**Φυσική**

**12-06-2023**

**ΘΕΜΑ Α**

**Α1.** β

**Α2.** δ

**Α3.** β

**Α4.** α

**Α5.** **α.** Λάθος

**β.** Σωστό

**γ.** Σωστό

**δ.** Λάθος

**ε.** Λάθος

**ΘΕΜΑ Β**

**Β1.α.** Σωστή απάντηση **i.**

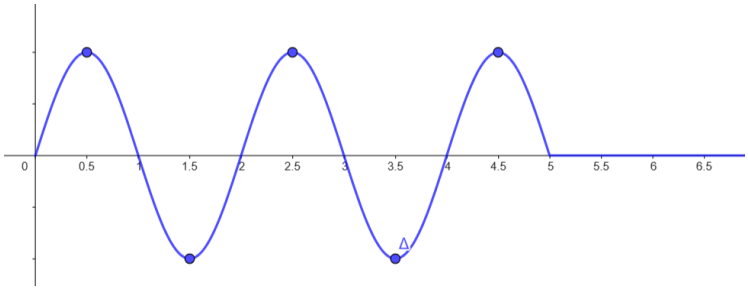
**Β1.β.** $\phi = 2\pi\left(\frac{t}{T} - \frac{x}{\lambda}\right) \Rightarrow \phi = 2\pi\left(\frac{2}{T} - \frac{x}{\lambda}\right)$

$x = 0: \quad \phi = \frac{4\pi}{T} \Rightarrow 4\pi = \frac{4\pi}{T} \Rightarrow T = 1s$

$\phi = 0: \quad 0 = 2\pi\left(\frac{2}{1} - \frac{x}{\lambda}\right) \Rightarrow 0 = 2 - \frac{4}{\lambda} \Leftrightarrow \frac{4}{\lambda} = 2 \Leftrightarrow \lambda = 2m$

$\upsilon_\delta = \frac{\lambda}{T} = 2m/s$

$t_2 = 2,5s: \quad x = \upsilon_\delta t = 2 \cdot 2,5 = 5m = 2\lambda + \frac{\lambda}{2}$




5 σημεία

**Β2.** **ii.** $f(1)=\frac{\phi}{h}$.

$$K=h\cdot f_2-\phi \Leftrightarrow e\cdot V_0=h\cdot 3\cdot f_1-f_1\cdot h \Leftrightarrow V_0=\frac{2\cdot h\cdot f_1}{e}$$

**Β3.α.** **ii.** $\vec{\upsilon}_{στα\theta} \Rightarrow F_{μαγ}=F_{ηλ} \Leftrightarrow B_1\cdot\upsilon\cdot q=E\cdot q$

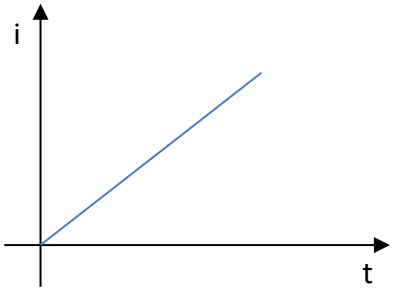
$$\upsilon=\frac{E}{B_1}$$

**Β3.β.** **i.** $d_2-d_1=d \Leftrightarrow 2R_1-2R_2=d \Leftrightarrow \frac{m_1\cdot\upsilon}{B_2\cdot q}-\frac{m_2\cdot\upsilon}{B_2\cdot q}=\frac{d}{2}$

$$m_1-m_2=\frac{\frac{d}{2}}{\frac{N}{B_2\cdot q}} \Leftrightarrow m_1-m_2=\frac{d\cdot B_2\cdot q}{2\cdot\upsilon}=\frac{d\cdot B_2\cdot q}{2\cdot\frac{E}{B_1}}=\frac{d\cdot B_1\cdot B_2\cdot q}{2E}$$

