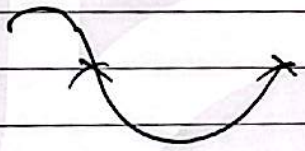
Θέμα Α

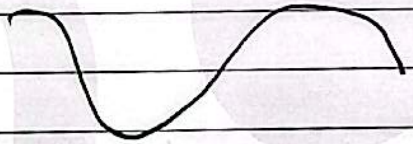
Α1 δ
Α2 β
Α3 α
Α4 γ.

Α5 α) Σωστό
β) Λάθος
γ) Λάθος
δ) Λάθος
ε) Σωστό

Θέμα Β



$L = \frac{\lambda_1}{4} + \frac{\lambda_1}{2} \Rightarrow L = \frac{3\lambda_1}{4}$ (1)



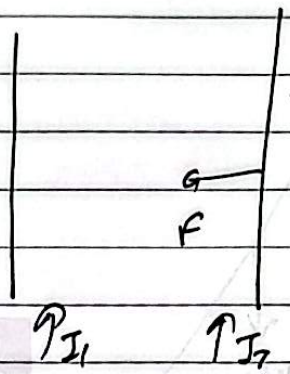
$L = \frac{5\lambda_2}{4}$ (2)

Από (1) και (2) $\frac{3\lambda_1}{4} = \frac{5\lambda_2}{4}$ $3\lambda_1 = 5\lambda_2$

$$\left.\begin{array}{l} u = \lambda_1 f_1 = \frac{\lambda_1}{T_1} \\ u = \lambda_2 f_2 = \frac{\lambda_2}{T_2} \end{array}\right\} \quad \frac{T_1}{T_2} = \frac{5}{3}$$

Σωστή απάντηση iii

Β2. Σωστή απάντηση (i)



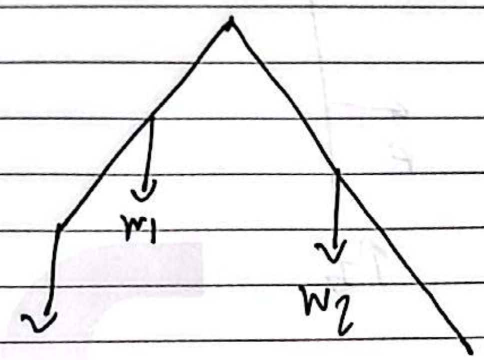
$$F_1 = \frac{\mu_0}{4\pi} \frac{2 I_1 I_2}{r} \ell = \frac{\mu_0}{4\pi} \frac{2I\,2I}{r} \ell$$

Τώρα $r' = r + d = \frac{3r}{2}$

$$F_2 = \frac{\mu_0}{4\pi} \frac{2 I_1 I_2'}{r'} \ell = \frac{\mu_0}{4\pi} \frac{16 I^2 \ell}{3r}$$

$$\frac{F_1}{F_2} = \frac{3}{4}$$

B_3 Σωστη απαντηση ii



$\Sigma \tau_{(O)} = 0$

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

$$\frac{M}{2} g\, l_1 + mg \frac{l_1}{2} - mg \frac{l_2}{2} = 0$$

$$\frac{l_1}{l_2} = \frac{1}{2}.$$

Θέμα Γ

Γ1 $\lambda' - \lambda = \frac{h}{m_e c}(1 - \sin\varphi)$.

$\lambda' - 8\lambda_c = \lambda_c (1+1)$.

$\lambda' = 10\,\lambda_c$

Γ2) $E_\phi = hf = \frac{hc}{\lambda} = \frac{hc}{8\lambda_c} = \frac{m_e c^2}{8}$.

$E'_\phi = hf' = \frac{hc}{10\lambda_c} = \frac{m_e c^2}{10}$

$E_\phi = E'_\phi + K$

$K = \frac{10^5}{8}$ eV

Γ3) Από την Εξίσωση Einstein

$K_e = hf - \phi$

$K \geq 0 \qquad hf - \phi \geq 0$

$f \geq \frac{\phi}{h}$.

$f_0 = \frac{1,4\,eV}{6,4\,10^{-34}} = 0,35\,10^{15}$ Hz.

