

ΕΠΑΝΑΛΗΠΤΙΚΕΣ ΠΑΝΕΛΛΑΔΙΚΕΣ ΕΞΕΤΑΣΕΙΣ

Δ' ΤΑΞΗΣ ΕΣΠΕΡΙΝΟΥ ΓΕΝΙΚΟΥ ΛΥΚΕΙΟΥ

ΠΑΡΑΣΚΕΥΗ 14 ΙΟΥΝΙΟΥ 2013

ΑΠΑΝΤΗΣΕΙΣ ΣΤΗΝ ΗΛΕΚΤΡΟΛΟΓΙΑ ΤΕΧΝΟΛΟΓΙΚΗΣ ΚΑΤΕΥΘΥΝΣΗΣ

ΘΕΜΑ Α

A1.1. γ A1.2. β

A2.1. γ A2.2. δ

A3. α. Λάθος, β. Λάθος, γ. Σωστό, δ. Σωστό, ε. Λάθος.

Α4. > μεταγωγός Α

$$R_{\text{ολ}} = \frac{10 \cdot 10^3 \cdot 10 \cdot 10^3}{2 \cdot 10 \cdot 10^3} + 10 \cdot 10^3 \Rightarrow R_{\text{ολ}} = 15 \cdot 10^3 \Omega$$

$$I_{\text{ολ}} = \frac{V_{\text{ολ}}}{R_{\text{ολ}}} = \frac{60}{15 \cdot 10^3} = 4 \cdot 10^{-3} \text{ A}$$

$$V_{ZH} = I_{\text{ολ}} \cdot 10 \cdot 10^3 \Rightarrow V_{ZH} = 40 \text{ V}$$

$$V_{\Gamma A} = 0 \leftarrow \text{ορθή πόλωση}$$

> μεταγωγός Β

$$R'_{\text{ολ}} = 20 \cdot 10^3 \Omega, \quad I'_{\text{ολ}} = \frac{V_{\text{ολ}}}{R'_{\text{ολ}}} = \frac{60}{20 \cdot 10^3} = 3 \cdot 10^{-3} \text{ A}$$

$$V'_{ZH} = I'_{\text{ολ}} \cdot 10 \cdot 10^3 \Rightarrow V_{ZH} = 30 \text{ V}$$

$$V_{\Gamma B} = -V_{ZH} \Rightarrow V_{\Gamma B} = -30 \text{ V}$$

A5.α. Ο συντελεστής ποιότητας πηνίου (Q_{Π}) δηλώνει ότι η τάση στα άκρα του πηνίου είναι Q_{Π} φορές την τάση τροφοδοσίας. Το φαινόμενο αυτό είναι γνωστό και ως υπέρβαση κατά τον συντονισμό.

$$\beta. Q_{\Pi} = \frac{1}{R \cdot C w_0} = \frac{1}{R} \cdot w_0 L = \frac{L}{R} \cdot \frac{1}{\sqrt{LC}} = \frac{1}{R} \cdot \sqrt{\frac{L^2}{LC}} \Rightarrow Q_{\Pi} = \frac{1}{R} \cdot \sqrt{\frac{L}{C}}$$

$$\gamma. Q_{\Pi} = \frac{1}{R} \cdot \sqrt{\frac{L}{C}}$$

$$Q'_{\Pi} = \frac{1}{R'} \cdot \sqrt{\frac{L}{C'}} \stackrel{C' = 4C}{=} \stackrel{R' = 2R}{=} \frac{1}{2R} \cdot \sqrt{\frac{L}{4C}} = \frac{1}{4} \cdot \frac{1}{R} \cdot \sqrt{\frac{L}{C}} = \frac{1}{4} \cdot Q_{\Pi}$$

$$\frac{Q_{\Pi} - Q'_{\Pi}}{Q_{\Pi}} \cdot 100\% = \frac{Q_{\Pi} - \frac{1}{4} \cdot Q_{\Pi}}{Q_{\Pi}} \cdot 100\% = 75\% \text{ μείωση}$$

ΘΕΜΑ Β

B1.α. $E_{o\lambda} = n \cdot E = 6 \cdot 8 \Rightarrow E_{o\lambda} = 48 \text{ V}$

$$r_{o\lambda} = \frac{n \cdot r}{m} = \frac{6 \cdot 4}{4} \Rightarrow r_{o\lambda} = 6 \Omega$$

$$\beta. P_{\Sigma} = \frac{V_{\Sigma}^2}{R_{\Sigma}} \Rightarrow R_{\Sigma} = \frac{V_{\Sigma}^2}{P_{\Sigma}} = \frac{20^2}{80} \Rightarrow R_{\Sigma} = 5 \Omega$$

$$P = I^2 \cdot R_{\Sigma} \Rightarrow I^2 = \frac{P}{R_{\Sigma}} \Rightarrow I = \sqrt{\frac{P}{R_{\Sigma}}} = \sqrt{\frac{80}{5}} \Rightarrow I = 4 \text{ A}$$

$$\gamma. I_{o\lambda} = \frac{E_{o\lambda}}{R_{\Sigma} + R_1 + r_{o\lambda}} = \frac{48}{5 + 1 + 6} = \frac{48}{12} \Rightarrow I_{o\lambda} = 4 \text{ A}$$

