ΠΑΝΕΛΛΑΔΙΚΕΣ ΕΞΕΤΑΣΕΙΣ
Δ' ΤΑΞΗΣ ΕΣΠΕΡΙΝΟΥ ΓΕΝΙΚΟΥ ΛΥΚΕΙΟΥ
ΤΕΤΑΡΤΗ 13 ΙΟΥΝΙΟΥ 2018
ΕΞΕΤΑΖΟΜΕΝΟ ΜΑΘΗΜΑ:
ΦΥΣΙΚΗ ΠΡΟΣΑΝΑΤΟΛΙΣΜΟΥ

ΕΝΔΕΙΚΤΙΚΕΣ ΑΠΑΝΤΗΣΕΙΣ ΘΕΜΑΤΩΝ

ΘΕΜΑ Α

Α1. γ

Α2. δ

Α3. α

Α4. δ

Α5. **α)** Λάθος **β)** Σωστό **γ)** Λάθος **δ)** Σωστό **ε)** Λάθος

ΘΕΜΑ Β

Β1. $d_2 = \sqrt{4\lambda_1^2 + \frac{9\lambda_1^2}{4}} = \sqrt{\frac{25\lambda_1^2}{4}} = \frac{5\lambda_1}{2} = 2,5\lambda_1$

$d_2 - d_1 = 2,5\lambda_1 - \lambda_1 = \frac{\lambda_1}{2}$

$\upsilon\delta = \lambda_1 \cdot f_1 = \lambda_2 \cdot f_2 \rightarrow \lambda_1 \cdot \cancel{f_1} = \lambda_2 \cdot \cancel{f_2} \rightarrow \lambda_2 = \frac{\lambda_1}{2}$

$A' = \left|2A\sigma\upsilon\nu\pi\frac{d_2 - d_1}{\lambda_2}\right| = \left|2A\sigma\upsilon\nu\pi\frac{\frac{\lambda_1}{2}}{\frac{\lambda_1}{2}}\right| = 2A$

Επιλέγω (i)

Β2. $\Sigma\vec{\tau}_{\varepsilon\xi} = 0 \rightarrow \vec{L}_1 = \vec{L}_2 \rightarrow \cancel{m}\upsilon_1\cancel{R} = \cancel{m}\upsilon_1\frac{\cancel{R}}{2} \rightarrow \upsilon_2 = 2\upsilon_1$

$$W_F = K_2 - K_1 = \frac{1}{2}m\upsilon_2^2 - \frac{1}{2}m\upsilon_1^2$$
$$= \frac{1}{2}m\left(4\upsilon_1^2 - \upsilon_1^2\right)$$
$$= \frac{3}{2}m\upsilon_1^2$$
$$= \frac{3}{2}m\upsilon\omega^2R^2$$

Επιλέγω (iii)

Β3. $x = \upsilon_\Delta \cdot t$

$$4h = \upsilon_\Delta \cdot \sqrt{\frac{2h}{g}} \rightarrow \overset{8}{\cancel{16}} h^{\cancel{2}} = \upsilon_\Delta^2 \cdot \frac{\cancel{2}\cancel{h}}{g} \rightarrow \upsilon_\Delta = \sqrt{8gh}$$

<u>Εξ. συνέχειας:</u>

$$\Pi_\Gamma = \Pi_\Delta \rightarrow A_\Gamma \cdot U_\Gamma = A_\Delta \cdot U_\Delta \rightarrow 2A\Delta \cdot U_\Gamma = A_\Delta \cdot U_\Delta$$

$$\rightarrow U_\Delta = 2U_\Gamma \rightarrow \sqrt{8gh} = 2U_\Gamma$$

$$8gh = 4U_\Gamma^2$$

$$gh = \frac{U_\Gamma^2}{2}$$

<u>Εξ. Bernoulli:</u>

$$P_\Gamma + \frac{1}{2}pU_\Gamma^2 = P_\Delta + \frac{1}{2}pU_\Delta^2 + pgh$$

$$P_\Gamma - P_\Delta = \frac{1}{2}pU_\Delta^2 - \frac{1}{2}pU_\Gamma^2 + pgh$$

$$= \frac{1}{2}p4U_\Gamma^2 - \frac{1}{2}pU_\Gamma^2 + p \cdot \frac{U_\Gamma^2}{2}$$

$$= 2pU_\Gamma^2$$

Επιλέγω (i)

ΘΕΜΑ Γ

Γ1.

