ΘΕΜΑ Α

Α.1 γ.

Α.2 β.

Α.3 γ.

Α.4 γ.

Α.5

α. $\longrightarrow \Sigma$

β. $\longrightarrow \Lambda$

γ. $\longrightarrow \Sigma$

δ. $\longrightarrow \Lambda$

ε. $\longrightarrow \Lambda$

ΘΕΜΑ Β

Β.1

$r_{1\kappa} - r_{2\kappa} = \kappa\lambda$

$\lambda' = \dfrac{u}{2f} = \dfrac{\lambda}{2}$

$\lambda' = \dfrac{r_{1\kappa} - r_{2\kappa}}{2\kappa} => r_{1\kappa} - r_{2\kappa} = 2\kappa\lambda' => r_{1\kappa} - r_{2\kappa} = N\lambda'$(Ικανοποιεί πάλι συνθήκη ενίσχυσης)

Άρα εξακολουθεί να έχει μέγιστο πλάτος 2Α, άρα σωστό είναι το **α.**

Β2.

Σωστό το α

$$\left.\begin{aligned} f_\delta = |f - f_1| \\ f_\delta = |f - f_2| \end{aligned}\right\} \Rightarrow$$

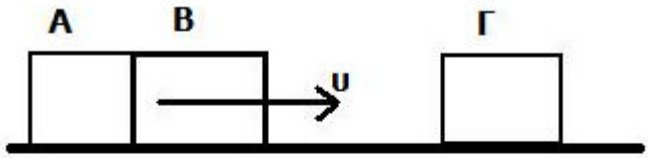
$\nearrow^{(1)}\ f - f_1 = t(f - f_2) \Rightarrow f_1 = f_2$ απορριπτεται

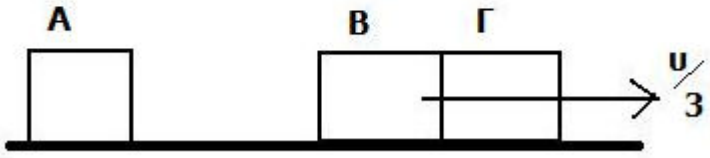
$\searrow_{(2)}\ f - f_1 = -(f - f_2) \Rightarrow f - f_1 = f_2 - f \Rightarrow$

$$\Rightarrow 2f = f_1 + f_2 \Rightarrow$$

$$\Rightarrow f = \frac{f_1 + f_2}{2}$$

Β3. ΣΩΣΤΟ το α





Α.Δ.Ο:

Pαρχ.ολ =**P**τελ.ολ $\Rightarrow$

$$(m_1+m_2)u=(m_2+4m_1)\frac{u}{3}\Rightarrow$$

$$\Rightarrow m_1+m_2=\frac{m_2}{3}+\frac{4m_1}{3}\Rightarrow$$

$$\Rightarrow m_2-\frac{m_2}{3}=\frac{4m_1}{3}-m_1\Rightarrow$$

$$\Rightarrow \frac{2}{3}m_2=\frac{1}{3}m_1\Rightarrow 2m_2=m_1$$

$$\Rightarrow \frac{m_1}{m_2}=2$$

Θέμα Γ

Γ1.

$A\pi o\ \delta\iota\alpha\gamma\rho\alpha\mu\mu\alpha\ \lambda=1m$

$A=0,01m$

$$\upsilon=\frac{x}{t}=\frac{2}{1}\Rightarrow \upsilon=2m/s$$

$$\upsilon=\frac{\lambda}{T}\Rightarrow T=\frac{\lambda}{\upsilon}=\frac{1}{2}\Rightarrow T=0,5\sec$$

Γ2.

$$y = A\eta\mu 2\pi\left(\frac{t}{T} - \frac{x}{\lambda}\right) \Rightarrow$$

$$\Rightarrow y = 0,01\eta\mu 2\pi\left(\frac{t}{0,5} - \frac{x}{1}\right) \Rightarrow$$

$$\Rightarrow y = 0,01\eta\mu\left(4\pi t - 2\pi x\right)$$

Γ3.

$$\upsilon_{max} = \omega \bullet A$$

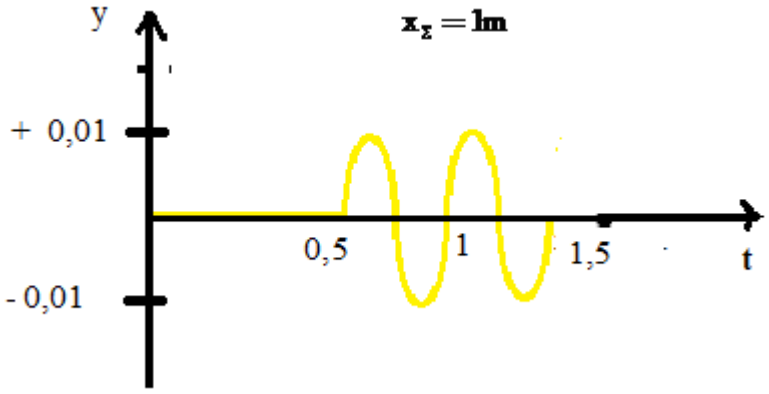
$$\omega = \frac{2\pi}{T} = \frac{2\pi}{0,5} \Rightarrow \quad \omega = 4\pi\, rad/\sec \Big\} \upsilon_{max} = 4\pi \bullet 0,01 \Rightarrow \upsilon_{max} = 0,04\pi\, m/\sec$$

