot x_1=5\rightarrow 100\cdot x_1=5\rightarrow x_1=0.05m$

$F_O=m\cdot\omega^2\cdot A=1\cdot 100\cdot 0{,}05\rightarrow F_O=5N$

$A=x-x_1\rightarrow 0{,}1-0{,}05\rightarrow A=0{,}05m$

$D=K=m\cdot\omega^2\rightarrow 100=1\cdot\omega^2\rightarrow\omega=10rad/sec$

και $F=-F_O\cdot\eta\mu(\omega t+\varphi_0)\rightarrow -5\cdot\eta\mu(10t+\frac{3\pi}{2})$ (S.I.)

Δ3) $\Sigma\tau = I \cdot \alpha_{\gamma\omega\nu} \rightarrow T_p' \cdot R = \frac{1}{2} \cdot M \cdot R^2 \alpha_{\gamma\omega\nu} \rightarrow T_p' = \frac{1}{2} \cdot M \cdot \alpha_{cm} \rightarrow T_p' = \alpha_{cm}$

$\Sigma F = M \cdot \alpha_{cm} \rightarrow Mg\eta\mu\varphi - T_p' = M \cdot \alpha_{cm} \rightarrow$

$\Sigma Fx = ma_{cm} \rightarrow mg\,\sigma\upsilon\nu\varphi - T_{\sigma\tau} = m \cdot a_{cm} \rightarrow 10 - a_{cm} = 2a_{cm} \rightarrow a_{cm} = \frac{10}{3}\frac{m}{s^2}$

$a_{cm} = \alpha_{\gamma\omega\nu} \cdot R \rightarrow \alpha_{\gamma\omega\nu} = \frac{100}{3}\frac{rad}{s^2}$

$N = \frac{\theta}{2\pi} \rightarrow \theta = 24rad$

$\theta = \frac{1}{2} \cdot \alpha_{\gamma\omega\nu} \cdot t^2 \rightarrow t^2 = \frac{24 \cdot 6}{100} = 1{,}2sec$

$\omega = \alpha_{\gamma\omega\nu} \cdot t = \frac{100}{3} \cdot 1{,}2 = \frac{120}{3} = 40rad/sec$

$L = I \cdot \omega = \frac{1}{2} \cdot M \cdot R^2 \cdot \omega \rightarrow L = 0{,}4\,Kgm/s$

Δ4)

$$\frac{\Delta K}{\Delta t} = \Sigma F \cdot \upsilon_1 + \Sigma\tau \cdot \omega_1$$

Μ: $\Sigma F = W_{Mx} - T_p' = Mg\eta\mu\varphi - T_p' = \frac{20}{3}N$

$\upsilon_1 = \alpha_{cm} \cdot t = \frac{10}{3} \cdot 3 \Rightarrow \upsilon_1 = 10\ m/\sec$

$\Sigma\tau = T_p' \cdot R = \frac{10}{3} \cdot 0{,}1 \rightarrow \Sigma\tau = \frac{1}{3}N \cdot m$

$\omega_1 = \alpha_{\gamma\omega\nu} \cdot t \rightarrow \omega_1 = 100rad/sec$

$$\frac{\Delta K}{\Delta t} = \Sigma F \cdot \upsilon_1 + \Sigma\tau \cdot \omega_1$$

$\frac{\Delta K}{\Delta t} = \frac{20}{3} \cdot 10 + \frac{1}{3} \cdot 100 \rightarrow \frac{\Delta K}{\Delta t} = 100\,J/sec$

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