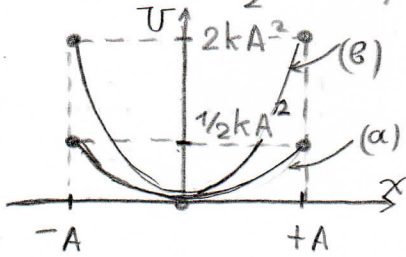


Θέμα Α

A1 → α, A2 → β, A3 → δ, A4 → ΣΣΛΛΣ

Θέμα Β

B1.  $E_T = \frac{1}{2} kA^2$ ,  $E_T' = \frac{1}{2} 4kA^2 = 2kA^2$



B2.  $E_1 = E_2 \Rightarrow \frac{1}{2} L_1 I_1^2 = \frac{1}{2} 4L_1 I_2^2 \Rightarrow I_1^2 = 4I_2^2 \Rightarrow I_1 = 2I_2 \rightarrow \textcircled{\alpha}$

Θέμα Γ

α)  $T = \frac{2\pi}{\omega} = \frac{2\pi}{10^4} = 2\pi \cdot 10^{-4} \text{ s}$

β)  $\omega = \frac{1}{\sqrt{LC}} \Rightarrow \omega^2 = \frac{1}{LC} \Rightarrow C = \frac{1}{L\omega^2} = \frac{1}{10^{-2} \cdot 10^8} = 10^{-6} \text{ F}$

γ)  $Q = \frac{I}{\omega} = \frac{0,5}{10^4} = 0,5 \cdot 10^{-4} \text{ C}$

δ)  $A\Delta E_T \Rightarrow \frac{1}{2} \frac{q^2}{C} + \frac{1}{2} Li^2 = \frac{1}{2} \frac{Q^2}{C} \Rightarrow q^2 + LC i^2 = Q^2$

$\Rightarrow i^2 = \frac{Q^2 - q^2}{LC} \Rightarrow |i| = \sqrt{\frac{0,25 \cdot 10^{-8} - 9 \cdot 10^{-10}}{10^{-2} \cdot 10^{-6}}} =$

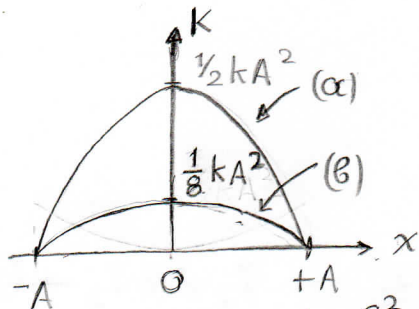
$= \sqrt{\frac{(0,25 - 0,09) \cdot 10^{-8}}{10^{-8}}} = \sqrt{0,16} = 0,4 \text{ A}$

Θέμα Α

A1 → β, A2 → γ, A3 → α, A4 → ΛΛΣΛΣ

Θέμα Β'

B1.  $E_T = \frac{1}{2} kA^2$ ,  $E'_T = \frac{1}{2} \frac{k}{4} A^2 = \frac{1}{8} kA^2$



B2.  $U_E = \frac{1}{2} \frac{q^2}{C} = \frac{1}{2} \frac{Q^2/4}{C} = \frac{1}{4} \cdot \frac{1}{2} \frac{Q^2}{C} = \frac{1}{4} E$

$U_B = E - U_E = E - \frac{1}{4} E = \frac{3}{4} E = 0,75 \cdot E \rightarrow \text{ⓧ}$

Θέμα Γ

α)  $T_1 = 2\pi \cdot \sqrt{\frac{m_1}{k}} = 2\pi \sqrt{\frac{1}{400}} = \frac{\pi}{10} = 0,1 \cdot \pi \text{ s}$ ,  $\omega_1 = \frac{2\pi}{T_1} = \frac{2\pi}{0,1\pi} = 20 \text{ r/s}$

β)  $v_1 \rightarrow v_2 = 0 \parallel \rightarrow v_K$  A.Δ.Ο.  $\vec{P}_{\text{πρην}} = \vec{P}_{\text{μετα}} \Rightarrow$

$\Rightarrow m_1 v_1 = (m_1 + m_2) v_K \Rightarrow v_K = \frac{m_1 v_1}{m_1 + m_2} \text{ ①}$

$v_1 = +v_{\text{max},1} = +A \cdot \omega_1 = 0,1 \cdot 20 = 2 \text{ m/s}$

①  $\Rightarrow v_K = \frac{1 \cdot 2}{4} = 0,5 \text{ m/s}$

γ)  $\omega = \sqrt{\frac{k}{m_1 + m_2}} = \sqrt{\frac{400}{4}} = 10 \text{ rad/s}$ . Επειδή η κρούση έγινε στα θ.Ι.

$v_K = v_{\text{max}} = A' \cdot \omega \Rightarrow A' = \frac{v_K}{\omega} = \frac{0,5}{10} = 0,05 \text{ m}$

β' τρόπος:  $A \Delta E_T \Rightarrow \cancel{U} + K = E_T \Rightarrow \frac{1}{2} (m_1 + m_2) \cdot v_{\text{max}}^2 = \frac{1}{2} kA'^2 \Rightarrow$

$\Rightarrow A' = 0,05 \text{ m}$

δ)  $t_0 = 0, x = 0, v > 0 \Rightarrow \phi_0 = 0$

$x = A' \cdot \eta \mu \omega t \Rightarrow x = 0,05 \cdot \eta \mu 10 t \text{ (s.I.)}$