



ΕΠ.Α.Λ. Β' ΟΜΑΔΑΣ

ΦΥΣΙΚΗ Ι

ΑΠΑΝΤΗΣΕΙΣ

ΘΕΜΑ 1^ο

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

ΘΕΜΑ 2^ο

2.1 Σωστή απάντηση: (β)

Αιτιολόγηση:

$$5 \cdot \frac{\lambda_I}{4} = 12,5 \rightarrow \lambda_I = 10 \text{ cm}$$

Από το σχήμα βλέπουμε: $\lambda_{II} = 5 \text{ cm}$.

$$\text{Ισχύει ότι: } \frac{n_I}{n_{II}} = \frac{\lambda_{II}}{\lambda_I} \rightarrow \frac{n_I}{n_{II}} = \frac{5 \text{ cm}}{10 \text{ cm}} \rightarrow \frac{n_I}{n_{II}} = \frac{1}{2} \rightarrow n_I = \frac{n_{II}}{2}$$

2.2 Σωστή απάντηση: (γ)

Αιτιολόγηση:

$$\frac{\frac{E_A}{E_B}}{\frac{E_\infty - E_2}{E_\infty - E_3}} = \frac{E_2}{E_3} = \frac{4}{9} = \frac{\frac{E_1}{E_1}}{\frac{9}{9}}$$

2.3 Σωστή απάντηση: (δ)

Αιτιολόγηση:

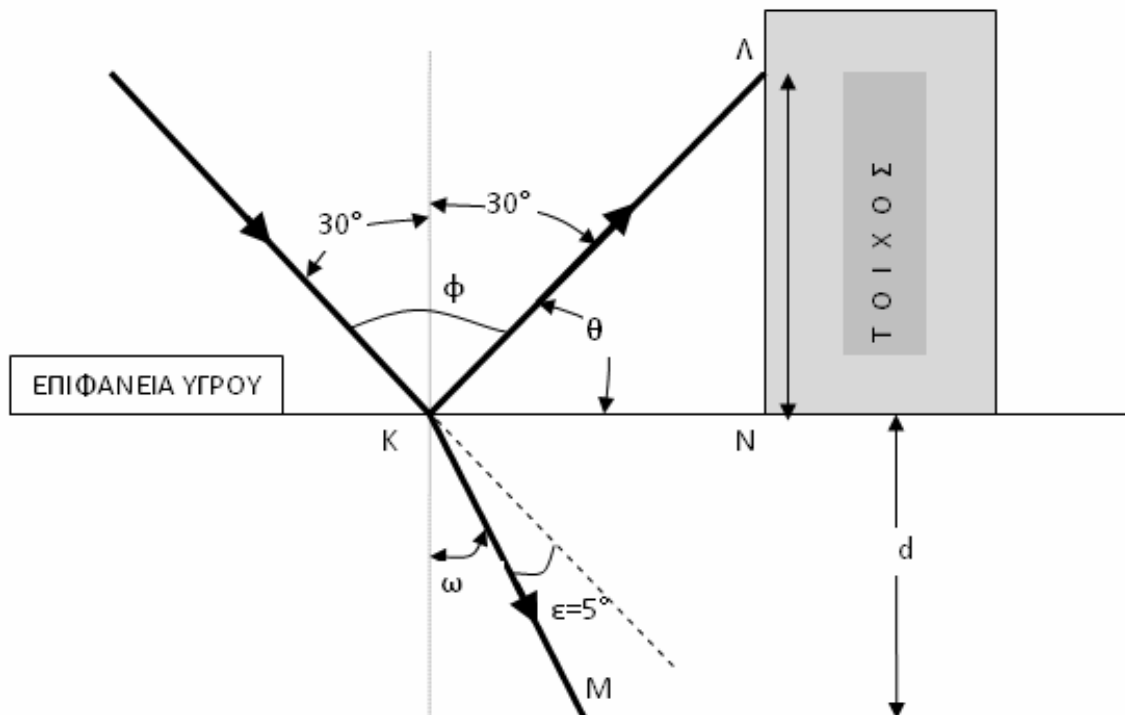
$$\lambda_{\min} = \frac{C \cdot h}{e \cdot V} \rightarrow \lambda_{\min} = \frac{2 \cdot C \cdot h}{m \cdot u^2}$$

$$\lambda'_{\min} = \frac{C \cdot h}{e \cdot V'} \rightarrow \lambda'_{\min} = \frac{2 \cdot C \cdot h}{m \cdot u'^2}$$

