ΑΠΑΝΤΗΣΕΙΣ ΦΥΣΙΚΗΣ ΠΡΟΣΑΝΑΤΟΛΙΣΜΟΥ 08/06/2026

ΘΕΜΑ Α

Α1. δ

Α2. β

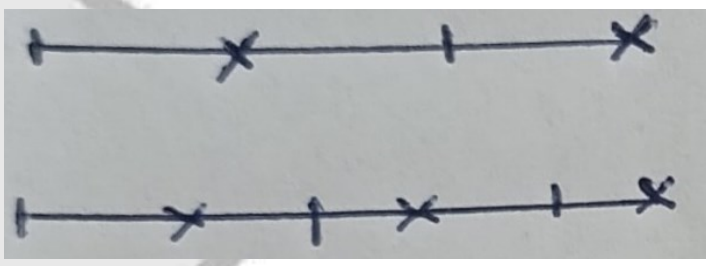
Α3. α

Α4. γ

Α5. α. Σ **β.** Σ **γ.** Λ **δ.** Λ **ε.** Σ

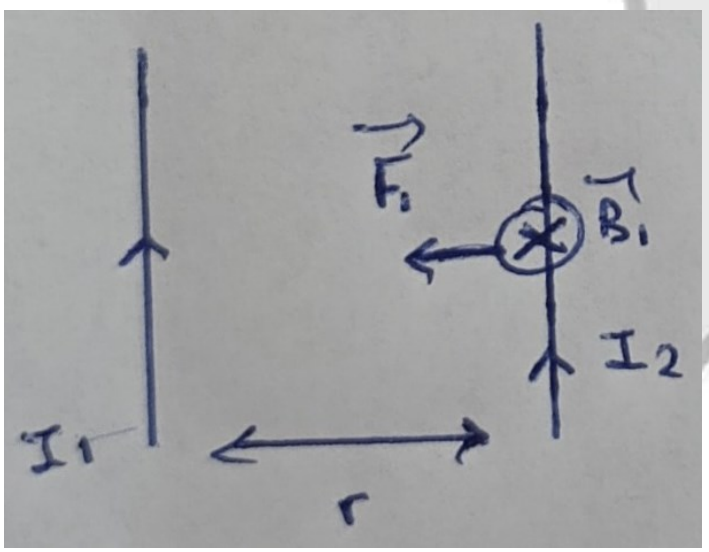
ΘΕΜΑ Β

Β1. α. iii



$$\left.\begin{array}{l} L=\dfrac{3\boldsymbol{\lambda_1}}{4} \\ L=\dfrac{5\lambda_2}{4} \end{array}\right\} \Rightarrow \frac{3\boldsymbol{\lambda_1}}{\cancel{4}}=\frac{5\lambda_2}{\cancel{4}} \Longrightarrow 3\frac{\cancel{v}}{\cancel{s}}T_1=5\frac{\cancel{v}}{\cancel{s}}T_2 \Rightarrow \frac{T_1}{T_2}=\frac{5}{3}$$

Β2. β i.



$\mathrm{I}_1 = I$

$\mathrm{I}_2 = I$

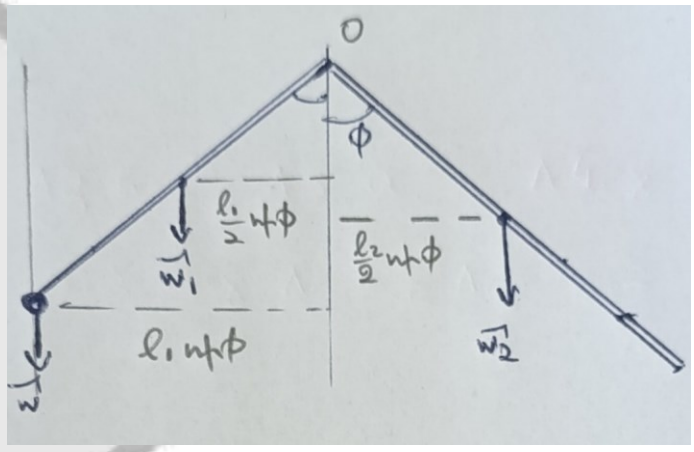
$F_1 = B_1 \cdot \mathrm{I}_2 \, \ell = \frac{\mu_o}{4\pi} \cdot \frac{2\mathrm{I}_1}{r} \cdot \mathrm{I}_2 \cdot \ell \ (1)$

Και

$F_2 = \frac{\mu_o}{4\pi} \cdot \frac{2\mathrm{I}_1}{r + \frac{r}{2}} \cdot 2\mathrm{I}_2 \cdot \ell = \frac{\mu_o}{4\pi} \cdot \frac{2\mathrm{I}_1}{\frac{3r}{2}} \cdot 2\mathrm{I}_2 \cdot \ell = \frac{4}{3} \frac{\mu_o}{4\pi} \cdot \frac{2\mathrm{I}_1}{r} \cdot \mathrm{I}_2 \cdot \ell \ (2)$

Άρα $(1), (2) \Rightarrow F_2 = \frac{4}{3} \cdot F_1 \Rightarrow \frac{F_1}{F_2} = \frac{3}{4}$

Β3. α ii.



