ΕΠΑΝΑΛΗΠΤΙΚΕΣ ΠΑΝΕΛΛΑΔΙΚΕΣ ΕΞΕΤΑΣΕΙΣ
Γ΄ ΤΑΞΗΣ ΗΜΕΡΗΣΙΟΥ ΓΕΝΙΚΟΥ ΛΥΚΕΙΟΥ
ΠΑΡΑΣΚΕΥΗ 13 ΙΟΥΝΙΟΥ 2013
ΑΠΑΝΤΗΣΕΙΣ ΣΤΗΝ ΗΛΕΚΤΡΟΛΟΓΙΑ ΤΕΧΝΟΛΟΓΙΚΗΣ ΚΑΤΕΥΘΥΝΣΗΣ

ΘΕΜΑ Α

Α1. **1**. γ **Α1**. **2**. β

Α2. **1**. γ **Α2**. **2**. δ

Α3. **α**. Λάθος, **β**. Λάθος, **γ.** Σωστό, **δ**. Σωστό **ε**. Λάθος

Α4. – **μεταγωγός Α**

$$R_{o\lambda} = \frac{10 \cdot 10^3 \cdot 10 \cdot 10^3}{2 \cdot 10 \cdot 10^3} + 10 \cdot 10^3 \Longrightarrow R_{o\lambda} = 15 \cdot 10^3\ \Omega$$

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

$$V_{ZH} = I_{o\lambda} \cdot 10 \cdot 10^3 \Longrightarrow V_{ZH} = 40\ V$$

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

- **μεταγωγός Β**

$$R'_{o\lambda} = 20 \cdot 10^3\ \Omega, \qquad I'_{o\lambda} = \frac{V_{o\lambda}}{R'_{o\lambda}} = \frac{60}{20 \cdot 10^3} = 3 \cdot 10^{-3}\ A$$

$$V'_{ZH} = I'_{o\lambda} \cdot 10 \cdot 10^3 \Longrightarrow V'_{ZH} = 30\ V$$

$$V_{\Gamma B} = -V'_{ZH} \Longrightarrow V_{\Gamma B} = -30\ V$$

Α5. **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.

$$\boldsymbol{\beta}.\ Q_Π = \frac{1}{R \cdot C w_0} = \frac{1}{R} \cdot w_0 L = \frac{L}{R} \cdot \frac{1}{\sqrt{LC}} = \frac{1}{R} \cdot \sqrt{\frac{L^2}{LC}} \Longrightarrow Q_Π = \frac{1}{R} \cdot \sqrt{\frac{L}{C}}$$

$$\boldsymbol{\gamma}.\ Q_Π = \frac{1}{R} \cdot \sqrt{\frac{L}{C}}$$

$$Q'_Π = \frac{1}{R'} \cdot \sqrt{\frac{L}{C'}} = \frac{1}{2R} \cdot \sqrt{\frac{L}{4C}} = \frac{1}{4} \cdot \frac{1}{R} \cdot \sqrt{\frac{L}{C}} = \frac{1}{4} \cdot Q_Π$$

$$\frac{Q_Π - Q'_Π}{Q_Π} \cdot 100\% = \frac{Q_Π - \frac{1}{4} Q_Π}{Q_Π} \cdot 100\% = 75\%\ \textit{μείωση}$$

ΘΕΜΑ Β

Β1. α. $E_{o\lambda} = n \cdot E = 6 \cdot 8 \Longrightarrow E_{o\lambda} = 48\ V$

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

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

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

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

$$V_\Sigma = I_{o\lambda} \cdot R_\Sigma = 4 \cdot 5 \Longrightarrow V_\Sigma = 20\ V \ \rightarrow \lambda\varepsilon\iota\tau o\upsilon\rho\gamma\varepsilon\acute{\iota}\ \kappa\alpha\nu o\nu\iota\kappa\acute{\alpha}$$

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

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

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

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

$$P'_\Sigma = I_1^2 \cdot R_\Sigma = 2^2 \cdot 5 \Longrightarrow P'_\Sigma = 20\ W$$

