

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)**

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

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

**B2. (i)**

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

Ισορροπία:

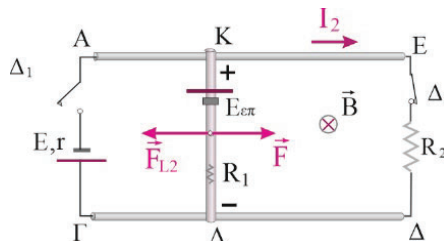
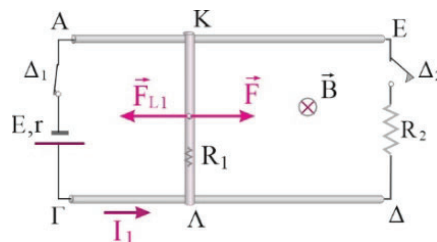
$$\Sigma F_1 = 0 \Rightarrow F = F_{L,1} = BI_1 L \Rightarrow F = B \frac{E}{4R} L$$

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

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

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

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



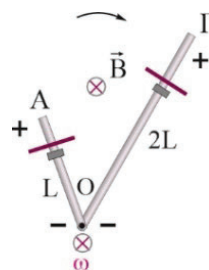
**B3. (i)**

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

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

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

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

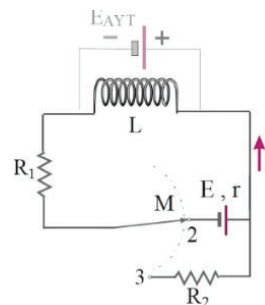


**ΘΕΜΑ Γ**

**Γ1.**  $U_B = \frac{1}{2} Li_1^2 \Rightarrow i_1 = 1A$

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

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



**Γ2.**  $E = |E_{AYT}| + i(R_1 + r) \Rightarrow |E_{AYT}| = E - i(R_1 + r) = 20 - 10i$  (S.I.)

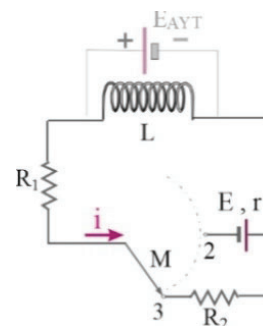
$P_L = |E_{AYT}|i = (20 - 10i)i = 20i - 10i^2 \Rightarrow 10i^2 - 20i + P_L = 0$  (1)

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

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

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

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

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

**ΘΕΜΑ Δ**

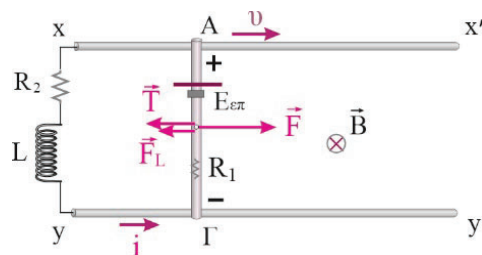
**Δ1.**  $V_2 = \alpha + \beta t$

Για  $t = 0$  είναι  $V_2 = 0,6V \Rightarrow \alpha = 0,6V$

και για  $t = 4s$  είναι  $V_2 = 1V \Rightarrow \beta = 0,1 \frac{V}{s}$

Άρα,  $V_2 = 0,6 + 0,1t$  (S.I.)

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



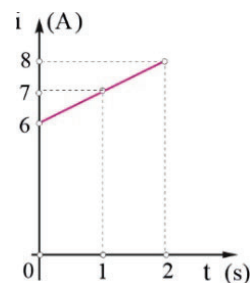
$|E_{AYT}| = L \left| \frac{di}{dt} \right| = L \frac{d(6+t)}{dt} \Rightarrow |E_{AYT}| = 0,2V$

**Δ2.**

$E_{\epsilon\pi} = |E_{AYT}| + i(R_1 + R_2) \Rightarrow Bvd = |E_{AYT}| + (6+t)(R_1 + R_2) \Rightarrow$

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

**Δ3.**  $q \leftrightarrow \epsilon\mu\beta\alpha\delta\acute{o} \Rightarrow q = \frac{7+8}{2} C = 7,5C$



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

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

$$\Sigma F = m\alpha \Rightarrow F - F_L - T = m\alpha \Rightarrow F = Bld + T + m\alpha \Rightarrow F = 8,2 \text{ N}$$

$$\Delta 5. Q = |W_T| = Tx \Rightarrow x = 1,5 \text{ m}, \quad x = v_0 t + \frac{1}{2} \alpha t^2 \Rightarrow 1,5 = 1,4t + 0,1t^2 \Rightarrow t = 1 \text{ s}$$

$$U_B = \frac{1}{2} Li_1^2 = \frac{1}{2} L(6+t)^2 = 4,9 \text{ J}$$