Διαιρούμε κατά μέλη:

$$\frac{\lambda_{\min}}{\lambda'_{\min}} = \frac{u'^2}{u^2} \rightarrow \frac{u'}{u} = \sqrt{\frac{1}{16}} \rightarrow \frac{u'}{u} = \frac{1}{4} \rightarrow u' = \frac{u}{4}$$

ΘΕΜΑ 3^ο



A. α)
$$P = \frac{W}{t} \rightarrow P = \frac{N \cdot h \cdot f}{t} \rightarrow \frac{N}{t} = \frac{P}{h \cdot f} \rightarrow \frac{N}{t} = 4 \cdot 10^{19} \text{ φωτόνια/sec}$$

β)
$$\eta \mu \Theta = \frac{(AN)}{(KL)} \rightarrow (AN) = (KL) \cdot \eta \mu \Theta \rightarrow$$

$$(AN) = c_0 \cdot t_{KM} \cdot \eta \mu \Theta \rightarrow (AN) = 3 \cdot 10^8 \cdot 10^{-9} \cdot \frac{\sqrt{3}}{2} = 0,15\sqrt{3} \text{ m}$$

B. B1)
$$\omega + \epsilon = 30^\circ \rightarrow \omega = 25^\circ$$

$$\frac{\sin \omega}{(KM)} = \frac{d}{(KM)} \rightarrow (KM) = \frac{d}{\sin \omega} = \frac{36 \cdot 10^{-2}}{0,9} = 0,4 \text{ m}$$

$$(KM) = N \cdot \lambda_1 \rightarrow \lambda_1 = \frac{(KM)}{N} \rightarrow \lambda_1 = \frac{0,4}{10^6} \rightarrow \lambda_1 = 4 \cdot 10^{-7} \text{ m} \quad \eta \quad \lambda_1 = 400 \text{ nm}$$

$$\text{Άρα } n_1 = \frac{\lambda_0}{\lambda_1} \rightarrow n_1 = \frac{c_0}{\lambda_1 \cdot f} \rightarrow n_1 = \frac{3 \cdot 10^8}{4 \cdot 10^{-7} \cdot 5 \cdot 10^{14}} = 1,5$$

B2)
$$\Delta t = \frac{x}{c_1} - \frac{x}{c_0} = \frac{n \cdot x}{c_0} - \frac{x}{c_0} = \frac{x \cdot (n-1)}{c_0} = \frac{27 \cdot 10^{-2} \cdot 5 \cdot 10^{-1}}{3 \cdot 10^8} = 45 \cdot 10^{-11} \text{ s}$$

ΘΕΜΑ 4^ο

A. A1) $E_{\text{απορ}} = E_3 - E_1 \rightarrow E_{\text{απορ}} = \frac{E_1}{9} - E_1 \rightarrow E_{\text{απορ}} = 12,09 \text{ V}$

A2) $U_3 = 2E_3 \rightarrow U_3 = 2(-1,51) \rightarrow U_3 = -3,02 \text{ eV}$

A3) $E_3 - E_1 = h \cdot \frac{c}{\lambda_{3 \rightarrow 1}} \rightarrow \lambda_{3 \rightarrow 1} = \frac{h \cdot c}{E_3 - E_1} = 1,02 \cdot 10^{-7} \text{ m}$

B) $\lambda_{\min} = \frac{h \cdot c}{e \cdot V}$

$$\lambda_{4 \rightarrow 1} = \frac{h \cdot c}{E_{4 \rightarrow 1}}$$

Διαιρώντας κατά μέλη τις σχέσεις προκύπτει:

$$\frac{\lambda_{\min}}{\lambda_{4 \rightarrow 1}} = \frac{E_{4 \rightarrow 1}}{e \cdot V} \rightarrow \frac{E_{4 \rightarrow 1}}{e \cdot V} = \frac{1}{2} \rightarrow V = \frac{2 \cdot E_{4 \rightarrow 1}}{e} = 25,5 \text{ V}$$