ΠΑΝΕΛΛΑΔΙΚΕΣ ΕΞΕΤΑΣΕΙΣ
Δ΄ ΤΑΞΗΣ ΕΣΠΕΡΙΝΟΥ ΓΕΝΙΚΟΥ ΛΥΚΕΙΟΥ
ΤΕΤΑΡΤΗ 13 ΙΟΥΝΙΟΥ 2018

ΑΠΑΝΤΗΣΕΙΣ ΣΤΗ ΦΥΣΙΚΗ ΠΡΟΣΑΝΑΤΟΛΙΣΜΟΥ

ΘΕΜΑ Α

Α1. γ

Α2. δ

Α3. α

Α4. δ

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

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Β1. α. Σωστή απάντηση : i

β. Αιτιολόγηση :

$$d_2 = \sqrt{(2\lambda_1)^2 + \left(\frac{3\lambda_1}{2}\right)^2} = \sqrt{4\lambda_1^2 + \frac{9\lambda_1^2}{4}} = \sqrt{\frac{25\lambda_1^2}{4}} = \frac{5\lambda_1}{2}$$

$$\upsilon = \upsilon' \Rightarrow \lambda_1 \cdot f_1 = \lambda_2 \cdot 2f_1 \Rightarrow \lambda_2 = \frac{\lambda_1}{2}$$

$$A' = \left|2A \cdot \sigma\upsilon\nu \frac{2\pi|d_1 - d_2|}{2\lambda_2}\right| = \left|2A \cdot \sigma\upsilon\nu \frac{2\pi\left|2\lambda_1 - \frac{5\lambda_1}{2}\right|}{2\frac{\lambda_1}{2}}\right|$$

$$= \left|2A \cdot \sigma\upsilon\nu \frac{2\pi\frac{\lambda_1}{2}}{\lambda_1}\right| = |2A \cdot \sigma\upsilon\nu\pi| = 2A$$

B2. α. Σωστή απάντηση : iii

β. Αιτιολόγηση :

Αρχή διατήρησης στροφορμής :

$$L_{αρχ} = L_{τελ} \Rightarrow mυR = mυ'\frac{R}{2} \Rightarrow υ' = 2υ \Rightarrow ω' = 4ω$$

Θ.Μ.Κ.Ε. : $W_F = K_τ - K_α = \frac{1}{2}I'ω'^2 - \frac{1}{2}Iω^2 = \frac{3}{2}mR^2ω^2$

B3. α. Σωστή απάντηση : i

β. Αιτιολόγηση :

$$h' = \frac{1}{2}gt^2 \Rightarrow t = \sqrt{\frac{2h}{g}}$$

$$x = υ_Δ \cdot t \Rightarrow 4h = υ_Δ \cdot \sqrt{\frac{2h}{g}} \Rightarrow 16h^{\not 2} = υ_Δ^2 \cdot \frac{2\not h}{g} \Rightarrow υ_Δ^2 = 8gh$$

Εξίσωση συνέχειας

$$Π_Γ = Π_Δ \Rightarrow A_Γ \cdot υ_Γ = A_Δ \cdot υ_Δ \Rightarrow 2A_Δ \cdot υ_Γ = A_Δ \cdot υ_Δ \Rightarrow$$

$$υ_Δ = 2υ_Γ \Rightarrow υ_Δ^2 = 4υ_Γ^2 \Rightarrow 8gh = 4υ_Γ^2 \Rightarrow υ_Γ^2 = 2gh$$

$$\text{Bernoulli} : P_Γ + \frac{1}{2}ρυ_Γ^2 = P_Δ + \frac{1}{2}ρυ_Δ^2 + ρgh \Rightarrow$$

$$P_Γ - P_Δ = \frac{1}{2}ρ \cdot 8gh + ρgh - \frac{1}{2}ρ \cdot 2gh \Rightarrow$$

$$P_Γ - P_Δ = 4ρgh \Rightarrow P_Γ - P_Δ = 2ρυ_Γ^2$$

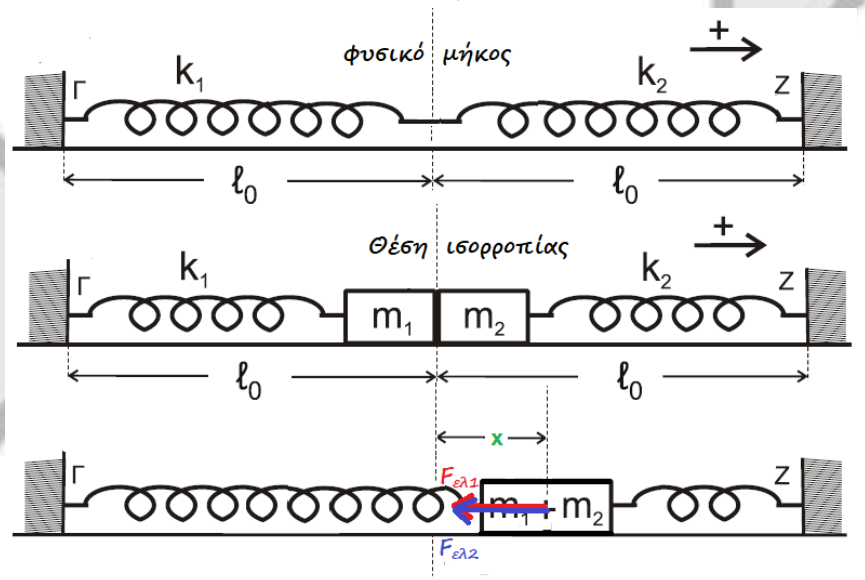
ΘΕΜΑ Γ

Γ1. $\upsilon_1 = \upsilon_{max(1)} \Rightarrow \omega_1 \cdot A = \sqrt{\frac{\kappa}{m_1}} \cdot A \Rightarrow \upsilon_1 = 2\ m/s$

ΑΔΕΤ : $A = \Delta\ell$

$\sum F = -F_{\varepsilon\lambda_1} - F_{\varepsilon\lambda_2} = -kx - kx = -2kx = -Dx \Rightarrow D = 2k$ (Α.Α.Τ.)

