ΒΑΚΑΛΗΣ
ΦΡΟΝΤΙΣΤΗΡΙΑ
ΑΠΟ ΤΟ 1967

ΦΥΣΙΚΗ

ΘΕΤΙΚΗΣ & ΤΕΧΝΟΛΟΓΙΚΗΣ ΚΑΤΕΥΘΥΝΣΗΣ

ΑΠΑΝΤΗΣΕΙΣ ΣΤΑ ΘΕΜΑΤΑ ΕΞΕΤΑΣΕΩΝ 2008

ΘΕΜΑ 1ο

1. δ
2. α
3. γ
4. δ
5. α: Λ
   β: Λ
   γ: Λ
   δ: Σ
   ε: Σ

ΘΕΜΑ 2ο

1. $C = \frac{12 \cdot 10^{12}}{6 \cdot 10^{4}} = 2 \cdot 10^{8} \, \text{m/s}$

Άρα $n = \frac{Co}{C} = 1,5 \Rightarrow$ Σωστή η β.

2. $\frac{U_E}{U_B} = \frac{U_E}{E - U_E} = \frac{\frac{1}{2}\frac{q^2}{C}}{\frac{1}{2}\frac{Q^2}{C} - \frac{1}{2}\frac{q^2}{C}} = \frac{q^2}{Q^2 - q^2} = \frac{Q^2/9}{Q^2 - Q^2/9} = \frac{1}{8}$.

Σωστή η α.

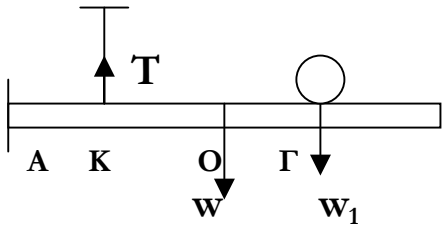
3. $f_1 = \frac{998\pi}{2\pi} = 499\text{H}$ $f_2 = \frac{1002\pi}{2\pi} = 501\text{Hz}$

άρα $f_\delta = |f_1 - f_2| = 2\text{Hz}$

και $T_\delta = \frac{1}{f_\delta} = 0{,}5\ \text{sec} \Rightarrow$ Σωστή η γ.

ΘΕΜΑ 3ο

α)



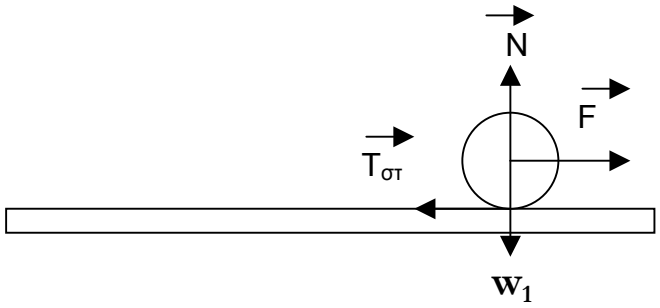
$\Sigma\tau\ (A)=0\ \tau_T+\tau_w+\tau_{W1}=0 \Rightarrow$

$T\frac{L}{4}-w\frac{L}{2}-w_1\frac{3L}{4}=0 \Rightarrow$

$T\frac{L}{4}-w\frac{L}{2}-w_1\frac{3L}{4}=0 \Rightarrow \frac{T}{4}=\frac{w}{2}+\frac{3w_1}{4} \Rightarrow T=2w+3w_1 \Rightarrow$

$T=2Mg+3mg=$**T=115 N**

β)



Μεταφορική κίνηση: $\Sigma F=ma_{cm} \Rightarrow F-T_{\sigma\tau}=ma_{cm}$ (1)

Στροφική κίνηση: $\Sigma\tau=I\,\alpha_{\gamma\omega\nu} \Rightarrow T_{\sigma\tau}r=\frac{2}{5}mr^2\frac{\alpha_{cm}}{r} \Rightarrow T_{\sigma\tau}=\frac{2}{5}m\alpha_{cm}$ (2)

(1), (2) $\Rightarrow F-\frac{2}{5}ma_{cm}=ma_{cm} \Rightarrow F=\frac{7}{5}ma_{cm} \Rightarrow$ **$\alpha_{cm}=2m/s^2$**

