

Λύσεις κριτηρίου 26

**ΘΕΜΑ Α**

A1. (α) A2. (β) A3. (β) A4. (δ) A5. α. Σ β. Λ γ. Λ δ. Λ ε. Σ

**ΘΕΜΑ Β**

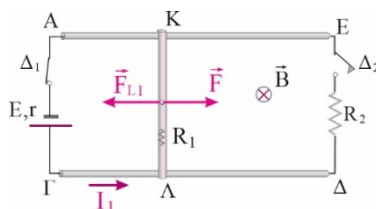
**B1. (ii)**

$$R_{\text{ολ}} = \frac{R_1 R_2}{R_1 + R_2} = \frac{2R}{3}$$

$$E = I_{\text{εγ}}^2 R_{\text{ολ}} t = \left( \frac{V_{\text{εγ}}}{R_{\text{ολ}}} \right)^2 R_{\text{ολ}} 2T = \frac{V_{\text{εγ}}^2}{2R} 2 \frac{2\pi}{\omega} = \frac{\left( \frac{V}{\sqrt{2}} \right)^2}{2R} 2 \frac{2\pi}{\omega} \Rightarrow E = \frac{3\pi V^2}{R\omega}$$

**B2. (i)**

$$I_1 = \frac{E}{R+r} = \frac{E}{4R}$$



Ισορροπία:

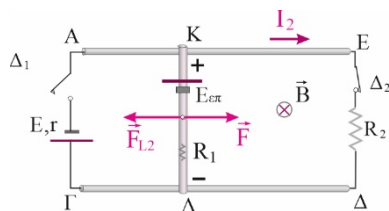
$$\Sigma F_1 = 0 \Rightarrow F = F_{L,1} = BI_1 L \Rightarrow F = B \frac{E}{4R} L$$

Οριακή ταχύτητα:  $\Sigma F_2 = 0 \Rightarrow$

$$F = F_{L,2} = BI_2 L = B \frac{E_{\text{επ}}}{R_{\text{ολ}}} L \Rightarrow$$

$$B \frac{E}{4R} L = B \frac{B v_{\text{οπ}} L}{5R} L \Rightarrow v_{\text{οπ}} = \frac{5E}{4BL}$$

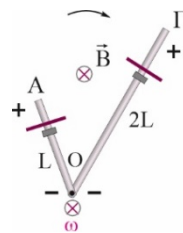
$$P_F = F v_{\text{οπ}} = \frac{BEL}{4R} \frac{5E}{4BL} \Rightarrow P_F = \frac{5E^2}{16R}$$



**B3. (i)**

$$\theta = \frac{1}{2} \alpha_{\gamma\omega\nu} t^2 \Rightarrow N2\pi = \frac{1}{2} \alpha_{\gamma\omega\nu} \left( \frac{\omega}{\alpha_{\gamma\omega\nu}} \right)^2 \Rightarrow$$

$$8\pi \text{ rad} = \frac{1}{2} \frac{\omega^2}{\alpha_{\gamma\omega\nu}} \Rightarrow \omega = 4\sqrt{\pi\alpha_{\gamma\omega\nu}}$$



$$V_{\Gamma A} = V_{\Gamma O} - V_{AO} = \frac{3}{2} B\omega L^2 = \frac{3}{2} B \cdot 4\sqrt{\pi\alpha_{\gamma\omega\nu}} L^2 \Rightarrow V_{\Gamma A} = 6BL^2 \sqrt{\pi\alpha_{\gamma\omega\nu}}$$

$$V_{AO} = \frac{1}{2} B\omega L^2$$

**ΘΕΜΑ Γ**

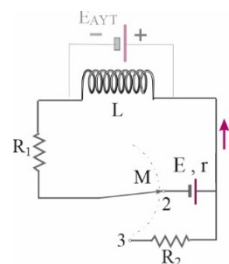
**Γ1.**

$$U_B = \frac{1}{2} Li_1^2 \Rightarrow i_1 = 1A$$

$$E = |E_{\text{ΑΥΤ}}| + i_1 (R_1 + r) \Rightarrow |E_{\text{ΑΥΤ}}| = 10V \Rightarrow$$

$$L \left| \frac{di}{dt} \right| = 10V \Rightarrow \left| \frac{di}{dt} \right| = 50 \Rightarrow \frac{di}{dt} = 50A/s$$

**Γ2.**



$$E = |E_{\text{ΑΥΤ}}| + i(R_1 + r) \Rightarrow |E_{\text{ΑΥΤ}}| = E - i(R_1 + r) = 20 - 10i \quad (\text{S.I.})$$

$$P_L = |E_{\text{ΑΥΤ}}| i = (20 - 10i) i = 20i - 10i^2 \Rightarrow 10i^2 - 20i + P_L = 0 \quad (1)$$