$m = \frac{M}{2}$

Το σύστημα ισορροπεί 0

$\Sigma\vec{\tau_{(0)}} = \vec{O} \Rightarrow \Sigma\tau_{(0)} = oNm \Rightarrow T_{w_{(0)}} + T_{w_{1(0)}} + T_{w_{2(0)}} + T_{F_{O(0)}} = oNm \Rightarrow$

$\Rightarrow \frac{M}{2} \cdot g \cdot l_1 \cdot \eta\mu\varphi + M \cdot g \cdot \frac{l_1}{2} \cdot \eta\mu\varphi - M \cdot g \cdot \frac{l_2}{2} \cdot \eta\mu\varphi = 0$

$\Rightarrow \cancel{M \cdot g} \cdot l_1 \cdot \cancel{\eta\mu\varphi} = \cancel{M \cdot g} \cdot \frac{l_2}{2} \cdot \cancel{\eta\mu\varphi} \Rightarrow l_1 = \frac{l_2}{2} \Rightarrow \frac{l_1}{l_2} = \frac{1}{2}$

ΘΕΜΑ Γ

Γ1.

λ'- λ = λ_c (1-συνφ) (με φ=π) $\Leftrightarrow \lambda' - \lambda = 2\lambda_c \Leftrightarrow \lambda' = \lambda + 2\lambda_c \Leftrightarrow \lambda' = 10\lambda_c \left(= 10\frac{h}{m_e c}\right)$

Γ2. $E_\varphi = h \cdot f = \frac{hc}{\lambda} = \frac{hc}{8\lambda_c} = \frac{hc}{8\frac{h}{m_e c}} = \frac{m_e c^2}{8}$

$E'_\varphi = h \cdot f' = \frac{hc}{A'} = \frac{hc}{10\lambda_c} = \frac{hc}{10\frac{h}{m_e c}} = \frac{m_e c^2}{10}$

ΑΔΕ $E_\varphi = \kappa' + E'\varphi \Leftrightarrow \kappa' = E_\varphi - E'\varphi = m_e c^2\left(\frac{1}{8} - \frac{1}{10}\right) = m_e c^2 \frac{1}{40} = \frac{m_e c^2}{40} = \frac{5\cdot 10^5 eV}{4\cdot 10} = 1{,}25 \cdot 10^4 eV = 12{,}5keV$

και λ'=$10\lambda_c \longrightarrow \lambda_1 = 400nm$

Γ3.

φ = 1,4eV

ΑΔΕ (φ/Η) $\longrightarrow h \cdot f = \kappa + \varphi \Leftrightarrow \kappa = h \cdot f - \varphi \geq 0 \longrightarrow h \cdot f \geq \varphi \Leftrightarrow f \geq \frac{\varphi}{h}$

$\longrightarrow f_0 = \frac{\varphi}{h} = \frac{1{,}4 \cdot 1{,}6 \cdot 10^{-19}}{6{,}4 \cdot 10^{-34}} Hz = \frac{14}{40} 10^{15} Hz = 0{,}35 \cdot 10^{15} Hz = 3{,}5 \cdot 10^{14} Hz.$

Γ4. $h \cdot f_1 = \frac{hc}{\lambda_1} = \frac{1200eV\ nm}{400nm} = 3eV$

ΑΔΕ (φ/Η) → $h \cdot f_1 = k + \varphi \Leftrightarrow \kappa = 3eV - 1{,}4eV = 1{,}6eV$

