## Λύσεις κριτηρίου 25

**ΘΕΜΑ Α**

**Α**1. (γ)    **Α**2. (β)    **Α**3. (β)    **Α**4. (α)    **Α**5. α. Σ    β. Σ    γ. Λ    δ. Λ    ε. Σ

**ΘΕΜΑ Β**

**Β1.** (iii)

$$q = it = \frac{E_{επ}}{R_{ολ}}t = \frac{BυL}{R_{ολ}}t \Rightarrow q = \frac{BυL}{R_1 + R_Λ}t \qquad (1)$$

$$P_F = P_1 + P_Λ \Rightarrow Fυ = P_1 + \frac{3Fυ}{4} \Rightarrow P_1 = \frac{Fυ}{4}$$

$$P_Λ = \frac{3Fυ}{4} = 3P_1 \Rightarrow I^2 R_Λ = 3I^2 R_1 \Rightarrow R_Λ = 3R_1$$

Με αντικατάσταση στην (1) παίρνουμε: $\quad q = \frac{BLυt}{R + 3R} \Rightarrow q = \frac{BLΔx}{4R}$
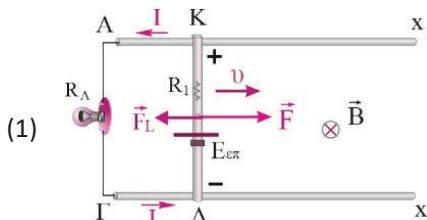
**Β2.** (i)

$$E_{επ,1} = \frac{ΔΦ}{Δt} = \frac{2Φ_0}{t_1} \quad , \quad \left|E_{επ,2}\right| = \left|\frac{ΔΦ}{Δt}\right| = \left|\frac{Φ_0 - 2Φ_0}{3t_1 - t_1}\right| = \frac{Φ_0}{2t_1} = \frac{E_{επ,1}}{4}$$

$$Q_1 = I_1^2 R t_1 = \left(\frac{E_{επ,1}}{R}\right)^2 R t_1 = \frac{E_{επ,1}^{\;2}}{R}t_1$$

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

**Β3.** (ii)

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

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

$$i = I_1 + i_2 \Rightarrow \frac{3E}{8R} = \frac{E}{R_1} + i_2 \Rightarrow i_2 = \frac{3E}{8R} - \frac{E}{4R} \Rightarrow i_2 = \frac{E}{8R}$$
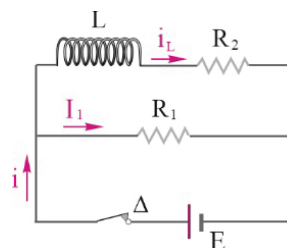
Με αντικατάσταση στην (1) παίρνουμε:

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

**ΘΕΜΑ Γ**

**Γ1.** $t = \frac{5T}{4} = 0{,}025s \Rightarrow T = 0{,}02s \quad , \quad ω = \frac{2π}{T} = 100π\frac{rad}{s}$

$$Φ_{max} = Bα^2 \Rightarrow B = 0{,}25π T \quad , \quad V = NωBA = 100V$$

**Γ2**. $I = \dfrac{V}{R} = 1A$ ,   $i = I\eta\mu\omega t = \dfrac{V}{R}\eta\mu\omega t = -\dfrac{\sqrt{2}}{2}A$ ,

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

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

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

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

**Γ4**.   $Q = I_{\epsilon\nu}{}^2 Rt = \dfrac{I^2}{2}Rt \Rightarrow t = 20s = NT \Rightarrow N = 1000\ \sigma\tau\rho\text{οφές}$

**ΘΕΜΑ Δ**

**Δ1.** $V_{K\Lambda} = V_{A\Gamma} = IR_2 = \dfrac{E_{\epsilon\pi}}{R_{o\lambda}}R_2 = \dfrac{Bv_0 L}{R_1 + R_2}R_2 \Rightarrow R_2 = \dfrac{R_1}{3} = 1\Omega$

**Δ2.** $K_1 = K_2 = 1J \Rightarrow \dfrac{1}{2}mv_1{}^2 = \dfrac{1}{2}mv_2{}^2 = 1J \Rightarrow$

$v_1 = v_2 = v = 2m/s$

$I = \dfrac{E_{\epsilon\pi}}{R_{o\lambda}} = \dfrac{BvL}{R_1 + R_2} = 0,5A$

$F_L = BIL = 0,5N$

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

$\alpha_1 = -13m/s^2\ \ \mu\epsilon\ \varphi\text{ορά}\ \pi\rho\text{ος}\ \ \tau\alpha\ \ \kappa\acute{\alpha}\tau\omega$

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

$\alpha_2 = 7m/s^2\ \ \mu\epsilon\ \varphi\text{ορά}\ \pi\rho\text{ος}\ \ \tau\alpha\ \ \kappa\acute{\alpha}\tau\omega$

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

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

$I_{o\rho} = \dfrac{E_{\epsilon\pi}}{R_{o\lambda}} = \dfrac{Bv_{o\rho}L}{R_{o\lambda}} = \dfrac{Bv_{o\rho}L}{R_1 + R_2} \Rightarrow v_{o\rho} = 16m/s$

$P_{\theta\epsilon\rho\mu.} = P_T + P_{R_{o\lambda}} = Tv_{o\rho} + I_{o\rho}{}^2 R_{o\lambda} \Rightarrow P_{\theta\epsilon\rho\mu.} = 80W$

**Δ4.** $Q_2 = I_{o\rho}{}^2 R_2 t \Rightarrow t = 2s$ ,   $q = I_{o\rho}t \Rightarrow q = 8C$