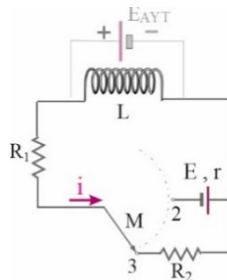
$$\Delta \geq 0 \Rightarrow \beta^2 - 4\alpha\gamma \geq 0 \Rightarrow 20^2 - 4 \cdot 10P_L \geq 0 \Rightarrow P_L \leq 10 \Rightarrow P_{L,\text{max}} = 10W$$

$$(1) \Rightarrow 10i^2 - 20i + P_{L,\text{max}} = 0 \Rightarrow 10i^2 - 20i + 10 = 0 \Rightarrow i^2 - 2i + 1 = 0 \Rightarrow i = 1A$$

**Γ3.**

$$I_0 = \frac{E}{R_1 + r} = 2A$$

$$|E_{AYT}| = L \left| \frac{di}{dt} \right| = 10V, |E_{AYT}| = I_0 (R_1 + R_2) \Rightarrow R_2 = 1\Omega$$



**Γ4.**  $U_{B,0} = \frac{1}{2} LI_0^2 = 0,4J$

$$\frac{Q_1}{Q_2} = \frac{\Sigma i^2 R_1 \Delta t}{\Sigma i^2 R_2 \Delta t} = \frac{\Sigma i^2 \Delta t R_1}{\Sigma i^2 \Delta t R_2} \Rightarrow \frac{Q_1}{Q_2} = 4 \Rightarrow Q_2 = \frac{1}{4} Q_1$$

$$Q_{\text{ολ.}} = U_{B,0} \Rightarrow Q_1 + Q_2 = 0,4 \Rightarrow \frac{5}{4} Q_1 = 0,4 \Rightarrow Q_1 = 0,32J \text{ και } Q_2 = 0,08J$$

**ΘΕΜΑ Δ**

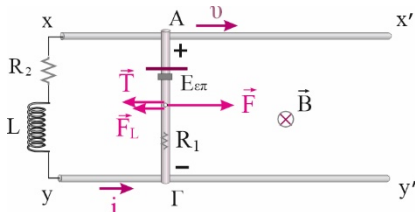
**Δ1.**  $V_2 = \alpha + \beta t$

Για  $t = 0$  ε ναι  $V_2 = \dots \Rightarrow \alpha = \dots$

και για  $t = 4s$  ε ναι  $V_2 = \dots \Rightarrow \beta = \frac{V}{s}$

Άρα,  $V_2 = 0,6 + 0,1t$  (S.I.)

$$i = \frac{V_2}{R_2} = \frac{0,6 + 0,1t}{0,1} \text{ (S.I.)} \Rightarrow i = 6 + t \text{ (S.I.)}$$

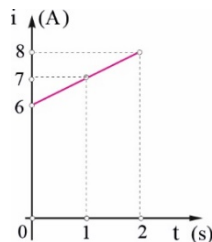


$$|E_{AYT}| = L \left| \frac{di}{dt} \right| = L \frac{d(6+t)}{dt} \Rightarrow |E_{AYT}| = 0,2V$$

**Δ2.**  $E_{\varepsilon\tau} = |E_{AYT}| + i(R_1 + R_2) \Rightarrow Bvd = |E_{AYT}| + (6+t)(R_1 + R_2) \Rightarrow$

$$v = 1,4 + 0,2t \Rightarrow v = 1,8m/s$$

**Δ3.**  $q \Leftrightarrow \varepsilon \mu \beta \alpha \delta \Rightarrow \dots = \frac{7+8}{2} = \dots$



**Δ4.**  $v = v_0 + \alpha t = 1,4 + 0,2t$

$$v_0 = 1,4m/s \text{ και } \alpha = 0,2m/s^2$$

$$\Sigma F = m\alpha \Rightarrow F - F_L - T = m\alpha \Rightarrow F = BId + T + m\alpha \Rightarrow F = 8,2N$$

$$x = v_0 t + \frac{1}{2} \alpha t^2 \Rightarrow 1,5 = 1,4t + 0,1t^2 \Rightarrow t = 1s$$

**Δ5.**  $Q = |W_T| = T x \Rightarrow x = 1,5m'$

$$U_B = \frac{1}{2} L i_1^2 = \frac{1}{2} L (6 + t)^2 = 4,9J$$