SÈRIE 4

Primera part

Exercici 1

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

Exercici 2

a) $Z = \sqrt{R^2 + (X_L - X_C)^2} = \sqrt{4^2 + (8-2)^2} = 7,211 \ \Omega$

b) $I = \frac{U}{Z} = \frac{230}{7,211} = 31,90 \ \text{A}$

c) $fdp = \cos\varphi = \frac{R}{Z} = \frac{4}{7,211} = 0,5547(i)$

d) $X_C' = 2X_C = 4 \ \Omega$; $X_L' = \frac{X_L}{2} = 4 \ \Omega$

$Z' = \sqrt{R^2 + (X_L' - X_C')^2} = R \ \Rightarrow \ fdp' = 1$

OPCIÓ A

Exercici 3

a) $I_R = \frac{U}{R} = \frac{660}{10} = 66 \ \text{A}$; $I_C = \frac{U}{X} = \frac{660}{20} = 33 \ \text{A}$

$I_b = \sqrt{I_R^2 + I_C^2} = \sqrt{66^2 + 33^2} = 73,79 \ \text{A}$

b) $I_l = \sqrt{3} I_b = 127,8 \ \text{A}$

c) $P = 3\frac{U^2}{R} = 3\frac{660^2}{10} = 130,7 \ \text{kW}$

$Q = -3\frac{U^2}{X} = -3\frac{660^2}{20} = -65,34 \ \text{kvar}$

d) $S = \sqrt{P^2 + Q^2} = 146,1 \ \text{kVA}$

$fdp = \cos\varphi = \frac{P}{S} = \frac{130,68}{146,1} = 0,8944$ (c)

Exercici 4

a) $E = U - R_i I = 24 - 0,75 \cdot 2 = 22,5$ V

b) $\Gamma = \frac{P_{mec}}{\omega} = \frac{EI}{\omega} = \frac{22,5 \cdot 2}{764 \frac{2\pi}{60}} = 0,5625$ Nm

c) $\eta = 100 \frac{P_{mec}}{P} = 100 \frac{EI}{UI} = 100 \frac{E}{I} = 100 \frac{22,5}{24} = 93,75$ %

OPCIÓ B

Exercici 3

a) $r_t = \frac{V_1}{V_2} = \frac{230}{48} = 4,792$;

b) $I_R = \frac{V_2}{R} = \frac{48}{4} = 12$ A; $I_L = \frac{V_2}{X} = \frac{48}{12} = 4$ A

$I_2 = \sqrt{I_R^2 + I_L^2} = \sqrt{12^2 + 4^2} = 12,65$ A

c) $I_1 = \frac{I_2}{r_t} = \frac{12,65}{4,792} = 2,640$ A

d) $Q = V_2 I_L = 48 \cdot 4 = 192$ var

Exercici 4

a) $P(R) = RI^2 = R\left(\frac{2U}{R + 2R_i}\right)^2 = 4U^2 \frac{R}{(R + 2R_i)^2} = 2304 \frac{R}{(R+1)^2}$ W

b)

c) $R = 2R_i = 1$ Ω

SÈRIE 1

Primera part

Exercici 1

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

Exercici 2

a) $Z = \sqrt{R^2 + X^2} = \sqrt{4^2 + 2^2} = 4,472 \ \ \Omega$; $I_b = \frac{U}{Z} = 89,44$ A

b) $I_l = \sqrt{3} I_b = 154,9$ A

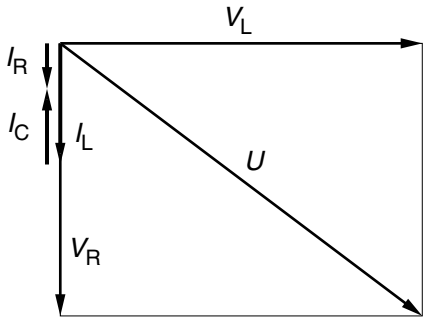
c) $P = 3R\, I_b^2 = 96$ kW

d) $Q = 3X\, I_b^2 = 48$ kvar

e) $fdp = \cos\varphi = \frac{P}{S} = \frac{P}{\sqrt{P^2 + Q^2}} = \frac{96}{\sqrt{96^2 + 48^2}} = 0,8944$

OPCIÓ A

Exercici 3



a) $V_L = V_C = X_C I_C = 16 \cdot 10 = 160$ V

$I_L = \frac{V_L}{X_L} = \frac{160}{10} = 16$ A

b) $I_R = I_L - I_C = 6$ A

c) $U = \sqrt{V_R^2 + V_L^2} = \sqrt{(RI_R)^2 + V_L^2}$

$U = \sqrt{(20 \cdot 6)^2 + 160^2} = 200$ V

Exercici 4

a) $\eta = 100 \frac{P}{\sqrt{3} UI \cos\varphi} = 100 \frac{22000}{\sqrt{3}\, 400 \cdot 39 \cdot 0,85} = 95,79\%$

b) p = 4 parells de pols

c) $n = 725 \ \text{min}^{-1} \Rightarrow \omega = 75{,}92 \frac{\text{rad}}{\text{s}}$; $\Gamma = \frac{P}{\omega} = 289{,}8 \ \text{Nm}$

d) Triangle, $I_l = 68$ A, $I_b = 39$ A

OPCIÓ B

Exercici 3

a) $I_1 = \frac{U_1}{R_1 + R_2} = \frac{24}{10} = 2{,}4 \ \text{A}$; $I_2 = \frac{U_2}{R_3 + R_4} = \frac{12}{12} = 1 \ \text{A}$

b) $P_1 = U_1 I_1 = 57{,}6 \ \text{W}$; $P_2 = U_2 I_2 = 12 \ \text{W}$

c) $R_{13} = \frac{R_1 R_3}{R_1 + R_3} = 3 \ \Omega$;

$$\begin{cases} U_2 = R_4 I_2' + R_{13}(I_1' + I_2') \\ U_1 = R_2 I_1' + R_{13}(I_1' + I_2') \end{cases}; \quad \begin{cases} 12 = 6 I_2' + 3(I_1' + I_2') \\ 24 = 4 I_1' + 3(I_1' + I_2') \end{cases} \Rightarrow \begin{matrix} I_1' = 3{,}333 \ \text{A} \\ I_2' = 0{,}2222 \ \text{A} \end{matrix}$$

$P_1' = U_1 I_1' = 80 \ \text{W}$; $P_2' = U_2 I_2' = 2{,}667 \ \text{W}$

Exercici 4

a) $I = \frac{P}{U} = \frac{2000}{230} = 8{,}696 \ \text{A}$

b) $R = \rho \frac{2L}{S} = 0{,}01786 \frac{2 \cdot 30}{4} = 0{,}2679 \ \Omega$

$$\Delta U(\%) = 100 \frac{R I}{U} = 100 \frac{0{,}2679 \cdot 8{,}696}{230} = 1{,}01\%$$

c) 10 A