Σύντομες απαντήσεις θεμάτων Φυσ. Κν. Γ' 2013.

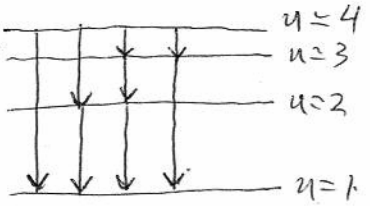
Θέμα 1ο 1δ, 2β, 3α, 4γ, 5 Λ, Σ, Σ, Λ, Λ.

Θέμα 2ο

1. Το γυαλί είναι αριστερά, διότι η γωνία διάθλασης είναι μικρότερη απ' τη γωνία προσπίπτοντος.

2. (γ). $E_{\varphi_2} = E_{\varphi_1} + E_{\varphi_3} \Rightarrow h \cdot f_2 = h \cdot f_1 + h f_3 \Rightarrow$
$f_2 = f_1 + f_3$.

3 α)



β). 6 διαφορετικά φωτόνια.

Θέμα 3ο

α) $E_\varphi = h \cdot f = 6{,}6 \cdot 10^{-34} \cdot 10^8 = 6{,}6 \cdot 10^{-26}$ J.

β). $c = \lambda_0 f \Rightarrow \lambda_0 = \frac{c}{f} \Rightarrow \lambda_0 = \frac{3 \cdot 10^8}{10^8} \Rightarrow \lambda_0 = 3$ m.

γ). $P = \frac{E_{ολ}}{t} = \frac{N \cdot E_\varphi}{t} \Rightarrow \frac{N}{t} = \frac{P}{E_\varphi} \Rightarrow \frac{N}{t} = \frac{6{,}6 \cdot 10^3}{6{,}6 \cdot 10^{-26}} = 10^{29} \frac{\text{φωτ}}{\text{s}}$.

δ). $\Delta t = \frac{d}{v} \Rightarrow \Delta t = \frac{d}{\frac{c}{n}} \Rightarrow \Delta t = \frac{0{,}1 \cdot 1{,}5}{3 \cdot 10^8} = \frac{0{,}1}{2} \cdot 10^{-8} = 5 \cdot 10^{-10}$ s.

Θέμα 4ο

α) $\lambda_{min} = \frac{h \cdot c}{eV} \Rightarrow V = \frac{h \cdot c}{e \cdot \lambda_{min}} \Rightarrow V = \frac{6{,}6 \cdot 10^{-34} \cdot 3 \cdot 10^8}{1{,}6 \cdot 10^{-19} \cdot 10^{-10}} \Rightarrow V = 12{,}375 \cdot 10^3$ V.

β). $P = V \cdot I \Rightarrow P = 12{,}375 \cdot 10^3 \cdot 40 \cdot 10^{-3} = 495$ W.

$E = P \cdot t \Rightarrow E = 495 \cdot 0{,}1 \Rightarrow E = 49{,}5$ J

γ). $P_x = 0{,}02 \cdot P \Rightarrow P_x = 0{,}02 \cdot 495 \Rightarrow P_x = 12{,}375$ W.

δ). $V = \frac{h \cdot c}{e \cdot \lambda_{min}}$, $V' = \frac{h \cdot c}{e \cdot \lambda_{min}'}$ Άρα $\frac{V'}{V} = \frac{\frac{h \cdot c}{e \cdot 0{,}8 \lambda}}{\frac{h \cdot c}{e \cdot \lambda}} \Rightarrow \frac{V'}{V} = \frac{1}{0{,}8} \Rightarrow$

$V' = \frac{V}{0{,}8} \Rightarrow V' = 1{,}25$ V. $\Delta V = V' - V \Rightarrow \Delta V = 0{,}25$ V. $\eta = \frac{\Delta V}{V} 100\% \Rightarrow$

$\Rightarrow \eta = 0{,}25 \cdot 100\% \Rightarrow \eta = 25\%$