γ) $x=\frac{L}{4}=\frac{1}{2}\alpha_{cm}t^2, \Rightarrow t^2=\frac{L}{2\alpha_{cm}}=\frac{4}{2\cdot 2} \Rightarrow t_1=1s$

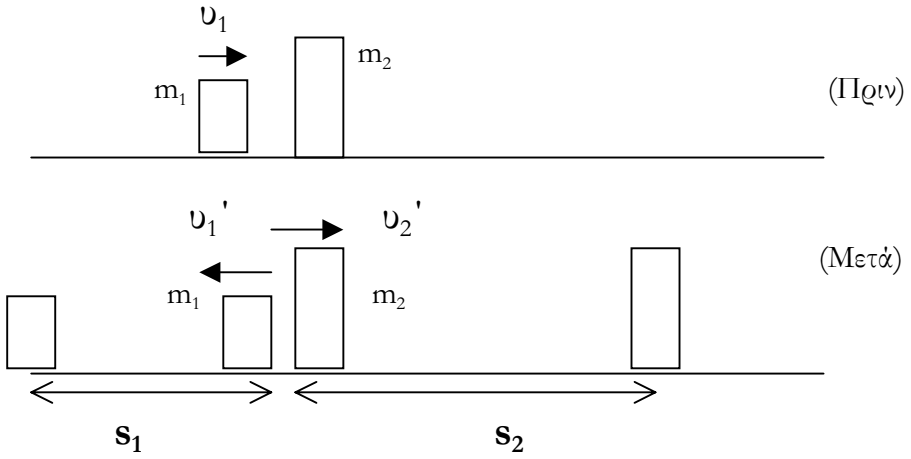
$\upsilon_{cm}=\alpha_{cm}t \Rightarrow \upsilon_{cm}=2$ m/s.

δ) $\omega=\frac{\upsilon_{cm}}{r}=\frac{2}{0.2}=10$ rod/s

$L=I\omega=\frac{2}{5}mr^2\omega \Rightarrow L=0.4\ \text{Kg}\frac{m^2}{s}$

ΘΕΜΑ 4ο

α)



$\upsilon'_1=\frac{m_1-m_2}{m_1+m_2}\upsilon_1 \Rightarrow -9=\frac{m_1-m_2}{m_1+m_2}15 \Rightarrow$

$-9m_1-9m_2=15m_1-15m_2 \Rightarrow 6m_2=24m_1 \Rightarrow \frac{m_1}{m_2}=\frac{1}{4}$

β) $\upsilon_2'=\frac{2m_1}{m_1+m_2}\upsilon_1=\frac{2m_1}{m_1+4m_1}\upsilon_1 \Rightarrow \upsilon'_2=\frac{2}{5}\cdot 15 \Rightarrow \upsilon'_2=6\,m/s_2$

γ)

$$\Pi\%=\frac{K_2'}{K_1'}100\%=\frac{\frac{1}{2}m_2\upsilon_2'^2}{\frac{1}{2}m_1\upsilon_1^2}100\% \Rightarrow$$

$$\Pi\%=\frac{4m_1\cdot 36}{m_1\cdot 225}100\% \Rightarrow \Pi\%=64\%$$

δ) ΘΜΚΕ για m_1:

$$K_{\tau\varepsilon\lambda} - K_{\alpha\rho\chi} = W_{T1} \Rightarrow -\frac{1}{2} m_1 \upsilon'^{2}_{1} = -T_1 \cdot s_1 \Rightarrow \frac{1}{2} m_1 \upsilon'^{2}_{1} = \mu m_1 g s_1 \Rightarrow$$

$$s_1 = \frac{\upsilon'^{2}_{2}}{2\mu g} = \frac{81}{2} \Rightarrow s_1 = 40.5\,\text{m}$$

ΘΜΚΕ για m_2:

$$K_{\tau\varepsilon\lambda} - K_{\alpha\rho\chi} = W_{T2} \Rightarrow -\frac{1}{2} m_2 \upsilon'^{2}_{2} = -\mu m_2 g s_2 \Rightarrow$$

$$s_2 = \frac{\upsilon'^{2}_{2}}{2\mu g} = \frac{36}{2} = 18\,\text{m}$$

Άρα $d = s_1 + s_2 \Rightarrow d = 58.5\,\text{m}$