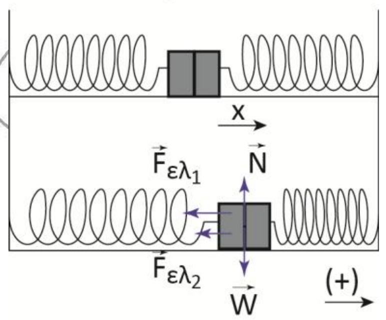
ΘΙ: $\upsilon_1 = \upsilon_{max} = \omega_1 \cdot A_1$

$$= \sqrt{\frac{K_1}{m_1}} \cdot \Delta\ell = 5 \cdot 0,4 = 2\ m/sec$$

ΑΔΟ $\vec{P}_{\alpha\rho\chi} = \vec{P}_{\tau\varepsilon\lambda} \rightarrow m_1 \cdot \upsilon_1 = (m_1 + m_2) \cdot \upsilon_2$

$$V_\Sigma = \frac{\upsilon_1}{2} = 1m/sec$$

ΘΙ, ΘΦΜ



Στη Θ.Ι. ΣF=0 (Θ.Φ.Μ)

Σε τυχαία θέση που απέχει x από τη Θ.Ι

$\Sigma F = -F_{\varepsilon\lambda_1} - F_{\varepsilon\lambda_2}$

$\Sigma F = -k_1 \cdot x - k_2 \cdot x$

$\Sigma F = -(k_1 + k_2) \cdot x$

$\Sigma F = -2k \cdot x$

Άρα εκτελεί απλή αρμονική ταλάντωση με $D = 2k = 100N/m$.

Θ.Ι $V_\Sigma = \upsilon_{max} \rightarrow V_\Sigma = \omega \cdot A \rightarrow V_\Sigma = \sqrt{\frac{D}{m_1+m_2}} \cdot A \rightarrow A = 0{,}2m$

Γ2. $D = (m_1 + m_2)\omega_2 \rightarrow \omega = \sqrt{\frac{D}{m_1+m_2}} = 5\,rad/sec$

$x = A\eta\mu(\omega t + \phi_0)$ $t = 0 \rightarrow x = 0,\ \upsilon > 0$

$x = 0{,}2\eta\mu(st)$ (SI) Άρα $\phi_0 = 0$

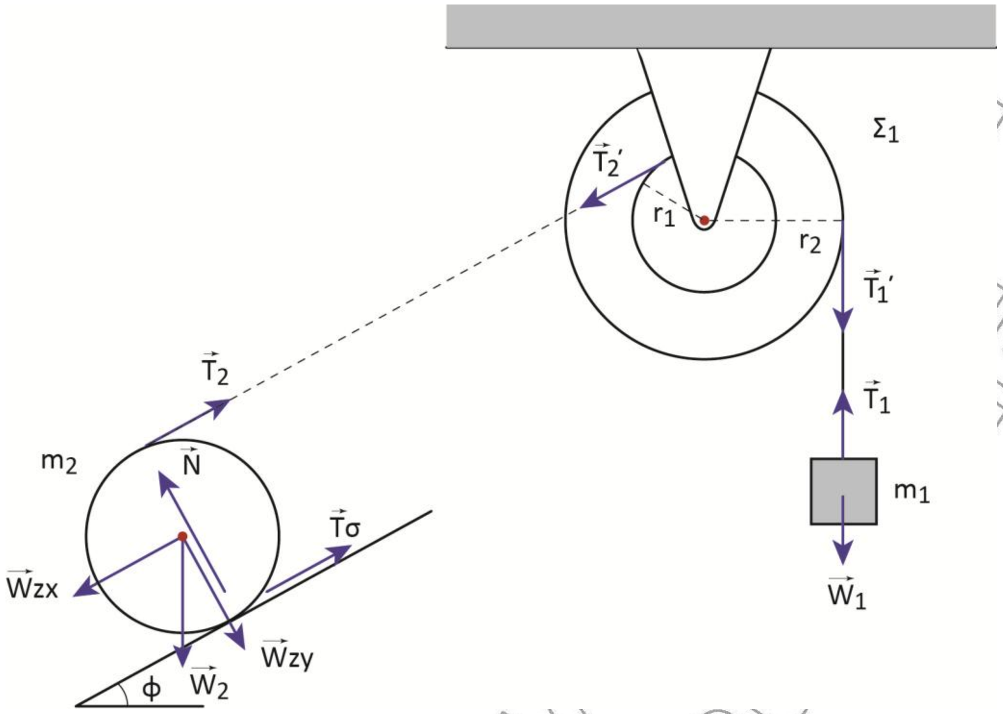
Γ3. $\frac{\Delta P}{\Delta t} = \Sigma F = -D \cdot x$

