ΘΕΜΑ Α

α β δ α ΛΣΣΛΛ

ΘΕΜΑ Β

Β1 iii

$$P_{αρχ} = P_{τελ} \Rightarrow m_1 v_0 = (m_1 + m_2) v_\Sigma \Rightarrow v_\Sigma = \frac{v_0}{4}$$

$$\frac{K_\Sigma}{K_1} = \frac{\frac{1}{2}(m_1+m_2) v_\Sigma^2}{\frac{1}{2} m_1 v_0^2} = \frac{4m v_\Sigma^2}{m_1 v_0^2} \Rightarrow \frac{4 \cdot \frac{v_0^2}{16}}{v_0^2} = \frac{4}{16} =$$

Άρα $\frac{K_\Sigma}{K_1} = \frac{1}{4}$

Β2 iii

$\phi_M < \phi_N$ άρα διαδίδεται από το Ν στο Μ

Για t_1 το Μ είναι στη Θ.Ι $v_M < 0$

$t_1 < \frac{3T}{2}$ θα είναι στην Θ.Ι $v_M = v_{max}$

$$\Delta\phi = 2\pi \frac{(x_M - x_N)}{\lambda} = 2\pi \frac{\frac{\lambda}{4}}{\lambda} \Rightarrow \Delta\phi = \frac{\pi}{2}$$

οπότε $y_A = A \cdot \eta\mu\phi = A \cdot \eta\mu\left(2k\pi + \frac{\pi}{2}\right) \Rightarrow y = +A$

Β3 ii

$E = E' + K \Rightarrow E = E + E' \Rightarrow E = 2E' \Rightarrow \lambda' = 2\lambda$ (Φ)

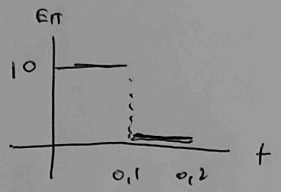
$\lambda' - \lambda = \frac{h}{m_e c}(1 - \sigma\upsilon\nu 60) \Rightarrow \lambda' - \lambda = \frac{h}{m_e c}(1 - \frac{1}{2}) \Rightarrow$

$\lambda' - \lambda = \frac{h}{m_e c} \cdot \frac{1}{2}$ (Φ) $\Rightarrow 2\lambda - \lambda = \frac{h}{2 m_e c} \Rightarrow \lambda = \frac{h}{2 m_e c}$

$E = \frac{hc}{\lambda} = \frac{hc}{\frac{h}{2 m_e c}} \Rightarrow 2 m_e c^2$.

Θέμα Γ

Γ1) $|E_{επ}| = N\left|\frac{\Delta\Phi}{\Delta t}\right| = N\cdot\left|\frac{\Delta B}{\Delta t}\right|\cdot A = 10\ V$



Γ2) ω σταθερό της μαγνητικό πεδίο R

Άρα ΗΕΔ. $U = V_{max}\sin\omega t$ $\quad V = N\omega BA \Rightarrow V = 50\pi$

$\Delta t = T = \frac{2\pi}{\omega} = 0,04$ αρα

$Q = I_{εν}^2 \cdot R\cdot\Delta t = \frac{V_{εν}^2}{R^2}R\cdot T = \frac{V^2}{2R}\cdot\frac{2\pi}{\omega} = 50J$

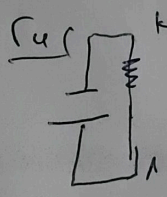
Γ3) $\omega' = 2\omega$ οπότε θα εχουμε

$V' = N\omega BA = 2NBA = 2\ V$

$Q' = \frac{V_{εν}^2}{R}\cdot T' = \frac{V'}{2R}\cdot\frac{2\pi}{\omega}$ αρα $Q' = 100\ J$

$\frac{Q'-Q}{Q}\cdot 100 = 100\%$

Γ4)



για το ΚΛ $I_2 = \frac{E}{R} = 2A$

$F = \frac{\mu_0}{4\pi}\frac{2I_1\cdot I}{d} \Rightarrow F = 10^{-4}\ N$

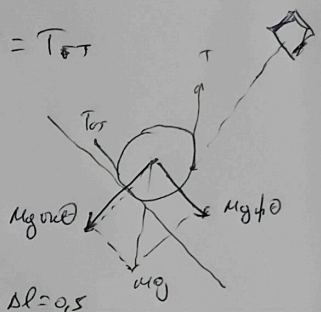
ΒΟΛΛΑΡΗΣ ΦΡΟΝΤΙΣΤΗΡΙΑ

Θέμα Δ

$\Sigma\tau(o) = 0 \Rightarrow T \cdot R = T_{\delta\sigma} R \Rightarrow T = T_{\delta\sigma}$

$\Sigma F(x) = 0 \Rightarrow T_{\delta\sigma} + T\eta\mu\theta = Mg\eta\mu\theta$

$T + 0,6\,T = 24 \Rightarrow T = 15\,N$



για το σώμα $\Sigma F = 0$

$F_{\epsilon\lambda} = T' + m_1 g \Rightarrow k\Delta\ell = T - m_1 g \Rightarrow \Delta\ell = 0,5$

για τον Ν. Θ.Ι $\Sigma F = 0 \rightarrow \Delta\ell' = \frac{mg}{k} = 0,25\ m$

άρα $A = \Delta\ell - \Delta\ell' = 0,25\,m$

Δ2 $\theta = 3\pi$ από τη $N = 1,5$ περιστροφές

$S = \frac{1}{2}\alpha_{\sigma\upsilon\nu} t_1^2 \Rightarrow \alpha_{\sigma\upsilon\nu} = 3\ m/s$

$U_{\sigma\upsilon\nu} = \alpha_{\sigma\upsilon\nu} t_1 = 4,5\ m/s$

$U_\Delta = U_{\sigma\upsilon\nu}\sqrt{2} = 4,5\sqrt{2}$

Δ3 $T = 2\pi\sqrt{\frac{m}{k}} = 2\pi\sqrt{\frac{1}{40}} = 1\,s$ άρα

$t_1 = 1,1\,T$ για το πάνω σώμα

$\Delta\ell_T = 0$ $\Delta\ell_{\sigma\omega\mu} = 0,5$

Άρα $W_{F_{\epsilon\lambda}} = -\Delta U = 7,5\,J$

Δ4

$\Sigma\tau(A) = 0$

$F \cdot \ell \sin\theta = N(d+x) + mg \frac{\ell}{2} \sin\theta$

$F \cdot \ell \sin\theta = mg \sin\theta (d+x) + mg \frac{\ell}{2} \sin\theta$

Άρα $F = 10 + 10x$