Γ' ΛΥΚΕΙΟΥ
ΘΕΤΙΚΗ & ΤΕΧΝΟΛΟΓΙΚΗ ΚΑΤΕΥΘΥΝΣΗ
ΦΥΣΙΚΗ

ΑΠΑΝΤΗΣΕΙΣ

ΘΕΜΑ 1ο

1. γ
2. δ
3. β
4. γ
5. **(α)** Σ
(β) Λ
(γ) Σ
(δ) Σ
(ε) Λ

ΘΕΜΑ 2ο

1. $\frac{K}{U}=\frac{E-U}{U}=\frac{\frac{1}{2}DA^2-\frac{1}{2}D\frac{A^2}{4}}{\frac{1}{2}D\frac{A^2}{4}}=3$ Σωστό το **γ.**

2. $E=25\%E_0 \Rightarrow \frac{1}{2}DA^2=\frac{1}{4}\cdot\frac{1}{2}DA_0^2 \Rightarrow A=\frac{A_0}{2}$ Σωστό το **α.**

3. **α.** Σωστή. ($T_0=T$ γιατί $f=$σταθερή)
β. Λάθος

$$8\pi 10^6 x=2\pi\frac{x}{\lambda}\Rightarrow\lambda=\frac{10^{-6}}{4}m$$

$$4\pi 10^6 x=2\pi\frac{x}{\lambda_0}\Rightarrow\lambda_0=\frac{10^{-6}}{2}m$$

Άρα $n=\frac{\lambda_0}{\lambda}=\frac{\frac{10^{-6}}{2}}{\frac{10^{-6}}{4}}=2$

$$\eta\mu\theta_{\kappa\rho}=\frac{n_{\alpha\acute{\epsilon}\rho\alpha}}{n}=\frac{1}{2}\Rightarrow\theta_{\kappa\rho}=30^\circ$$

άρα παθαίνει ΟΛΙΚΗ ΑΝΑΚΛΑΣΗ

4. $L = I\omega \Rightarrow L = Ia_{\gamma\omega\nu}t \Rightarrow \frac{L}{t} = Ia_{\gamma\omega\nu}$

$$\left.\begin{array}{l} \varepsilon\phi\theta_1 = \frac{2L}{t} \\ \varepsilon\phi\theta_2 = \frac{L}{t} \end{array}\right\} \Rightarrow \varepsilon\phi\theta_1 = 2\varepsilon\phi\theta_2 \Rightarrow \mathrm{I}\alpha_{\gamma\omega\nu 1} = 2\mathrm{I}\alpha_{\gamma\omega\nu 2} \Rightarrow \alpha_{\gamma\omega\nu 1} = 2\alpha_{\gamma\omega\nu 2}$$. Σωστό το **β**.

ΘΕΜΑ 3ο

$\mathrm{A} = 0{,}1m$

$2T = 0{,}4s \Rightarrow T = 0{,}2s$

$f = 5Hz$

$\omega = 10\pi \frac{rad}{s}$

α) $\upsilon = \frac{x}{t} = \frac{4}{0{,}4} = 10\frac{m}{s}$

$\lambda = \frac{\upsilon}{f} = \frac{10}{5} = 2m$

β) $\phi = \omega t \Rightarrow 10\pi t = 3{,}75\pi \Rightarrow t = 0{,}375s$

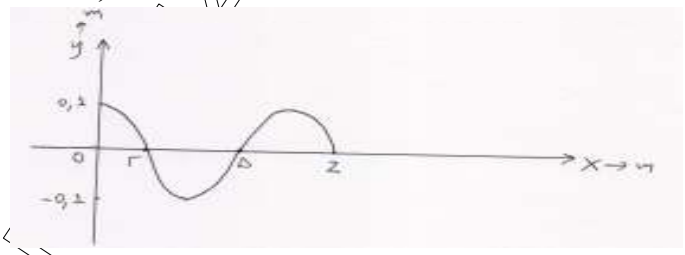
Το κύμα έχει διαδοθεί σε απόσταση: $x = \upsilon t = 3{,}75m$

$$\upsilon = \upsilon_{\max}\sigma\upsilon\nu 2\pi\left(\frac{t}{\tau} - \frac{x}{\lambda}\right) = 0{,}1\cdot 10\pi\sigma\upsilon\nu 2\pi\left(\frac{0{,}375}{0{,}2} - \frac{3}{2}\right) =$$

$$= \pi\sigma\upsilon\nu 2\pi(1{,}875 - 1{,}5) =$$

$$= \pi\sigma\upsilon\nu\frac{3\pi}{4} = \pi\left(-\frac{\sqrt{2}}{2}\right) = -\frac{\pi\sqrt{2}}{2}\frac{m}{s}$$

