ΠΑΝΕΛΛΑΔΙΚΕΣ ΕΞΕΤΑΣΕΙΣ
ΓΕΝΙΚΟΥ ΛΥΚΕΙΟΥ
ΦΥΣΙΚΗ ΠΡΟΣΑΝΑΤΟΛΙΣΜΟΥ
8 ΙΟΥΝΙΟΥ 2026

ΑΠΑΝΤΗΣΕΙΣ
(ΘΕΜΑΤΑ Α-Γ)

ΘΕΜΑ Α

Α1. δ

Α2. β

Α3. α

Α4. γ

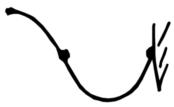
Α5. **α.** → Σ
β. → Σ
γ. → Λ
δ. → Λ
ε. → Σ

Θέμα Β

B1.

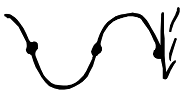
T_1

$$L = (2N_1+1)\frac{\lambda_1}{4}, \quad N_1 = 1 \;\rightarrow\; L = 3\frac{\lambda_1}{4} \quad (1)$$



T_2

$$L = (2N_2+1)\frac{\lambda_2}{4}, \quad N_2 = 2 \;\rightarrow\; L = 5\frac{\lambda_2}{4} \quad (2)$$



(1),(2)

$$3\frac{\lambda_1}{\cancel{4}} = 5\frac{\lambda_2}{\cancel{4}} \Rightarrow$$

$$\lambda_1 = \frac{5}{3}\lambda_2 \xRightarrow{\lambda = \upsilon\cdot T}$$

$$\cancel{\upsilon}\cdot T_1 = \frac{5}{3}\cancel{\upsilon}\cdot T_2$$

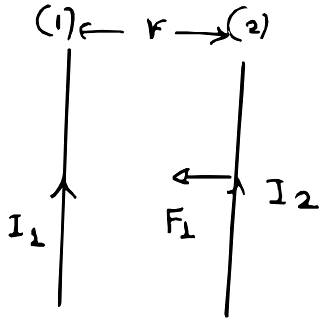
$$\frac{T_1}{T_2} = \frac{5}{3}$$

Σωστή απάντηση: (iii)

B2.

$I_1 = I$

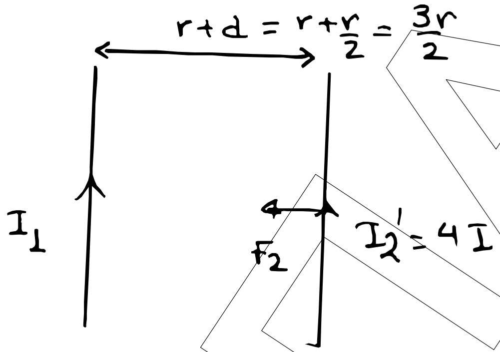
$I_2 = 2I$



Τα ρευματα που διαρρέουν τους αγωγούς ομόρροπα αρα ελκονται με δυναμη

$$F_1 = \frac{\mu_0}{4\pi}\frac{2I_1I_2}{r}\cdot \ell \Rightarrow F_1 = \frac{\mu_0}{4\pi}\frac{2I\cdot 2I}{r}\ell$$

$$F_1 = \frac{\mu_0}{4\pi}\frac{4I^2}{r}\cdot \ell \Rightarrow F_1 = \frac{\mu_0}{\pi}\frac{I^2\ell}{r} \quad (1)$$



$$F_2 = \frac{\mu_0}{4\pi}\frac{2I_1I_2'}{\frac{3r}{2}}\cdot \ell = \frac{\mu_0}{4\pi}\frac{2\cdot I\cdot 4I}{\frac{3r}{2}}\cdot \ell$$

$$F_2 = \frac{\mu_0}{\cancel{4}\pi}\frac{\overset{4}{\cancel{16}}I^2\ell}{3r} \Rightarrow F_2 = \frac{\mu_0}{\pi}\frac{4I^2\cdot\ell}{3r} \quad (2)$$

$$\frac{F_1}{F_2} = \frac{\frac{\cancel{\mu_0}}{\cancel{\pi}}\frac{\cancel{I^2}\cancel{\ell}}{\cancel{r}}}{\frac{\cancel{\mu_0}}{\cancel{\pi}}\frac{4\cancel{I^2}\cancel{\ell}}{3\cancel{r}}} = \frac{3}{4} \Rightarrow \frac{F_1}{F_2} = \frac{3}{4}$$

Σωστή απάντηση (i)

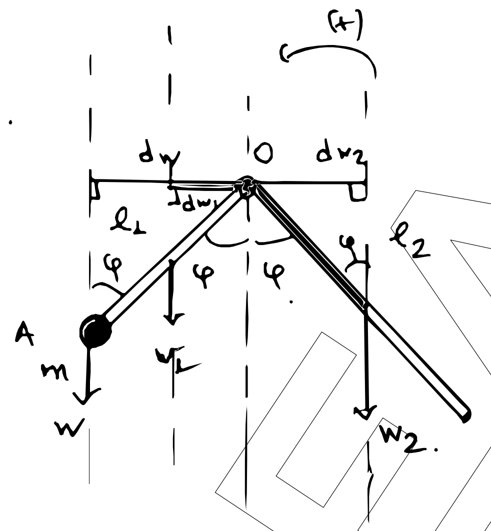
B3 $\quad (OA) = \ell_1 \quad M$

$(O\Gamma) = \ell_2 \quad M.$

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

$\frac{\ell_1}{\ell_2} = ;$

Ισορροπία



Το σύστημα των ράβδων ισορροπεί:

$$\Sigma\tau_{(O)} = 0 \Rightarrow \tau_{w(O)} + \tau_{w_1(O)} - \tau_{w_2(O)} = 0$$

$$w \cdot d_w + w_1 \cdot d_{w_1} - w_2 \cdot d_{w_2} = 0 \quad (1)$$

$d_w = \ell_1\, \eta\mu\varphi$

$d_{w_1} = \frac{\ell_1}{2}\eta\mu\varphi$

$d_{w_2} = \frac{\ell_2}{2}\eta\mu\varphi.$

Άρα:

$$(1) \quad \frac{M}{2} g\, \ell_1\, \eta\mu\varphi + Mg\frac{\ell_1}{2}\eta\mu\varphi - Mg\frac{\ell_2}{2}\eta\mu\varphi = 0$$

$$\cancel{\frac{Mg}{2}}\ell_1\, \cancel{\eta\mu\varphi} + \cancel{Mg}\frac{\ell_1}{\cancel{2}}\cancel{\eta\mu\varphi} = \cancel{Mg}\frac{\ell_2}{\cancel{2}}\cancel{\eta\mu\varphi}$$

$$2\ell_1 = \ell_2 \Rightarrow \frac{\ell_1}{\ell_2} = \frac{1}{2}$$

Σωστή απάντηση (ii)

ΘΕΜΑ: Γ

Γ1) Από την σχέση $\lambda' - \lambda = \frac{h}{m_e \cdot c} \cdot (1 - \sigma\upsilon\nu\phi)$ έχουμε:

$$\lambda' - 8\lambda_c = \lambda_c \cdot (1 - \sigma\upsilon\nu 180^\circ) \Rightarrow \lambda' - 8\lambda_c = \lambda_c \cdot 2 \Rightarrow$$

$$\Rightarrow \lambda' = 10 \cdot \lambda_c$$

Γ.2) $$E_\phi = h \cdot f = \frac{h \cdot c}{\lambda} = \frac{h \cdot c}{8 \cdot \lambda_c} = \frac{\cancel{h} \cdot c}{8 \cdot \frac{\cancel{h}}{m_e c}} = \boxed{\frac{m_e c^2}{8}}$$

$$E_\phi' = h \cdot f' = \frac{h \cdot c}{\lambda'} = \frac{h \cdot c}{10 \cdot \frac{h}{m_e c}} = \boxed{\frac{m_e c^2}{10}}$$

Από ΑΔΕ έχουμε: $E_\phi = E_\phi' + K_e \Rightarrow K_e = E_\phi - E_\phi' \Rightarrow$

$$\Rightarrow K_e = \frac{m_e c^2}{8} - \frac{m_e c^2}{10} = \frac{10 m_e c^2 - 8 m_e c^2}{80} = \frac{2 \cdot m_e c^2}{80} = \frac{m_e c^2}{40} \Rightarrow$$

$$\Rightarrow K_e = \frac{5 \cdot 10^5 eV}{40} = \boxed{\frac{5}{4} \cdot 10^4 eV} \text{ ή } \boxed{1{,}25 \cdot 10^4 eV}$$

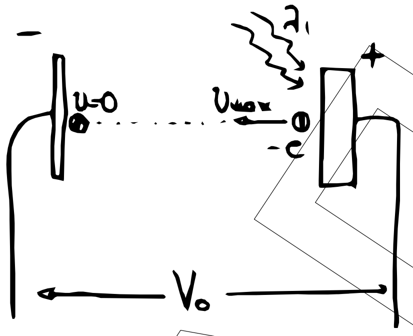
Γ.3. Από την φωτοηλεκτρική εξίσωση του Einstein έχουμε: $K_e = h\cdot f - \phi \xrightarrow[f=f_0]{K_e=0} 0 = h\cdot f_0 - \phi \Rightarrow$

$$\Rightarrow \boxed{f_0 = \frac{\phi}{h}}$$

Έτσι: $f_0 = \frac{1,4\,eV}{6,4\cdot 10^{-34}\,J\cdot s} = \frac{1,4\cdot 1,6\cdot 10^{-19}}{6,4\cdot 10^{-34}}\,Hz \Rightarrow$

$\Rightarrow f_0 = 0,35\cdot 10^{15}\,Hz$ ή $\boxed{35\cdot 10^{13}\,Hz}$

Γ.4) Εφαρμόζοντας ΘΜΚΕ για τα εξερχόμενα φωτοηλεκτρόνια και μέχρι να σταματήσουν παίρνουμε: $0 - K_e = -e(V_+ - V_-) \Rightarrow \frac{K_e}{e} = V_0 \Rightarrow$



$\Rightarrow V_0 = \frac{h\cdot f}{e} - \frac{\phi}{e} = \frac{h\cdot c}{\lambda_1 e} - \frac{\phi}{e} =$

$= \frac{1200\,\cancel{e}V\,\cancel{nm}}{400\,\cancel{nm}\cdot \cancel{e}} - \frac{1,4\,\cancel{e}V}{\cancel{e}} =$

$= 3V - 1,4V \Rightarrow \boxed{V_0 = 1,6V}$