

Sèrie 2

Primera part

Exercici 1

Q1 c

Q2 c

Q3 b

Q4 a

Q5 a

Exercici 2

a) $I_R = \frac{U}{R} = 22 \text{ A}$

b) $I_L = \frac{U}{2\pi fL} = 11,67 \text{ A}$

c) $I = \sqrt{I_R^2 + I_L^2} = 24,90 \text{ A}$

d) $P = \frac{U^2}{R} = 4840 \text{ W}$

e) $\cos\varphi = \frac{P}{S} = \frac{P}{UI} = 0,8834 \text{ (ind.)}$

Segona part

OPCIÓ A

Exercici 3

a) $R_{23} = \frac{1}{\frac{1}{R_2} + \frac{1}{R_3}} = 8,33 \Omega$; $I_L = \frac{U/\sqrt{3}}{R_1 + R_{23}} = 22,35 \text{ A}$

b) $P = \sqrt{3}UI_L = 15,48 \text{ kW}$

c) $V_{B'} = R_{23}I_L = 186,2 \text{ V}$; $V_1 = \sqrt{3} V_{B'} = 322,6 \text{ V}$

Exercici 4

a) 3

b) $\eta = 100 \frac{P}{\sqrt{3}UI\cos\varphi} = 100 \frac{50000}{\sqrt{3} \cdot 400 \cdot 92 \cdot 0,85} = 92,29\%$

c) $\Gamma = \frac{P}{\omega} = \frac{50000}{970 \cdot \frac{100\pi}{3000}} = 492,2 \text{ Nm}$

d) estrella

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Exercici 3

a) $I = \frac{U_1}{R_1 + R_3} = 15,38 \text{ A}$

b) $V_3 = R_3 I = 153,8 \text{ V}$

c)
$$\left. \begin{array}{l} U_1 = R_1 I_1 + R_3 I_3 \\ U_2 = R_2 I_2 + R_3 I_3 \\ I_1 + I_2 = I_3 \end{array} \right\} \Rightarrow I_1 = 28,99 \text{ A}; I_2 = -17,68 \text{ A}; I_3 = 11,31 \text{ A}$$

d) $P_1 = U_1 I_1 = 5797 \text{ W}; P_2 = U_2 I_2 = -1061 \text{ W}$

Exercici 4

Si es pren la hipòtesi habitual de corrent constant

a) $I = \frac{P}{U} = 7,826 \text{ A}; \Delta V = 2RI \Rightarrow R_{\max} \leq \frac{\Delta V}{2I} = \frac{0,02 \cdot 230}{2 \cdot 7,826} = 0,2939 \Omega$

b) $\rho \frac{L}{S} < R_{\max} \Rightarrow S > 3,045 \text{ mm}^2$

c) $S = 4 \text{ mm}^2$

d) $\Delta V(\%) = 2 \frac{3,045}{4} = 1,523 \%$

Si es pren la hipòtesi de resistència constant

a) $R_e = \frac{U^2}{P} = 29,39 \Omega; \frac{2R_{\max}}{2R_{\max} + R_e} \leq 0,02 \Rightarrow R_{\max} = 0,2999 \Omega$

b) $\rho \frac{L}{S} < R_{\max} \Rightarrow S > 2,984 \text{ mm}^2$

c) $S = 4 \text{ mm}^2$

d) $R = \rho \frac{L}{S} = 0,2237 \Omega; \Delta V(\%) = \frac{2R}{2R + R_e} 100 = 1,5 \%$

Sèrie 5

Primera part

Exercici 1

Q1 b Q2 d Q3 c Q4 c Q5 a

Exercici 2

a) $P_3 = \frac{U_2^2}{R_3} = 250 \text{ W}$

b) $U_1 - R_1 I_1 - R_2 I_1 - U_2 = 0 \Rightarrow I_1 = 2,5 \text{ A}$

c) $I_3 = \frac{U_2}{R_3} = 5 \text{ A}; I_1 + I_2 - I_3 = 0 \Rightarrow I_2 = 2,5 \text{ A}$

d) $P = U_1 I_1 + U_2 I_2 = 375 \text{ W}$

Segona part

OPCIÓ A

Exercici 3

a) $\frac{X_1}{X_1 + X_2} = \frac{X_2}{X_2 + X_x} \Rightarrow X_1 X_x = X_2 X_3 \Rightarrow \frac{1}{\omega^2 C_1 C_x} = \frac{1}{\omega^2 C_2 C_3} \Rightarrow$
 $C_x = \frac{C_2 C_3}{C_1} \Rightarrow C_x = 66 \mu\text{F}$

b) $\frac{1}{C_{b1}} = \frac{1}{C_1} + \frac{1}{C_3} \Rightarrow C_{b1} = 15,5 \mu\text{F}; \frac{1}{C_{b2}} = \frac{1}{C_2} + \frac{1}{C_x} \Rightarrow C_{b2} = 15,5 \mu\text{F};$
 $C_t = C_{b1} + C_{b2} = 23,02 \mu\text{F}; Q = -\omega C U^2 \Rightarrow Q = -350 \text{ VAR}$

c) No varia.

Exercici 4

a) $V_{C1} = V_{R2} = \frac{R_2}{R_1 + R_2} U_1 = 7,5 \text{ V}; V_{C2} = V_{R1} = \frac{R_1}{R_1 + R_2} U_1 = 2,5 \text{ V}$

b) $E_{C1} = \frac{1}{2} C_1 V_{C1}^2 = 2,813 \text{ mJ}$

c) $E_{L1} = \frac{1}{2} L_1 I^2 = \frac{1}{2} L_1 \left(\frac{U_1}{R_1 + R_2} \right)^2 = 3,472 \text{ mJ}$

OPCIÓ B

Exercici 3

a) $P_R = R_i I^2 = 400 \text{ W}$; $P_e = UI = 6000 \text{ W}$; $\eta(\%) = \frac{P_e - P_R}{P_e} 100 = 93,33\%$

b) $U - R_i I = E \Rightarrow E = 280 \text{ V}$

c) $E = k \omega \Rightarrow k = 0,28 \frac{\text{V}}{\text{min}^{-1}}$

d) $E = kn' \Rightarrow E' = 290 \text{ V}$; $I' = \frac{U - E'}{R_i} = 10 \text{ A}$

Exercici 4

a) $S_M = \frac{P_M}{\cos \varphi} = 5,714 \text{ kVA}$; $Q_M = S_M \sqrt{1 - \cos^2 \varphi} = 4,081 \text{ kVAr}$;

$$P = P_M + P_B = 6000 \text{ W}; Q = Q_M; S = \sqrt{P^2 + Q^2} = 7,256 \text{ kVA};$$

$$\text{fdp} = \cos \varphi = \frac{P}{S} = 0,83$$

b) $S = UI \Rightarrow I = 32,98 \text{ A}$

c) 35 A