$V_{\Sigma} = I_{o\lambda} \cdot R_{\Sigma} = 4 \cdot 5 \Rightarrow V_{\Sigma} = 20 \text{ V}$ → λειτουργεί κανονικά

$$\delta. \frac{1}{R_{o\lambda}} = \frac{1}{R_2} + \frac{1}{R_{\Sigma} + R_1} = \frac{1}{3} + \frac{1}{6} = \frac{1}{2} \Rightarrow R_{o\lambda} = 2 \Omega$$

$$I'_{o\lambda} = \frac{E_{o\lambda}}{R_{o\lambda} + r_{o\lambda}} = \frac{48}{2 + 6} = \frac{48}{8} \Rightarrow I'_{o\lambda} = 6 \text{ A}$$

$$V_{\Pi} = E_{o\lambda} - I'_{o\lambda} \cdot r_{o\lambda} = 48 - 6 \cdot 6 \Rightarrow V_{\Pi} = 12 \text{ V}$$

$$I_1 = \frac{V_{\Pi}}{R_{1\Sigma}} = \frac{12}{6} \Rightarrow I_1 = 2 \text{ A}$$

$$P'_{\Sigma} = I_1^2 \cdot R_{\Sigma} = 2^2 \cdot 5 \Rightarrow P'_{\Sigma} = 20 \text{ W}$$

$$\frac{P'_{\Sigma} - P_{\Sigma}}{P_{\Sigma}} \cdot 100\% = \frac{20 - 80}{80} \cdot 100\% = -75\%$$

$$\epsilon. I' = \frac{I_{o\lambda}}{4} = \frac{4}{4} \Rightarrow I' = 1 \text{ A}$$

$$V_{KA} = E + E + E - I' \cdot 3r = 8 + 8 + 8 - 1 \cdot 3 \cdot 4 \Rightarrow V_{KA} = 12 \text{ V}$$

$$\mathbf{B2.a.} V_{1\text{EV}} = I_{1\text{EV}} \cdot R_1 = 2 \cdot 20 \Rightarrow V_{1\text{EV}} = 40 \text{ V}$$

$$V_{2\text{EV}} = V_{1\text{EV}} \Rightarrow V_{2\text{EV}} = 40 \text{ V}$$

$$I_{2\text{EV}} = \frac{V_{2\text{EV}}}{R_2} = \frac{40}{5} \Rightarrow I_{2\text{EV}} = 8 \text{ A}$$

$$I_{o\lambda\text{EV}} = I_{1\text{EV}} + I_{2\text{EV}} = 2 + 8 \Rightarrow I_{o\lambda\text{EV}} = 10 \text{ A}$$

$$V_{\epsilon v_L} = I_{o\lambda\text{EV}} \cdot \omega \cdot L = 10 \cdot 100 \cdot 0,07 \Rightarrow V_{\epsilon v_L} = 70 \text{ V}$$

$$\mathbf{\beta.} V_{\epsilon v_R} = I_{o\lambda\text{EV}} \cdot R_{o\lambda} = 10 \cdot 4 \Rightarrow V_{\epsilon v_R} = 40 \text{ V}$$

$$V_{\epsilon v_C} = I_{o\lambda\text{EV}} \cdot \frac{1}{\omega C} = 10 \cdot \frac{1}{100 \cdot 2,5 \cdot 10^{-3}} \Rightarrow V_{\epsilon v_C} = 40 \text{ V}$$

$$V_{\epsilon v}^2 = V_{\epsilon v_R}^2 + (V_{\epsilon v_L} - V_{\epsilon v_C})^2 = 40^2 + (70 - 40)^2 = 2500 \Rightarrow$$

$$V_{\epsilon v} = \sqrt{2500} \Rightarrow V_{\epsilon v} = 50 \text{ V}$$

$$\gamma. S = V_{\epsilon v} \cdot I_{\epsilon v} = 50 \cdot 10 \Rightarrow S = 500 \text{ VA}$$

$$P = I_{\epsilon v}^2 \cdot R_{o\lambda} = 10^2 \cdot 4 \Rightarrow P = 400 \text{ W}$$

$$\sigma v \varphi = \frac{P}{S} = \frac{400}{500} \Rightarrow \sigma v \varphi = \frac{4}{5}$$

$$\delta. P = V_{\epsilon v} \cdot I_{\epsilon v} \cdot \sigma v \varphi = 50 \cdot 10 \cdot \frac{4}{5} \Rightarrow P = 400 \text{ W}$$

$$\epsilon. V^2 = V_R^2 + (V'_C - V_L)^2 \Rightarrow V'_C = 100 \text{ V}$$

$$V'_C = I_{\epsilon v} \cdot \frac{1}{\omega C'} \Rightarrow V'_C = I_{\epsilon v} \cdot \frac{\sqrt{LC'}}{C'} \Rightarrow$$

$$C' = \frac{I_{\epsilon v}^2 \cdot L}{V'^2_C} = \frac{10^2 \cdot 0,07}{100^2} \Rightarrow C' = 7 \cdot 10^{-4} \text{ F} \text{ ή } 0,7 \text{ mF}$$