



08
επαναληπτικά
θέματα

Γ' ΛΥΚΕΙΟΥ
ΘΕΤΙΚΗ & ΤΕΧΝΟΛΟΓΙΚΗ
ΚΑΤΕΥΘΥΝΣΗ
ΦΥΣΙΚΗ

ΑΠΑΝΤΗΣΕΙΣ

ΘΕΜΑ 1^ο

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

ΘΕΜΑ 2^ο

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 $f = \text{σταθερή}$)
β. Λάθος
- $$8\pi 10^6 x = 2\pi \frac{x}{\lambda} \Rightarrow \lambda = \frac{10^{-6}}{4} m$$
- $$4\pi 10^6 x = 2\pi \frac{x}{\lambda_0} \Rightarrow \lambda_0 = \frac{10^{-6}}{2} m$$
- $$\text{Άρα } n = \frac{\lambda_0}{\lambda} = \frac{\frac{10^{-6}}{2}}{\frac{10^{-6}}{4}} = 2$$
- $$\eta\mu\theta_{\text{κρ}} = \frac{n_{\text{αέρα}}}{n} = \frac{1}{2} \Rightarrow \theta_{\text{κρ}} = 30^\circ$$
- άρα παθαίνει ΟΛΙΚΗ ΑΝΑΚΛΑΣΗ

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

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

ΘΕΜΑ 3^ο

$$A = 0,1m$$

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

$$f = 5Hz$$

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

$$\alpha) \quad \nu = \frac{x}{t} = \frac{4}{0,4} = 10 \frac{m}{s}$$

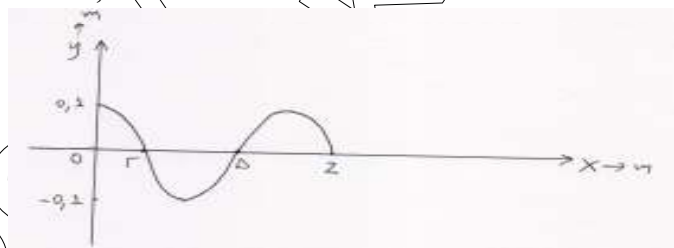
$$\lambda = \frac{\nu}{f} = \frac{10}{5} = 2m$$

$$\beta) \quad \phi = \omega t \Rightarrow 10\pi t = 3,75\pi \Rightarrow t = 0,375s$$

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

$$\begin{aligned} \nu &= \nu_{\max} \sin 2\pi \left(\frac{t}{\tau} - \frac{x}{\lambda} \right) = 0,1 \cdot 10\pi \sin 2\pi \left(\frac{0,375}{0,2} - \frac{3}{2} \right) = \\ &= \pi \sin 2\pi (1,875 - 1,5) = \\ &= \pi \sin \frac{3\pi}{4} = \pi \left(\frac{\sqrt{2}}{2} \right) = \frac{\pi\sqrt{2}}{2} \frac{m}{s} \end{aligned}$$

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



K_{\max} έχουν τα σημεία Γ, Δ, Ζ

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

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

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

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

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

ΘΕΜΑ 4^ο

α)

$$\left. \begin{aligned} I &= I_{\delta\alpha\kappa\tau} + 2I_{\rho\alpha\beta\delta} \\ I_{\delta\alpha\kappa\tau} &= MR^2 = 6\text{kgm}^2 \\ I_{\rho\alpha\beta\delta} &= \frac{1}{12}ml^2 = \frac{1}{12}3 \cdot 2^2 = 1\text{kgm}^2 \end{aligned} \right\} \Rightarrow I = 8\text{kgm}^2$$

β) $M_{ολ} = M + 2m = 12\text{Kg}$

$$\Sigma Fy = 0 \Rightarrow N = M_{ολ}g \text{ συν}\phi \quad (1)$$

$$\Sigma Fx = M_{ολ}a_{cm} \Rightarrow F - T_{\sigma\tau} - M_{ολ}g\eta\mu\phi = M_{ολ}a_{cm} \Rightarrow T_{\sigma\tau} = F - M_{ολ}g\eta\mu\phi - M_{ολ}a_{cm} \quad (2)$$

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

$$(2)(3): F - M_{ολ}g\eta\mu\phi - \frac{I}{R^2} a_{cm} = \frac{I}{R^2} a_{cm} \Rightarrow a_{cm} = \frac{2m}{s^2}$$

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

γ) $\frac{dK_{\sigma\tau\omega\phi}}{dt} = \Sigma \tau \cdot \omega = T_{\sigma\tau} R \omega \quad (4)$

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

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

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

$$(4) \Rightarrow \frac{dK_{\sigma\tau\omega\phi}}{dt} = 160 \frac{\text{J}}{\text{s}}$$

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

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

$$U_B = M_{ολ}gh$$

$$K_B = \frac{1}{2} I \omega_B^2 + \frac{1}{2} M_{ολ} v_B^2$$

$$K_{\Gamma} = \frac{1}{2} I \omega_{\Gamma}^2 + \frac{1}{2} M_{ολ} v_{\Gamma}^2$$

$$(5) \Rightarrow v_{\Gamma} = 12\text{m/s}$$