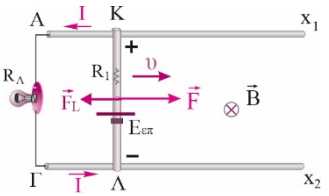
Λύσεις κριτηρίου 25

ΘΕΜΑ Α

Α1. (γ) **Α2.** (β) **Α3.** (β) **Α4.** (α) **Α5.** α. Σ β. Σ γ. Λ δ. Λ ε. Σ

ΘΕΜΑ Β

Β1. (iii)



$$q = it = \frac{E_{\varepsilon\pi}}{R_{o\lambda}}t = \frac{B\upsilon L}{R_{o\lambda}}t \Rightarrow q = \frac{B\upsilon L}{R_1 + R_\Lambda}t \quad (1)$$

$$P_F = P_1 + P_\Lambda \Rightarrow F\upsilon = P_1 + \frac{3F\upsilon}{4} \Rightarrow P_1 = \frac{F\upsilon}{4}$$

$$P_\Lambda = \frac{3F\upsilon}{4} = 3P_1 \Rightarrow I^2R_\Lambda = 3I^2R_1 \Rightarrow R_\Lambda = 3R_1$$

Με αντικατάσταση στην (1) παίρνουμε: $q = \frac{BL\upsilon t}{R + 3R} \Rightarrow q = \frac{BL\Delta x}{4R}$

Β2. (i)

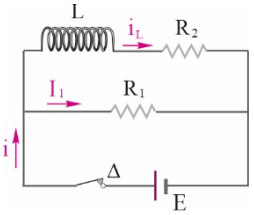
$$\left|E_{\varepsilon\pi,2}\right| = \left|\frac{\Delta\Phi}{\Delta t}\right| = \left|\frac{\Phi_0 - 2\Phi_0}{3t_1 - t_1}\right| = \frac{\Phi_0}{2t_1} = \frac{E_{\varepsilon\pi,1}}{4}$$

$$E_{\varepsilon\pi,1} = \frac{\Delta\Phi}{\Delta t} = \frac{2\Phi_0}{t_1} \quad ,$$

$$Q_1 = I_1^2Rt_1 = \left(\frac{E_{\varepsilon\pi,1}}{R}\right)^2 Rt_1 = \frac{E_{\varepsilon\pi,1}^2}{R}t_1$$

$$Q_2 = I_2^2R2t_1 = \left(\frac{E_{\varepsilon\pi,2}}{R}\right)^2 R2t_1 = \frac{\left(\frac{E_{\varepsilon\pi,1}}{4}\right)^2}{R}2t_1 = \frac{E_{\varepsilon\pi,1}^2}{16R}2t_1 = \frac{Q_1}{8} \Rightarrow Q_1 = 8Q_2$$

Β3. **(ii)**



$$E = |E_{AYT}| + i_2 R_2 \Rightarrow |E_{AYT}| = E - i_2 R \quad (1)$$

$$P_{ηλ} = Ei = \frac{3}{8}\frac{E^2}{R} \Rightarrow i = \frac{3E}{8R}$$

$$i = I_1 + i_2 \Rightarrow \frac{3E}{8R} = \frac{E}{R_1} + i_2 \Rightarrow i_2 = \frac{3E}{8R} - \frac{E}{4R} \Rightarrow i_2 = \frac{E}{8R}$$

Με αντικατάσταση στην (1) παίρνουμε:

$$|E_{AYT}| = E - \frac{E}{8R}R = \frac{7E}{8} \Rightarrow L\left|\frac{di}{dt}\right| = \frac{7E}{8} \Rightarrow \left|\frac{di}{dt}\right| = \frac{7E}{8L} \Rightarrow \frac{di}{dt} = \frac{7E}{8L}$$