γ) $\frac{t}{T} = \frac{0{,}25}{0{,}2} = 1{,}25 \Rightarrow t = 1{,}25T$



$K_{\max}$ έχουν τα σημεία Γ, Δ, Z

$x_\Gamma = \frac{\lambda}{4} = 0{,}5m$

$x_\Delta = \frac{3\lambda}{4} = 1{,}5m$

$x_Z = \frac{5\lambda}{4} = 2{,}5m$

δ) $A = A_1 - A_2 \Rightarrow 0,1 = A_1 - 0,1 \Rightarrow A_1 = 0,2m$

$y_1 = 0,2\eta\mu 10\pi t \ \ (SI)$

ΘΕΜΑ 4ο

α)

$$\left.\begin{array}{l} I = I_{\delta\alpha\kappa\tau} + 2\mathrm{I}_{\rho\alpha\beta\delta} \\ I_{\delta\alpha\kappa\tau} = MR^2 = 6kgm^2 \\ I_{\rho\alpha\beta\delta} = \dfrac{1}{12}ml^2 = \dfrac{1}{12}3\cdot 2^2 = 1kgm^2 \end{array}\right\} \Rightarrow I = 8kgm^2$$

β) $M_{o\lambda} = \mathrm{M} + 2m = 12Kg$

$\Sigma Fy = 0 \Rightarrow N = M_{o\lambda} g\sigma\upsilon\nu\phi \quad (1)$

$\Sigma Fx = M_{o\lambda} a_{cm} \Rightarrow F - T_{\sigma\tau} - \mathrm{M}_{o\lambda} g\eta\mu\phi = M_{o\lambda} a_{cm} \Rightarrow T_{\sigma\tau} = F - M_{o\lambda} g\eta\mu\phi - \mathrm{M}_{o\lambda}\alpha_{cm} (2)$

$\Sigma\tau_{cm} = I\cdot a_{\gamma\omega\nu} \Rightarrow T_{\sigma\tau}\cdot R = I\dfrac{a_{cm}}{R} \Rightarrow T_{\sigma\tau} = \dfrac{\mathrm{I}}{R^2}a_{cm} \quad (3)$

(2)(3): $F - \mathrm{M}_{o\lambda} g\eta\mu\phi - \mathrm{M}_{o\lambda} a_{cm} = \dfrac{I}{R^2}a_{cm} \Rightarrow a_{cm} = 2\dfrac{m}{s^2}$

(3) $T_{\sigma\tau} = 16\mathrm{N}$

γ) $\dfrac{d\mathrm{K}_{\sigma\tau\rho o\phi}}{dt} = \Sigma\tau\cdot\omega = T_{\sigma\tau}R\omega \quad (4)$

$N = \dfrac{\theta}{2\pi} \Rightarrow \theta = N\cdot 2\pi = 25rad$

$\theta = \dfrac{1}{2}a_{\gamma\omega\nu}t^2 \Rightarrow t = \sqrt{\dfrac{2\theta}{a_{\gamma\omega\nu}}} = \sqrt{\dfrac{2\cdot 25}{2}} = 5s$

$\omega = a_{\gamma\omega\nu}t = 10\dfrac{rad}{s}$

$(4) \Rightarrow \dfrac{d\mathrm{K}_{\sigma\tau\rho o\phi}}{dt} = 160\dfrac{J}{s}$

δ) Μετά το Β δεν υπάρχει $T_{\sigma\tau}$ οπότε η στροφική κίνηση είναι ομαλή.

ΑΔΜΕ: $U_B + K_B = U_\Gamma + K_\Gamma \quad (5)$

$U_B = M_{o\lambda} gh$

$K_B = \dfrac{1}{2}I\omega_B{}^2 + \dfrac{1}{2}M_{o\lambda}\upsilon_B{}^2$

$K_\Gamma = \dfrac{1}{2}I\omega_B{}^2 + \dfrac{1}{2}M_{o\lambda}\upsilon_\Gamma{}^2$

$(5) \Rightarrow \upsilon_\Gamma = 12m/s$