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

$$\boldsymbol{\varepsilon}.\ I' = \frac{I_{o\lambda}}{4} = \frac{4}{4} \Longrightarrow I' = 1\ A$$

$$V_{K\Lambda} = E + E + E - I' \cdot 3r = 8 + 8 + 8 - 1 \cdot 3 \cdot 4 \Longrightarrow V_{K\Lambda} = 12\ V$$

B2. α. $V_{1\varepsilon\nu} = I_{1\varepsilon\nu} \cdot R_1 = 2 \cdot 20 \Longrightarrow V_{1\varepsilon\nu} = 40\ V$

$$V_{2\varepsilon\nu} = V_{1\varepsilon\nu} \Longrightarrow V_{2\varepsilon\nu} = 40\ V$$

$$I_{2\varepsilon\nu} = \frac{V_{2\varepsilon\nu}}{R_2} = \frac{40}{5} \Longrightarrow I_{2\varepsilon\nu} = 8\ A$$

$$I_{o\lambda\varepsilon\nu} = I_{1\varepsilon\nu} + I_{2\varepsilon\nu} = 2 + 8 \Longrightarrow I_{o\lambda\varepsilon\nu} = 10\ A$$

$$V_{\varepsilon\nu_L} = I_{o\lambda\varepsilon\nu} \cdot \omega \cdot L = 10 \cdot 100 \cdot 0{,}07 \Longrightarrow V_{\varepsilon\nu_L} = 70\ V$$

$$\boldsymbol{\beta}.\ V_{\varepsilon\nu_R} = I_{o\lambda\varepsilon\nu} \cdot R_{o\lambda} = 10 \cdot 4 \Longrightarrow V_{\varepsilon\nu_R} = 40\ V$$

$$V_{\varepsilon\nu_C} = I_{o\lambda\varepsilon\nu} \cdot \frac{1}{\omega C} = 10 \cdot \frac{1}{100 \cdot 2{,}5 \cdot 10^{-3}} \Longrightarrow V_{\varepsilon\nu_C} = 40\ V$$

$$V_{\varepsilon\nu}^2 = V_{\varepsilon\nu_R}^2 + \left(V_{\varepsilon\nu_L} - V_{\varepsilon\nu_C}\right)^2 = 40^2 + (70-40)^2 = 2500 \Longrightarrow V_{\varepsilon\nu} = \sqrt{2500} \Longrightarrow V_{\varepsilon\nu} = 50\ V$$

$$\boldsymbol{\gamma}.\ S = V_{\varepsilon\nu} \cdot I_{\varepsilon\nu} = 50 \cdot 10 \Longrightarrow S = 500\ VA$$

$$P = I_{\varepsilon\nu}^2 \cdot R_{o\lambda} = 10^2 \cdot 4 \Longrightarrow P = 400\ W$$

$$\sigma\upsilon\nu\varphi = \frac{P}{S} = \frac{400}{500} \Longrightarrow \sigma\upsilon\nu\varphi = \frac{4}{5}$$

$$\boldsymbol{\delta}.\ P = V_{\varepsilon\nu} \cdot I_{\varepsilon\nu} \cdot \sigma\upsilon\nu\varphi = 50 \cdot 10 \cdot \frac{4}{5} \Longrightarrow P = 400\ W$$

$$\boldsymbol{\varepsilon}.\ V^2 = V_R^2 + (V'_C - V_L)^2 \Longrightarrow V'_C = 100\ V$$

$$V'_C = I_{\varepsilon\nu} \cdot \frac{1}{\omega C'} \Longrightarrow V'_C = I_{\varepsilon\nu} \cdot \frac{\sqrt{LC'}}{C'} \Longrightarrow C' = \frac{I_{\varepsilon\nu}^2 \cdot L}{V'^2_C} = \frac{10^2 \cdot 0{,}07}{100^2} \Longrightarrow C' = 7 \cdot 10^{-4} F \text{ ή } 0{,}7\ mF$$