



## ΕΠΑ.Λ. Β' ΟΜΑΔΑΣ

## ΦΥΣΙΚΗ Ι

## ΑΠΑΝΤΗΣΕΙΣ

ΘΕΜΑ 1<sup>ο</sup>

1.  $\gamma$
2.  $\delta$
3.  $\alpha$
4.  $\alpha$
5.  $\alpha \rightarrow \Sigma$     $\beta \rightarrow \Sigma$     $\gamma \rightarrow \Sigma$     $\delta \rightarrow \Lambda$     $\epsilon \rightarrow \Lambda$

ΘΕΜΑ 2<sup>ο</sup>

2.1 Σωστή απάντηση: (β)

Αιτιολόγηση:

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

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

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

2.2 Σωστή απάντηση: (γ)

Αιτιολόγηση:

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

2.3 Σωστή απάντηση: (δ)

Αιτιολόγηση:

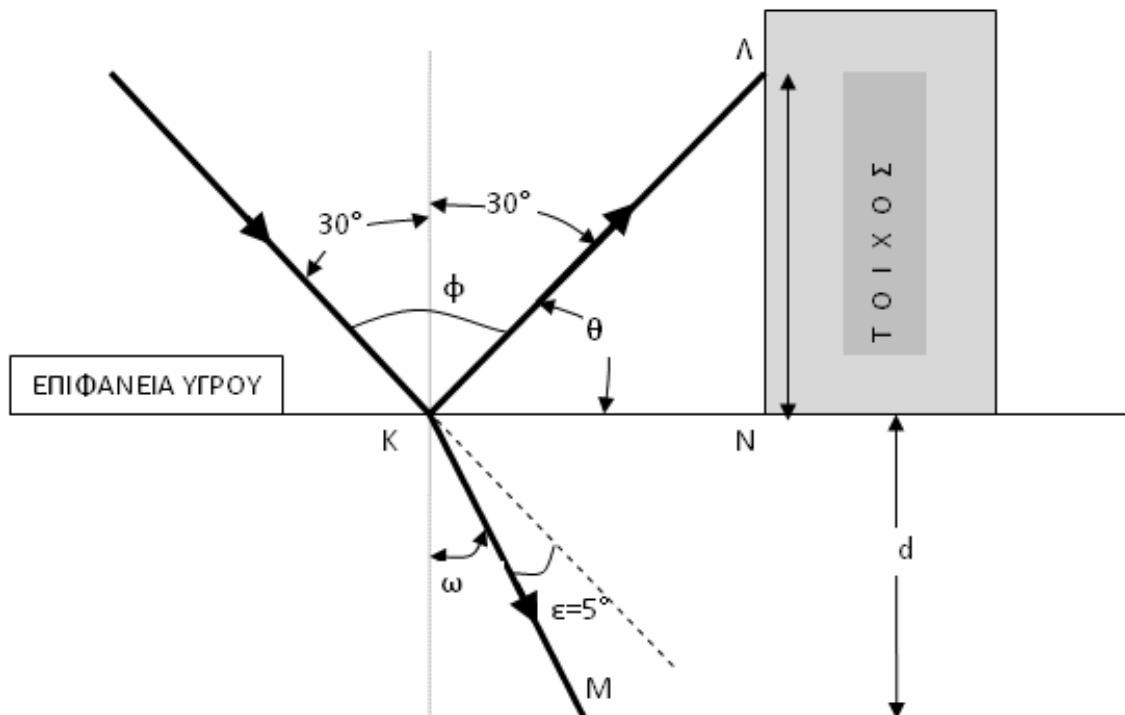
$$\lambda_{\min} = \frac{C \cdot h}{e \cdot V} \rightarrow \lambda_{\min} = \frac{2 \cdot C \cdot h}{m \cdot u^2}$$

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

Διαιρούμε κατά μέλη:

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

**ΘΕΜΑ 3<sup>ο</sup>**



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

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

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

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

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

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

**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<sup>ο</sup>**

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

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

Διαιρώντας κατά μέλη τις σχέσεις προκύπτει:

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