$\left|\frac{\Delta P}{\Delta t} max\right| = D \cdot A$

$= 100 \cdot 0{,}2$

$= 20\ kg\ m/sec^2$

ΘΕΜΑ Δ



Δ1. $m_1 \quad \Sigma F = 0 \rightarrow T_1 = W_1 = m_1 g = 30N$

$\Sigma_1 \quad \Sigma\tau = 0 \rightarrow T_1' \cdot r_2 - T_2' \cdot r_1 = 0$

$\rightarrow T_2' = \dfrac{T_1'}{2} = 15N$

Δ2. $\Sigma Fx = m_2 \cdot \alpha_{cm} \rightarrow W_{2x} - T\sigma = m_2 \cdot \alpha_{cm} \rightarrow m_2 g\eta\mu\varphi - T\sigma = m_2 \alpha_{cm} \quad (1)$

$\Sigma\tau = I_{cm} \cdot \alpha_{\gamma\omega\nu} \rightarrow T\sigma \cdot \cancel{R} = \dfrac{1}{2} m_2 \cancel{R^2} \cdot \dfrac{\alpha_{cm}}{\cancel{R}} \quad (2)$

$\xrightarrow{(3)+(4)} m_2 g\eta\mu\varphi = \dfrac{3}{2} m_2 \alpha_{cm} \rightarrow \alpha_{cm} = \dfrac{2}{3} g\eta\mu\varphi = 4m/sec^2$

Δ3. $m_1 \quad \Sigma F = m_1 \cdot \rightarrow W_1 - T_1 = m_1 \cdot \alpha_1 \quad (3)$

τροχ. $\quad \Sigma\tau = I_{cm} \cdot \alpha_{\gamma\omega\nu} \rightarrow T_1' \cdot r_2 = I_{cm} \cdot \dfrac{\alpha_1}{r_2} \rightarrow T_1' = \dfrac{I_{cm}}{r_2^2} \cdot \alpha_1 \quad (4)$

$\xrightarrow{(3)+(4)} m_1 g = \left(m_1 + \dfrac{I_{cm}}{r_2^2} \right) \cdot \alpha_1 \rightarrow 2m/sec^2$

Δ4. $\Delta x_1 = \frac{1}{2}\alpha_1 \cdot t_1^2 \rightarrow t_1 = \sqrt{\frac{2\Delta x_1}{\alpha_1}} \rightarrow t_1 = 0,5\sec$

$\upsilon_1 = \alpha_1 \cdot t_1 = 1 m/\sec$

$\omega 1 = \frac{\upsilon_1}{r_2} = 5 rad/\sec,\quad k_{\tau\rho o\chi(t_1)} = \frac{1}{2} Icm \cdot \omega^2 = 6J$

ΚΑΛΑ ΑΠΟΤΕΛΕΣΜΑΤΑ!!!