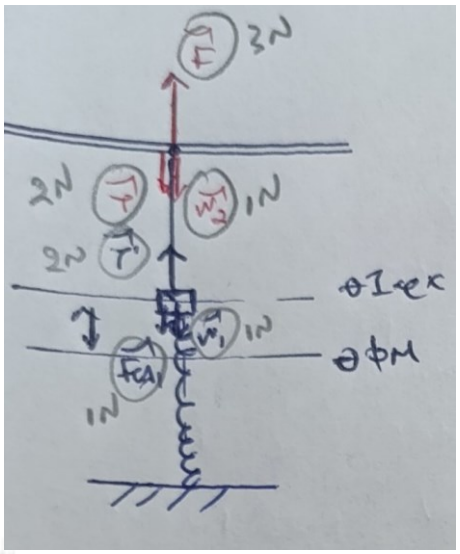
ΘΜΚΕ → $(\kappa\acute{\alpha}\theta o\delta o\varsigma \rightarrow \acute{\alpha}\nu o\delta o\varsigma)$ ΔΚ=Σ$W_f \Leftrightarrow K_{\tau\varepsilon\lambda} - K_{\alpha\rho\chi} = W_{fy(\kappa\alpha\theta-\alpha\nu)} \Leftrightarrow 0 - K_{\alpha\rho\chi} = q(V_{\kappa\alpha\theta} - V_{\alpha\nu}) \Leftrightarrow -K = -e(V_{\kappa\alpha\theta} - V_{\alpha\nu}) \Leftrightarrow K = e(V_{\kappa\alpha\theta} - V_{\alpha\nu}) \Leftrightarrow$

$K = eV_0 \Leftrightarrow 1{,}6eV = eV_0 \Leftrightarrow V_0 = 1{,}6V$

ΘΕΜΑ Δ

Δεδομένα Προβλήματος:
l = 1 m
R = 1 Ω
m_2 = 0,1 kg
$R_{N\Lambda}$ = 1 Ω
B = 1 T
F = 3 N
m_1 = 0,1 kg
k = 10 N/m
Δ ℓ

Δ1.



m_2 ισορροπεί:

$\Sigma\vec{F} = \vec{0}$ => … =>F = T + w_2 => T = 2 N

m_1 ισορροπεί:

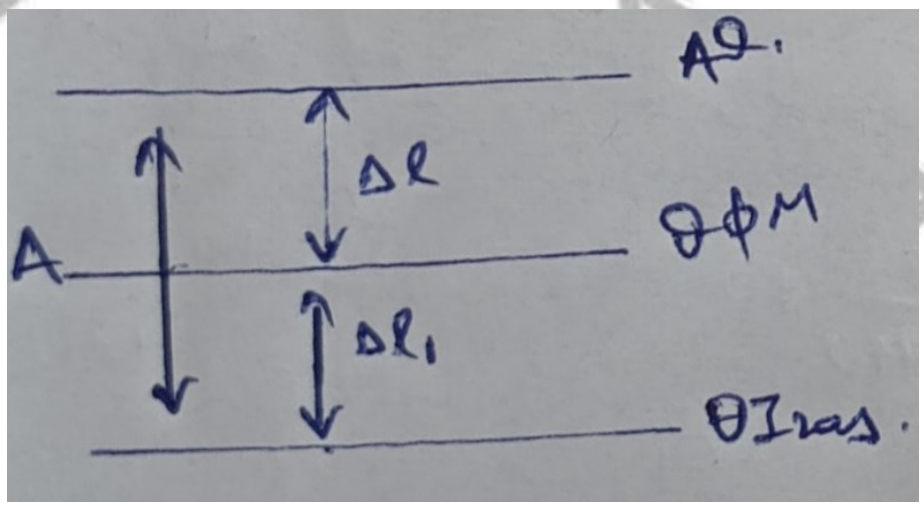
$\Sigma\vec{F} = \vec{0}$ => T' = $F_{ελ}$ + w_1 => $F_{ελ}$ = 1 N

k Δ ℓ = 1 N => Δl = 0,1 m (επιμήκυνση)

Κόβεται το νήμα -> το m_1 ξεκινά από την κάτω Α.Θ.

$ΘI_{τελ}$:

$\Sigma\vec{F} = \vec{0}$ => ... => kΔ ℓ_1 = m_1g => Δ $\ell_1 = \frac{m_1 g}{k}$ = 0,1 m (συσπ)



A = Δ ℓ + Δ ℓ_1 = 0,2 m

D = k = m_1 w^2 => w = $\sqrt{\frac{k}{m_1}}$ = 10 rad/s

$y(0) = +A \Rightarrow A\,\eta\mu\varphi_0 = A \Rightarrow \eta\mu\varphi_0 = 1 \xrightarrow{\varphi_0 \epsilon [0,2\pi]} \varphi_0 = \frac{\pi}{2}$

Άρα $x(t) = 0{,}2\,\eta\mu(10t + \frac{\pi}{2}) = 0{,}2\,\sigma\upsilon\nu(10t)$ (S.I.)

Δ2.