Σαρώθηκε με το CamScanner

Γ4/

$$K = hf - \phi$$

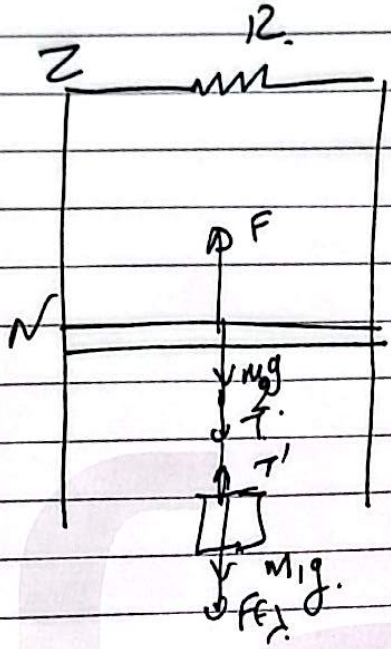
$$K = \frac{hc}{\lambda_1} - \phi = 1,6\,eV$$

$$K_{max} - K_{αρρ} = q_e V_0$$

$$-K = -eV_0$$

$$V_0 = 1,6 \text{ volt}$$

Θέμα Δ



$l = 1\,m.$

$R = 1\,\Omega.$

$R_{N\Lambda} = 1\,\Omega.$

$m_2 = 0,1\,kg.$

$B = 1\,T.$

Ο αγωγός ΝΛ. Ισορροπεί.

$\Sigma F = 0 \qquad F = m_2 g + T.$

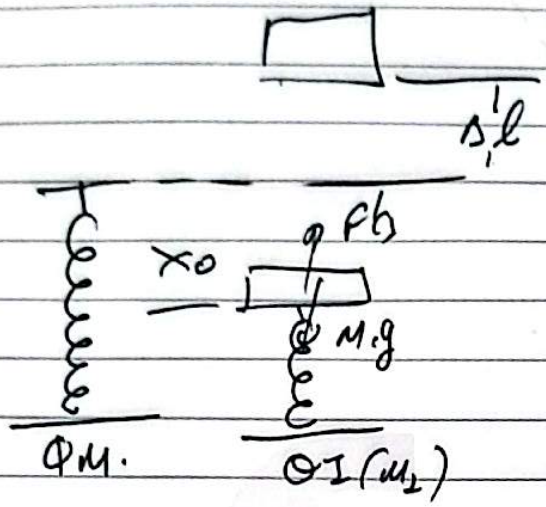
$T = 2N.$

$T' = T$

Ισορροπία για το m_1 $\qquad T = F_{ελ} + m_1 g$

$F_{ελ} = 1N$

$\Delta l = 0,1\,m$



ΘΙ(m1) $\Sigma F = 0$

$F_{ελ} = m_1 g$

$k x_0 = m_1 g$

$x_0 = 0,1 m$

Άρα το σημείο $A = \Delta l + x_0 = 0,2 m$

$x = 0,2 \eta\mu(10t + \frac{\pi}{2})$ $\omega = \sqrt{\frac{k}{m_1}}$

$D_2 = \frac{K}{E} = \frac{3}{4} \Rightarrow k = \frac{3}{4} E$

Άρα $U = \frac{1}{4} E$

$\frac{1}{2} D x^2 = \frac{1}{4} \frac{1}{2} D A^2$

$x^2 = \frac{A^2}{4}$

$x = \pm \frac{A}{2} = \pm 0,1 m.$ $|a| = \omega^2 x = 10 m/s^2.$

Δ3. Η δύναμη Είναι μεγαλύτερη απο το βάρος

$F > W_2$

Άρα θα κινηθεί προς τα πάνω. και θα κάνει Επιταχυνόμενη κίνηση στη αρχή.

$\Sigma F = 0$

$F = F_L + mg$ $\quad\quad$ $BIl = 2$

$3 = F_L + 1$ $\quad\quad$ $I = 2A$

$F_L = 2N$ $\quad\quad$ $\frac{B u l}{R_{ολ}} = 2$

$u_{op} = 4m/s$

Δ4 $\Delta x = u\Delta t = 0{,}5m$

$W = F\Delta x = 1{,}5J$

$Q = I^2 R_{ολ} \Delta t = 1J$

$\eta = \frac{Q}{W_F} 100\% = 66{,}6\%$