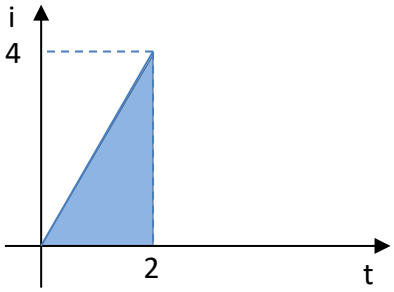
**ΘΕΜΑ Γ**

**Γ1.** $\frac{\Delta i}{\Delta t}=\frac{\Delta(2t)}{\Delta t}=2A/s$




$i=2\cdot 2=4A$

$q=E=\frac{2\cdot 4}{2}=4Cb$




**Γ2.** Αφού $\frac{\Delta i}{\Delta t}>0$, δηλαδή $i\uparrow$ λόγω κανόνα Lenz.

Πολικότητα στο πηνίο + Α, -Γ

$$|F_{ΑΥΤ}|=\left|-L\frac{\Delta i}{\Delta t}\right|=0,5\cdot 2=1V$$

**Γ3.** $i=\frac{E_{Επ}-|E_{Αυτ}|}{R_{Ολ}}=\frac{B\upsilon l-|E_{Αυτ}|}{R_{Ολ.}}$

$$2t=\frac{1\cdot\upsilon\cdot 1}{1} \Leftrightarrow 2t=\upsilon-1 \Leftrightarrow \upsilon=2t+1 \quad (SI)$$

**Γ4.α.** $\alpha = \dfrac{\Delta\upsilon}{\Delta t} = 2m/s^2$

$\sum\vec{F} = m\cdot\vec{\alpha} \Rightarrow F - F_1 - w = m\alpha \Rightarrow F = F_1 + m\alpha + mg = BIl + m\alpha = 1\cdot 2t\cdot 1 + 0{,}5\cdot 2 + 5$

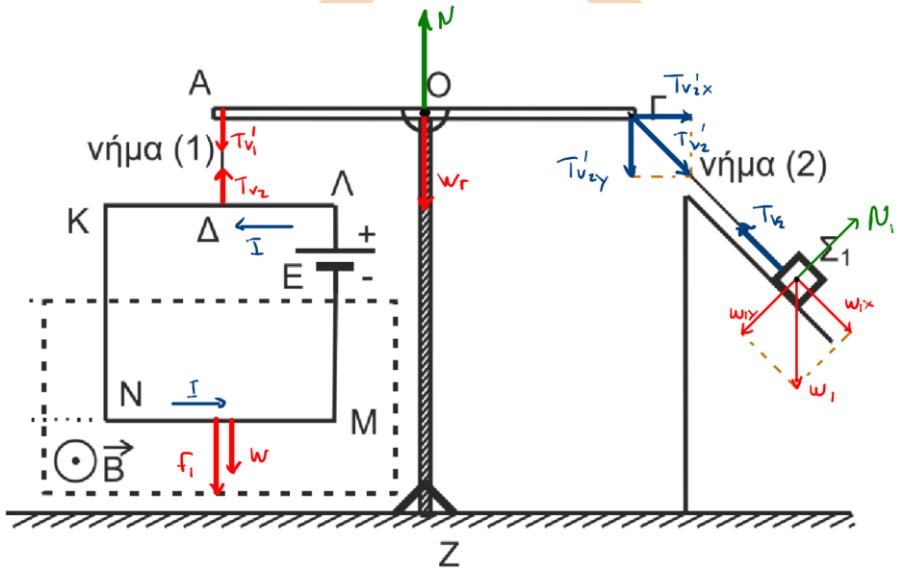
$t = 2s: F = 10N$

**Γ4.β.** $P_F = \dfrac{\Delta W_F}{\Delta t} = F\cdot\upsilon$, $\upsilon = 2t + 1 = 5m/s$, $P_F = 50J/s$

**Γ4.γ.** $\dfrac{\Delta U_L}{\Delta t} = E_{AYT}\cdot i = 1\cdot 4 = 4J/s$

$i = 2t = 2\cdot 2 = 4A$

**ΘΕΜΑ Δ**




**Δ1.** $\Sigma_1: \Sigma\vec{F}_x = 0 \Rightarrow m_1 g\eta\mu\phi = T_{v2} \Rightarrow T_{v2} = 3\cdot 10\cdot\dfrac{3}{5} \Rightarrow T_{v2} = 18N$

$T'_{v2} = T_{v2} = 18N$

Ράβδος: $\Sigma\vec{\tau}_{(O)} = 0 \Rightarrow \tau_{T'_{v1}} = \tau_{T'_{v2y}} \Rightarrow T'_{v1}\dfrac{l}{2} = T'_{v2y}\dfrac{l}{2} \Rightarrow T'_{v1} = \eta\mu\phi T'_{v2} = \dfrac{3}{5}18 = 10{,}8N$