ΘΕΜΑ Γ

Γ1. $\omega = \frac{2\pi}{T} = 100\ \frac{rad}{s}$,

$$t = \frac{5T}{4} = 0,025s \Rightarrow T = 0,02s$$

, $V = N\omega BA = 100V$

$$\Phi_{max} = B\alpha^2 \Rightarrow B = 0,25\pi T$$

Γ2. $i = I\eta\mu\omega t = \frac{V}{R}\eta\mu\omega t = -\frac{\sqrt{2}}{2}A$,

$$I = \frac{V}{R} = 1A$$

$$F_L = NB|i|L = 0,25\pi\sqrt{2}N$$

Γ3. $P_{\sigma\tau} = P_{\mu\acute{\varepsilon}\sigma\eta} \Rightarrow i^2R = I_{\varepsilon\nu}{}^2R = \frac{I^2}{2}R \Rightarrow i = \pm\frac{\sqrt{2}}{2} \Rightarrow I\eta\mu\omega t = \pm\frac{\sqrt{2}}{2} \Rightarrow$

$$\eta\mu 100\pi t = \pm\eta\mu\frac{\pi}{4} \Rightarrow$$

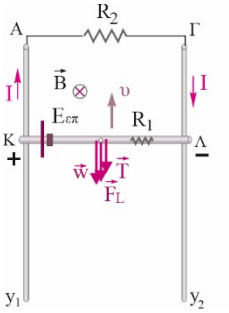
$$t_1 = \frac{1}{400}s,\ t_2 = \frac{3}{400}s,\ t_3 = \frac{5}{400}s,\ t_4 = \frac{7}{400}s,\ t_5 = \frac{9}{400}s$$

Γ4. $Q = I_{\varepsilon\nu}{}^2Rt = \frac{I^2}{2}Rt \Rightarrow t = 20s = NT \Rightarrow N = 1000$ στροφ ς

ΘΕΜΑ Δ

Δ1.

$$V_{K\Lambda} = V_{A\Gamma} = IR_2 = \frac{E_{\varepsilon\pi}}{R_{o\lambda}}R_2 = \frac{B\upsilon_0 L}{R_1 + R_2}R_2 \Rightarrow R_2 = \frac{R_1}{3} = 1\Omega$$



Δ2. $K_1 = K_2 = 1J \Rightarrow \frac{1}{2}m\upsilon_1{}^2 = \frac{1}{2}m\upsilon_2{}^2 = 1J \Rightarrow$

$$\upsilon_1 = \upsilon_2 = \upsilon = 2m/s$$

$$I = \frac{E_{\varepsilon\pi}}{R_{o\lambda}} = \frac{B\upsilon L}{R_1 + R_2} = 0,5A$$

$$F_L = BIL = 0,5N$$

$$\Sigma F_1 = m\alpha_1 \Rightarrow -T - w - F_L = m\alpha_1 \Rightarrow$$

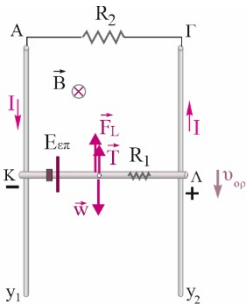
$$\alpha_1 = -13m/s^2 \quad \mu\varepsilon\ \varphi o\rho \quad \pi\rho o\varsigma \quad \tau\alpha \quad \kappa \quad \tau\omega$$

$$\Sigma F_2 = m\alpha_2 \Rightarrow w - T - F_L = m\alpha_2 \Rightarrow$$

$$\alpha_2 = 7m/s^2 \quad \mu\varepsilon\ \varphi o\rho \quad \pi\rho o\varsigma \quad \tau\alpha \quad \kappa \quad \tau\omega$$

$$|\Delta\alpha| = |\alpha_2 - |\alpha_1|| = 6m/s^2$$

Δ3. $\Sigma F = 0 \Rightarrow w = F_L + T \Rightarrow F_L = 4N \Rightarrow BI_{o\rho}L = 4N \Rightarrow I_{o\rho} = 4A$



$$I_{ορ} = \frac{E_{επ}}{R_{ολ}} = \frac{B\upsilon_{ορ}L}{R_{ολ}} = \frac{B\upsilon_{ορ}L}{R_1 + R_2} \Rightarrow \upsilon_{ορ} = 16m/s$$

$$P_{θερμ.} = P_T + P_{R_{ολ}} = T\upsilon_{ορ} + I_{ορ}{}^2R_{ολ} \Rightarrow P_{θερμ.} = 80W$$

Δ4. , $q = I_{ορ}t \Rightarrow q = 8C$

$$Q_2 = I_{ορ}{}^2R_2t \Rightarrow t = 2s$$