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

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

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

e) $\cos\varphi = \frac{P}{S} = \frac{P}{UI} = 0{,}8834$ (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) $P = \sqrt{3} U I_L = 15{,}48\,\text{kW}$

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

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

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) $I = \dfrac{P}{U} = 7{,}826\,\text{A};\ \Delta V = 2RI \Rightarrow R_{\text{màx}} \le \dfrac{\Delta V}{2I} = \dfrac{0{,}02 \cdot 230}{2 \cdot 7{,}826} = 0{,}2939\,\Omega$

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

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

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

Si es pren la hipòtesi de resistència constant

a) $R_e = \dfrac{U^2}{P} = 29{,}39\,\Omega;\ \dfrac{2R_{\text{màx}}}{2R_{\text{màx}} + R_e} \le 0{,}02 \Rightarrow R_{\text{màx}} = 0{,}2999\,\Omega$

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

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

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

Sèrie 5

Primera part

Exercici 1

Q1 b **Q2** d **Q3** c **Q4** c **Q5** a

Exercici 2

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

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

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

d) $P = U_1 I_1 + U_2 I_2 = 375$ W

Segona part

OPCIÓ A

Exercici 3

a) $\dfrac{X_1}{X_1 + X_2} = \dfrac{X_2}{X_2 + X_x} \Rightarrow X_1 X_x = X_2 X_3 \Rightarrow \dfrac{1}{\omega^2 C_1 C_x} = \dfrac{1}{\omega^2 C_2 C_3} \Rightarrow$

$C_x = \dfrac{C_2 C_3}{C_1} \Rightarrow C_x = 66\ \mu$F

b) $\dfrac{1}{C_{b1}} = \dfrac{1}{C_1} + \dfrac{1}{C_3} \Rightarrow$ [illegible] μF; $\dfrac{1}{C_{b2}} = \dfrac{1}{C_2} + \dfrac{1}{C_x} \Rightarrow C$ [illegible] μF;

$C_t = C_{b1} + C_{b2} = 23{,}02\ \mu$F; $Q = -\omega C U^2 \Rightarrow Q = -350$ VAr

c) No varia.

Exercici 4

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

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

c) $E_{L1} = \dfrac{1}{2} L_1 I^2 = \dfrac{1}{2} L_1 \left(\dfrac{U_1}{R_1 + R_2} \right)^2 = 3{,}472$ 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) $S_M = \frac{P_M}{\cos\varphi} = 5,714\ \text{kVA}$; $Q_M = S_M \sqrt{1 - \cos^2\varphi} = 4,081\ \text{kVAr}$;

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

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

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

c) 35 A