$\upsilon_{max} = \upsilon_K \Rightarrow \omega_\Sigma \cdot A_\Sigma = 1 \Leftrightarrow \sqrt{\frac{2k}{2m}} \cdot A_\Sigma = 1 \Rightarrow A_\Sigma = 0,2m$

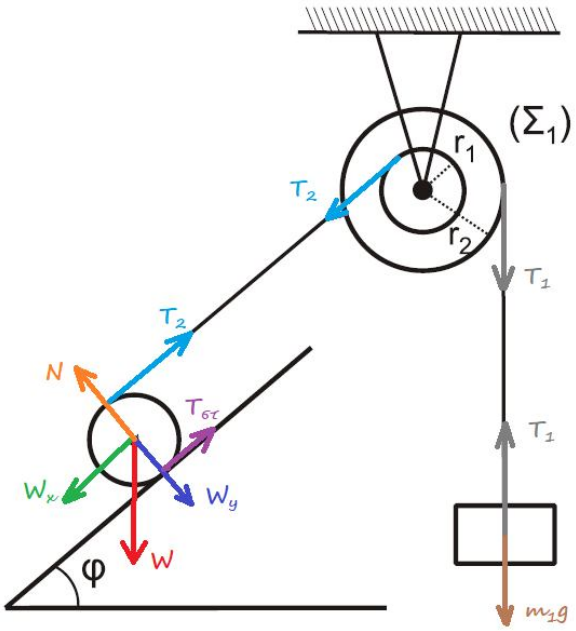


Γ2. $x = A \cdot \eta\mu\omega t \Rightarrow x = 0,2 \cdot \eta\mu 5t$ (SI)

$\omega = \sqrt{\frac{2k}{2m}} = 5\ r/s$

Γ3. $\Delta t = \frac{T}{4} = \frac{2\pi\sqrt{\frac{2m}{2k}}}{4} = 0,1\pi\ s$

ΘΕΜΑ Δ



Δ1. $\Sigma_1 : \sum F = 0 \Rightarrow$

$T_1 = m_1 g \Rightarrow$

$T_1 = 30\ N$

ΤΡΟΧΑΛΙΑ : $\sum \tau = 0 \Rightarrow$

$T_1 \cdot r_2 = T_2 \cdot r_1 \Rightarrow$

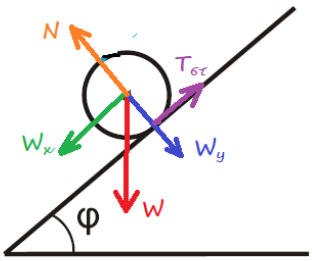
$30 \cdot 0{,}2 = T_2 \cdot 0{,}1 \Rightarrow$

$T_2 = 60\ N$

Δ2. $\sum F = m_2 \cdot \alpha_{cm} \Rightarrow$

$W_{x_2} - T_{\sigma\tau} = m_2 \cdot \alpha_{cm} \Rightarrow$

$T_{\sigma\tau} = 120 - 20 \cdot \alpha_{cm}$ (1)



$\sum \tau = I \cdot \alpha_{\gamma\omega v} \Rightarrow$

$T_{\sigma\tau} \cdot R = \frac{1}{2} m_2 \cdot R^2 \alpha_{\gamma\omega v} \Rightarrow$

$T_{\sigma\tau} = 10 \cdot \alpha_{cm}$ (2)

(1), (2) $\Rightarrow 10\alpha_{cm} = 120 - 20\alpha_{cm} \Leftrightarrow$

$30\alpha_{cm} = 120 \Leftrightarrow$

$\alpha_{cm} = 4\ m/s^2$

Δ3. ΤΡΟΧΑΛΙΑ

$$\sum \tau = I \cdot \alpha_{\gamma\omega\nu} \Rightarrow T_1 \cdot r_1 = 0{,}48 \cdot \alpha_{\gamma\omega\nu} \Rightarrow$$

$$T_1 = \frac{0{,}48}{0{,}2} \cdot \frac{\alpha}{R_2} \Rightarrow T_1 = 12\alpha \quad (1)$$

ΣΩΜΑ

$$\sum F = m_1 \cdot \alpha \Rightarrow m_1 g - T_1 = m_1 \alpha \Rightarrow$$

$$T_1 = m_1 g - m_1 \alpha \Rightarrow T_1 = 30 - 3\alpha \quad (2)$$

$$(1), (2) \Rightarrow 12\alpha = 30 - 3\alpha \Leftrightarrow 15\alpha = 30 \Leftrightarrow \alpha = 2 \text{ m/s}^2$$

Δ4. $x = \frac{1}{2}\alpha \cdot t^2 \Rightarrow 0{,}25 = \frac{1}{2} \cdot 2 \cdot t^2 \Rightarrow t^2 = 0{,}25 \Rightarrow t = 0{,}5 \text{ s}$

$$\alpha = \alpha_{\gamma\omega\nu} \cdot R_2 \Rightarrow \alpha_{\gamma\omega\nu} = \frac{\alpha}{R_2} = \frac{2}{0{,}2} = 10 \text{ r/s}^2$$

$$K = \frac{1}{2} I \cdot \omega^2 = \frac{1}{2} \cdot 0{,}48 \cdot (10 \cdot 0{,}5)^2 = \frac{1}{2} \cdot 0{,}48 \cdot 25 = 6 \text{ J}$$