Γ4. το σημείο ξεκινάει μετά από $4\pi t - 2\pi = 0 \Rightarrow t = 0,5\sec$

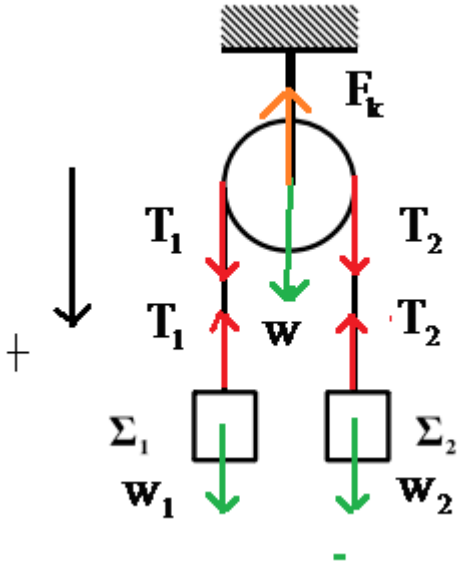
$\Gamma\iota\alpha \;\; το \;\; x_{\Sigma} = 1m \qquad \iota\sigma\chi\upsilon\varepsilon\iota$

$y = 0$, για $t < 0,5$ s

$y = 0,01\eta\mu\left(4\pi t - 2\pi \cdot 1\right)$, για $t \geq 0,5$



Δ1.



$2^{ος}$ Ν.Ν.

m_1 :

$\Sigma F_1 = m_1 \bullet a_{cm} \Rightarrow$

$\Rightarrow w_1 - T_1 = m_1 \bullet a_{cm} \Rightarrow$

$\Rightarrow 20 - T_1 = 2a_{cm} \quad \Rightarrow T_1 = 20 - 2a_{cm}\,(1)$

$2^{ος}$ Ν.Ν

m_2 :

$\Sigma F_2 = m_2 \bullet a_{cm} \Rightarrow$

$\Rightarrow T_2 - m_2 \bullet g = m_2 \bullet a_{cm} \Rightarrow$

$\Rightarrow T_2 - 10 = a_{cm} \qquad \Rightarrow T_2 = 10 + a_{cm}\ (2)$

$\alpha_{\gamma\omega\nu} = \dfrac{a_{cm}}{R}$

ΤΡΟΧΑΛΙΑ

Θ.Ν.Σ.Κ $\Sigma\tau = I \bullet a_{\gamma\omega\nu} \Rightarrow \tau_{T1} - \tau_{T2} = \dfrac{1}{2} mR^2 \bullet a_{\gamma\omega\nu} \Rightarrow$

$\Rightarrow (T_1 - T_2) \bullet R = \dfrac{1}{2} mR^2 \bullet \dfrac{a_{cm}}{R} \Rightarrow$

$\Rightarrow T_1 - T_2 = \dfrac{1}{2} m \bullet a_{cm} \Rightarrow$

$\Rightarrow T_1 - T_2 = 2 \bullet a_{cm}$ (3) $\overset{(2)}{(1)} \Rightarrow 20 - 2 \bullet a_{cm} - (10 + a_{cm}) = 2 \bullet a_{cm} \Rightarrow$

$\Rightarrow 20 - 2 \bullet a_{cm} - 10 - a_{cm} = 2 \bullet a_{cm} \Rightarrow$

$\Rightarrow 10 = 3 \bullet a_{cm} + 2 \bullet a_{cm} \Rightarrow$

$\Rightarrow 10 = 5 \bullet a_{cm} \Rightarrow a_{cm} = 2 \, m/s^2$

Δ2. $(1) => T_1 = 20 - 2 \cdot 2 => T_1 = 16 \, N$

$(2) => T_2 = 10 + 2 => T_2 = 12 \, N$

Δ3 . $\omega = \alpha_{\gamma\omega v} t$

$\alpha_{\gamma\omega v} = \dfrac{\alpha_{cm}}{R} = \dfrac{2}{0,5} => \alpha_{\gamma\omega v} = 4 \, rad/s^2$

$\omega = 4 \cdot 2 => \omega = 8 \, rad/s$

Δ4.

Για ύψος h

$h = \dfrac{1}{2} \alpha_{cm} t^2 => 3 = \dfrac{1}{2} 2 t^2 => t = \sqrt{3} \, s$

$u_1 = \alpha_{cm} t = 2\sqrt{3} \, m/s$

$u_2 = \alpha_{cm} t = 2\sqrt{3} \, m/s$

$\omega = \alpha_{\gamma\omega v} t = 4\sqrt{3} \, rad/s$

$K_{o\lambda} = K_1 + K_2 + K_{\tau\rho o\chi} => K_{o\lambda} = \dfrac{1}{2} m_1 u_1^2 + \dfrac{1}{2} m_2 u_2^2 + \dfrac{1}{2} I \omega^2 =>$

$K_{o\lambda} = \dfrac{1}{2} 2 (2\sqrt{3})^2 + \dfrac{1}{2} \cdot 1 \cdot (2\sqrt{3})^2 + \dfrac{1}{2} \dfrac{1}{2} m R^2 (4\sqrt{3})^2 =>$

$K_{o\lambda} = 12 + 6 + \dfrac{1}{4} 4 \cdot 0,25 \cdot 16 \cdot 3 => K_{o\lambda} = 12 + 6 + 12 =>$

$K_{o\lambda} = 30 \, j$

ΕΠΙΜΕΛΕΙΑ
Αγγελής Ιωάννης
Δοξόπουλος Κώστας
Πετρίδης Δημήτρης