$\frac{K}{E} = \frac{3}{4} \Rightarrow K = \frac{3}{4}E$

Από Α.Δ.Ε.Τ. :

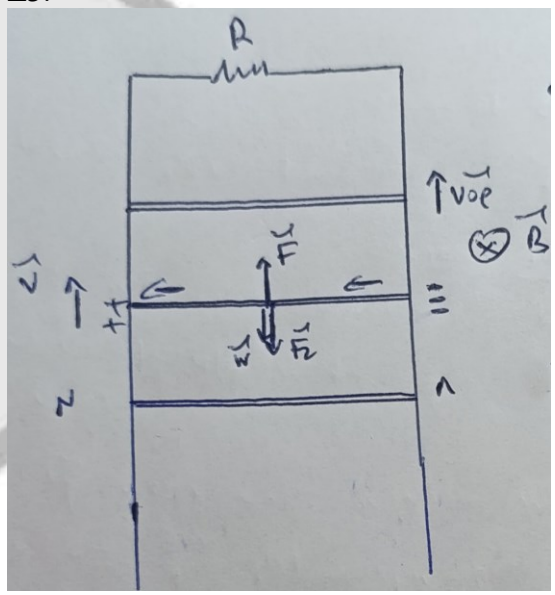
$K + U = E \Rightarrow \frac{3}{4}E + U = E \Rightarrow U = \frac{1}{4}E \Rightarrow \frac{1}{2}Dy_1^2 = \frac{1}{4}\frac{1}{2}DA^2 \Rightarrow y_1 = \pm\frac{A}{2}$

Άρα

$\alpha = -w^2 A\eta\mu(wt + \varphi_0) = -w^2 \cdot y \Rightarrow |\overrightarrow{\alpha}| = w^2 |y| \Rightarrow |\overrightarrow{\alpha_1}| = w^2 \cdot |y_1| = w^2 \cdot \frac{A}{2} =$

$= 100 \cdot 0{,}1\ m/s^2 = 10\ m/s^2$

Δ3.



$E_{\varepsilon\pi} = B\,\upsilon\,\ell$

$I_{\varepsilon\pi} = \frac{E_{\varepsilon\pi}}{R_{o\lambda}}$

$F_L = B \cdot \frac{B\,\upsilon\,\ell}{R_{o\lambda}} \cdot \ell = \frac{B^2 \cdot u \cdot \ell^L}{R_{o\lambda}}$

Με $\overrightarrow{u_0} = \vec{0}$

$\Sigma\vec{F} = m\vec{a} \Rightarrow F + \overrightarrow{F_L} + \vec{w} = m\vec{a} \Rightarrow F - \frac{B^2 \cdot u \cdot \ell^L}{R_{o\lambda}} - m_2 g = m_2 a \Rightarrow 2 - \frac{\upsilon}{2} = 0{,}1\,a$

$\Rightarrow 2 - 0{,}5\upsilon = 0{,}1a \Rightarrow a = 20 - 5\upsilon$ (S.I.)

Για $\upsilon = 0$ m/s $\Rightarrow a_{m4} = 20\ m/s^2$

$\upsilon\uparrow$, $\alpha\downarrow$

$\upsilon = \upsilon_{o\rho}$, $\alpha = 0$ m/s^2 => $20-5\upsilon_{o\rho} = 0$ => $\upsilon_{o\rho} = 4$ m/s

Ο αγωγός εκτελεί ευθύγραμμη μεταβαλλόμενη επιταχυνόμενη κίνηση με το μέτρο της επιτάχυνσης διαρκώς να μειώνεται έως ότου μηδενιστεί και αποκτήσει την οριακή του ταχύτητα.

Δ4.

$\Delta t = 0{,}125$ sec $= 1/8$ s

$\Delta_y = \upsilon_{o\rho} \cdot \Delta t = 4 \cdot \frac{1}{8}$ m $= 0{,}5$ m

$W_F = F \cdot \Delta y = 3 \cdot 0{,}5$ J $= 1{,}5$ J

$L_{o\rho} = \frac{B \cdot \upsilon_{o\rho} \cdot \ell}{R_{o\lambda}} = \frac{4}{2} A = 2A = I$

$Q_{Ro\lambda} = I^2 \cdot R_{o\lambda} \cdot \Delta t = 4 \cdot 2 \cdot \frac{1}{8}$ J $= 1$ J

άρα n % $= \frac{Q_{R_{o\lambda}}}{W_F} \cdot 100\% = \frac{1}{1{,}5} \cdot 100\% = \frac{2}{3} \cdot 100\% = 66{,}66\%$