**Δ2.** $T_{v1} = T'_{v1} = 10{,}8N$,

$I = \dfrac{E}{R_{\pi\lambda}} = \dfrac{30}{2} = 15A$

$\pi\lambda\alpha\iota\sigma\iota o: \Sigma F_y = 0 \Rightarrow w + F_L = T_{v1} \Rightarrow T_{v1} = F_L = BI\alpha \Rightarrow B = \dfrac{T_{v1}}{I\alpha} = \dfrac{10{,}8}{15\cdot 0{,}8} = 0{,}9T$

**Δ3.** $\Sigma_2:\ \upsilon_{2max}=\omega_2 d=\sqrt{\frac{k}{m_2}}d=10\frac{9\pi}{100}=\frac{9\pi}{10}\,m/s$

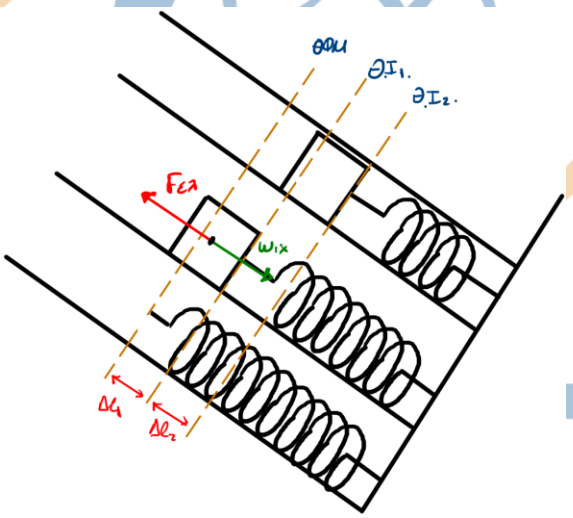
$\Sigma_1:\Sigma F_{1x}=w_{1x}\Rightarrow m_1\ \alpha=m_1 g\ \eta\mu\phi\Rightarrow\alpha=g\ \eta\mu\phi=10\frac{3}{5}=6\ m/s$

$\omega_2=\sqrt{\frac{k}{m}}=10\ rad/s,\ \ T=\frac{2\pi}{\omega}=\frac{2\pi}{10}=\frac{\pi}{5}s,\ \ \Delta t=\frac{T}{4}=\frac{\pi/5}{4}=\frac{\pi}{20}s$

$\upsilon_1=\alpha_1\Delta t=6\frac{\pi}{20}=\frac{3\pi}{10}\ m/s$

$A\Delta O:\ m_2\upsilon_{2max}-m_1\upsilon_1=(m_1+m_2)\upsilon_\sigma\Rightarrow\upsilon_\sigma=\frac{m_2\upsilon_{2max}-m_1\upsilon_1}{(m_1+m_2)}=\frac{1\cdot\frac{9\pi}{10}-3\cdot\frac{3\pi}{10}}{4}=0$

**Δ4.**




$(1)\qquad m_2\ g\ \eta\mu\phi=k\,\Delta l_1\Rightarrow\Delta l_1=\frac{m_2\ g\ \eta\mu\phi}{k}=\frac{1\cdot10\cdot\frac{3}{5}}{100}=0{,}06\ m$

$(2)\qquad (m_1+m_2)\ g\ \eta\mu\phi=k(\Delta l_1+\Delta l_2)\Rightarrow$

$\Delta l_1+\Delta l_2=\frac{(m_1+m_2)\ g\ \eta\mu\phi}{k}=\frac{4\cdot10\cdot\frac{3}{5}}{100}=0{,}24\ m$

$\Delta l_2=0{,}18\ m=A$

$\omega'=\sqrt{\frac{k}{m_1+m_2}}=5\ rad/s$

$$x = A\,\eta\mu(\omega t + \phi) = 0{,}18\,\eta\mu\left(5t + \frac{\pi}{2}\right)(SI)$$

**Δ5.** $F_{\varepsilon\lambda} = (m_1 + m_2)\,g\,\eta\mu\phi - k\,x = 24 - 100x$ (SI)

$x = 0$: $F_{\varepsilon\lambda} = 24$ N

$x = -A = -0{,}18$ m: $F_{\varepsilon\lambda} = 42$ N

$x = +A = +0{,}18$ m: $F_{\varepsilon\lambda} = 6$ N