ΠΑΝΕΛΛΗΝΙΕΣ ΕΞΕΤΑΣΕΙΣ ΕΠΑ.Λ. – 2023

ΗΛΕΚΤΡΟΤΕΧΝΙΑ 2

ΑΠΑΝΤΗΣΕΙΣ ΘΕΜΑΤΩΝ

ΘΕΜΑ Α

Α1. α) Σωστό

β) Λάθος

γ) Λάθος

δ) Σωστό

ε) Λάθος

Α2. 1. γ

2. στ

3. α

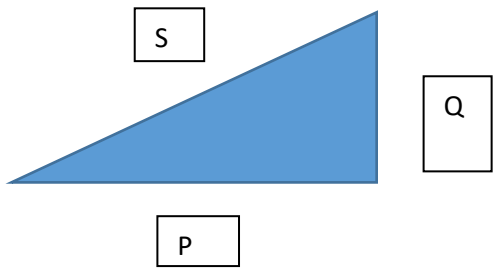
4. β

5. ε

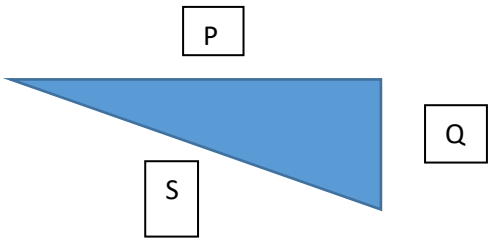
ΘΕΜΑ Β

Β1.

α) Τρίγωνο ισχύος με επαγωγική συμπεριφορά



β) Τρίγωνο ισχύος με χωρητική συμπεριφορά



B2. $u1 = 230\sqrt{2}(\eta\mu 314t + 20^o)V$

$u2 = 230\sqrt{2}(\eta\mu 314t - 100^o)V$

$u3 = 230\sqrt{3}(\eta\mu 314t - 220^o)V$

B3. $u= (30/\sqrt{2})\ \eta\mu(20\pi t+45^o)V$

α) Αρχική φάση $\varphi_0=45^o$

β) $U_{\varepsilon\nu}= (30/\sqrt{2})/\sqrt{2} = 30/(\sqrt{2}*\sqrt{2}) = 30/2 = 15V$

γ) $U(0) = (30/\sqrt{2})\ \eta\mu(20\pi\ 0 +45^o) = (30/\sqrt{2})\ \eta\mu(45^o) =$

$[(30/\sqrt{2})] * [(\sqrt{2}/2)] = 15V$

δ) $U_{\alpha\nu} = (1/2)* U_{\varepsilon\nu} = 15/2 = 7,5V.$

ΘΕΜΑ Γ

RLC σειράς

R, X_L C=(1/3)mf U=100V i(t)=10$\sqrt{2}$ημ(500t)A $X_L = 2X_C$

Γ1. Έχω $I_{εν} = I_o/\sqrt{2}=(10\sqrt{2})/\sqrt{2} = 10A$

Επομένως $U_{εν} = I_{εν} * Z \Rightarrow Z = U_{εν}/I_{εν} = 100V/10A = 10Ω$. Άρα Z=10Ω

Γ2. Για το X_C έχω

ω=500 rad/sec

$X_C = (1/ω*c) = [1/(500 * 1/3 *10^{-3})] = [(3*10^3)/(500)] = 3000/500 = 6$

$\underline{X_C = 6Ω}$

Γ3. 'Εχω $X_L = 2X_C \Leftrightarrow X_L = 2*6=12Ω$

Επομένως $U_L = I_{εν} * X_L = 10 * 12 = 120V$.

Γ4.

συνφ = R/Z

R= $\sqrt{Z^2-(X_L - X_C)^2} = \sqrt{10^2 - (12-6)^2} = \sqrt{100-36} = \sqrt{64} =$ 8Ω.

συνφ = R/Z = 8/10=0,8

P = $U_{εν}$ * $I_{εν}$ * συνφ = 100 * 10 *0,8 = 800Watt

S = $U_{εν}$ * $I_{εν}$ = 100 * 10 = 1000VA

Q = $\sqrt{S^2 - P^2} = \sqrt{1000^2 - 800^2}$ = 600Var.

ΘΕΜΑ Δ

Δ1.

RLC R=2Ω, L= 40/π mH C=100/π μf

U = 240$\sqrt{2}$ημ(500πt + 30^o)V

Δ1. $X_L = \omega * L = [(500\pi) * (40/\pi) * (10^{-3})] = 20\Omega$

$X_C = 1/\ \omega * C =$

$[1/(500\pi) * (100/\pi) * (10^{-6})] = 10^6/50000 = 10^2/5 = 100/5 = 20\Omega$

Δ2.

$Z = \sqrt{R^2 + (X_L - X_C)^2} = \sqrt{2^2 + (20-20)^2} = \sqrt{2^2} = 2\Omega$

Συντονισμός

$I = U_{εν}/Z = 240/2 = 120A$

$U_{εν} = 240\sqrt{2}/\sqrt{2} = 240V$

Δ3.

$i(t) = I_0 ημ(500\pi t)A$ $\quad$ $i(t) = 120\sqrt{2}\, ημ(500\pi t)A$

$I_0 = I_{εν} * \sqrt{2} = 120\sqrt{2}\ A$

Δ4.

$f_0 = 1/(2\pi/\sqrt{L\,C}) = 1/\ ^{2\pi}\sqrt{40 \cdot \frac{100}{\pi} \cdot 10^{-9}} = 1/\ ^{2\pi}\sqrt{\frac{4}{\pi^2} \cdot 10^{-6}} =$

$1/[2\pi * (2/\pi) * 10^{-3}] = 10^3/4 = 250Hz$

$Q_Π = X_L/R = 20/2 = 10.$