ΠΑΝΕΛΛΑΔΙΚΕΣ ΕΞΕΤΑΣΕΙΣ
Γ΄ ΤΑΞΗΣ ΗΜΕΡΗΣΙΟΥ 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 :

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

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

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

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

Β2. 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. : $W_F = K_τ - K_α = \frac{1}{2}I'ω'^2 - \frac{1}{2}Iω^2 = \frac{3}{2}mR^2ω^2$

Β3. 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

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

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

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. $υ_1 = υ_{max(1)} \Rightarrow ω_1 \cdot A = \sqrt{\frac{κ}{m_1}} \cdot A \Rightarrow υ_1 = 2$ m/s

ΑΔΕΤ : $A = Δℓ$

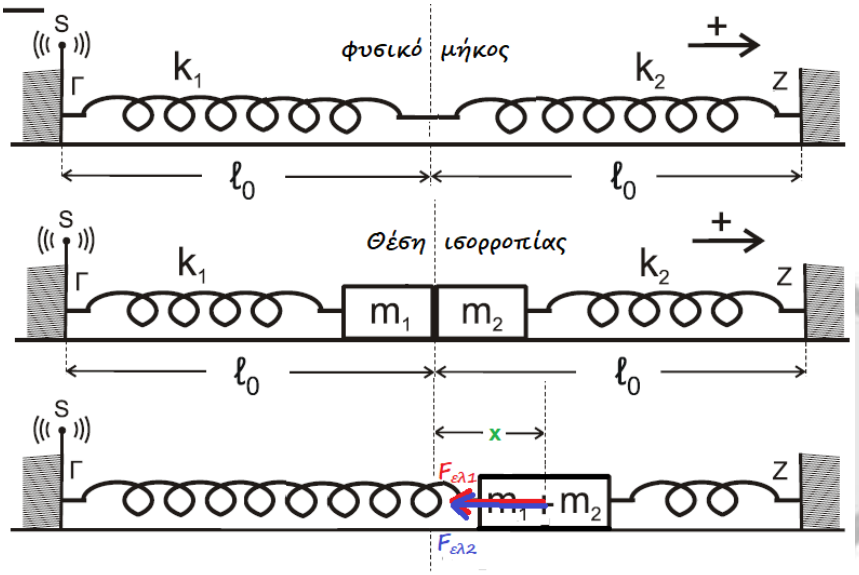
Στη Θ.Ι. πριν την κρούση : $f_1 = \frac{υ - υ_1}{υ} f_s = 338f_s$

Αρχή διατήρησης ορμής : $m_1 \cdot υ_1 = (m_1 + m_2) \cdot υ_Κ \Rightarrow υ_Κ = 1$ m/s

Στη Θ.Ι. μετά την κρούση : $f_2 = \frac{υ - υ_Κ}{υ} f_s = 339f_s$

Άρα $\frac{f_1}{f_2} = \frac{338}{339}$

Γ2.



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

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

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

Γ4. $\left.\frac{dp}{dt}\right|_{max} = \sum F_{max} = DA = 2kA = 20 \text{ kg}\cdot\text{m/s}^2$

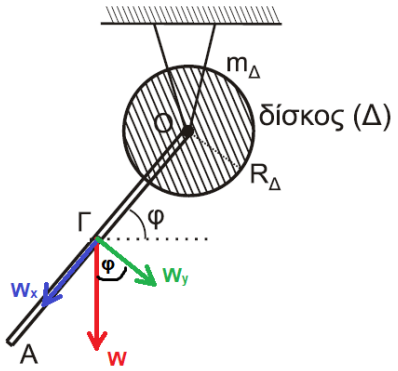
ΘΕΜΑ Δ

Δ1. $I = I_\Delta + I_P \Rightarrow I = \frac{1}{2}m_\Delta R_\Delta^2 + \frac{1}{12}M\ell^2 + M\frac{\ell^2}{4} \Rightarrow$

$$I = \frac{1}{2}\cdot 4\cdot\left(\frac{\sqrt{2}}{2}\right)^2 + \frac{1}{12}\cdot 8\cdot 3^2 + 8\cdot\frac{3^2}{4} = 25 \text{ kg}\cdot\text{m}^2$$

Δ2. $\left|\frac{dL}{dt}\right| = \sum\tau = W\cdot\sigma\upsilon\nu\varphi\cdot\frac{l}{2}$

$$= 80\cdot 0{,}6\cdot\frac{3}{2} = 72\ \frac{\text{kg}\cdot\text{m}^2}{\text{s}^2}$$



Δ3. $\eta\mu\varphi = \dfrac{y}{\frac{\ell}{2}} \Rightarrow y = \dfrac{\ell}{2}\eta\mu\varphi$

$x = \dfrac{\ell}{2} - \dfrac{\ell}{2}\eta\mu\varphi \Rightarrow x = \dfrac{3}{2} - \dfrac{3}{2}\cdot 0{,}8 \Rightarrow x = 0{,}1\ m$

ΑΔΜΕ

$K_A + U_A = K_T + U_T \Rightarrow$

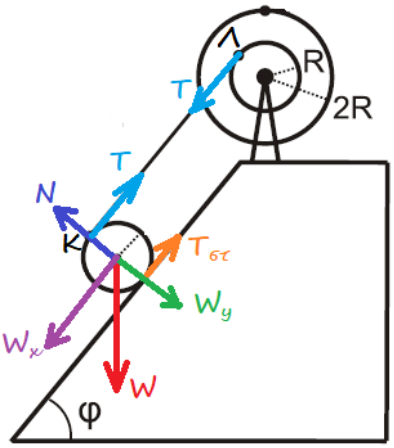
$K_T = M\cdot g\cdot x \Rightarrow K_T = 24\ J$

Δ4. ΤΡΟΧΑΛΙΑ

$\sum\tau = I_{cm(τροχαλίας)}\cdot\alpha_{γων(T)} \Rightarrow$

$T\cdot R = I_{cm(τροχαλίας)}\cdot\alpha_{γων(T)} \Rightarrow$

$T = 97{,}5\cdot\alpha_{cm}\ (1)$



ΔΙΣΚΟΣ

$\sum F = m\cdot\alpha_{cm} \Rightarrow m\cdot g\cdot\eta\mu\varphi - T - T_{στ} = m\cdot\alpha_{cm}$

$T_{στ} = 240 - 127{,}5\cdot\alpha_{cm}\ (2)$

$\sum\tau = I_{Δ}\cdot\alpha_{γων(Δ)} \Rightarrow T_{στ}\cdot R - T\cdot R = \dfrac{1}{2}m\cdot R^2\alpha_{γων(Δ)} \Rightarrow$

$T_{στ}\cdot R - T\cdot R = \dfrac{1}{2}m\cdot R^2\dfrac{\alpha_{cm}}{R} \Rightarrow T_{στ} - T = \dfrac{1}{2}\cdot 30\cdot\alpha_{cm} \overset{(1)}{\Rightarrow}$

$T_{στ} - 97{,}5\cdot\alpha_{cm} = 15\cdot\alpha_{cm} \Rightarrow T_{στ} = 97{,}5\cdot\alpha_{cm} + 15\cdot\alpha_{cm}\ (3)$

$\overset{(2)}{\underset{(3)}{\Rightarrow}}\ \alpha_{cm} = 1\ m/s^2$

$s = \dfrac{1}{2}\alpha_{cm}t^2 \Rightarrow t = 2\ sec$

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