SÈRIE 4

Primera part

Exercici 1

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

Exercici 2

a) $\left.\begin{cases} U_1 = R_1 \cdot I_1 + R_3 (I_1 + I_2) \\ U_2 = R_2 \cdot I_2 + R_3 (I_1 + I_2) \end{cases}\right\}; \left\{\begin{array}{l} 40 = 12 \cdot I_1 + 10 \cdot I_2 \\ 10 = 10 \cdot I_1 + 11 \cdot I_2 \end{array}\right\}; \left\{\begin{array}{l} I_1 = 10{,}625\,\text{A} \\ I_2 = -8{,}75\,\text{A} \end{array}\right\}$

b) $P(U_1) = U_1 \cdot I_1 = 40 \cdot 10{,}625 = 425\,\text{W}$; $P(U_2) = U_2 \cdot I_2 = 10 \cdot (-8{,}75) = -87{,}5\,\text{W}$

c) $I(R_1) = I_1 = \dfrac{U_1}{R_1} = \dfrac{40}{2} = 20\,\text{A}$; $I(R_2) = I_2 = \dfrac{U_2}{R_2} = \dfrac{10}{1} = 10\,\text{A}$

OPCIÓ A

Exercici 3

a) $I_\text{L} = \dfrac{\frac{U}{\sqrt{3}}}{\sqrt{R^2 + X_\text{L}^2}} = \dfrac{\frac{690}{\sqrt{3}}}{\sqrt{40^2 + 20^2}} = 8{,}908\,\text{A}$

b) $P = 3 \cdot R \cdot I_\text{L}^2 = 3 \cdot 40 \cdot 8{,}908^2 = 9{,}52\,\text{kW}$

c) $Q = 3 \cdot X_\text{L} \cdot I_\text{L}^2 = 3 \cdot 20 \cdot 8{,}908^2 = 4{,}76\,\text{kvar}$

d) $fdp = \cos\varphi = \dfrac{P}{S} = \dfrac{P}{\sqrt{3}\,U \cdot I_\text{L}} = \dfrac{9\,522}{\sqrt{3} \cdot 690 \cdot 8{,}908} = 0{,}8944$

Exercici 4

a) $I_\text{L} = \dfrac{P}{U} = \dfrac{1800}{230} = 7{,}826\,\text{A}$

b) $R = \rho \dfrac{2 \cdot L}{S} = 0{,}01786 \dfrac{2 \cdot 50}{4} = 0{,}4465\,\Omega$

$\Delta U = R \cdot I = 0{,}4465 \cdot 7{,}826 = 3{,}494\,\text{V}$

$\Delta U(\%) = 100 \dfrac{\Delta U}{U} = 100 \dfrac{3{,}494}{230} = 1{,}52\,\%$

c) 10 A

OPCIÓ B

Exercici 3

a) $P = R \cdot I^2 \Rightarrow I = \sqrt{\frac{P}{R}} = \sqrt{\frac{100}{25}} = 2\,\text{A}$

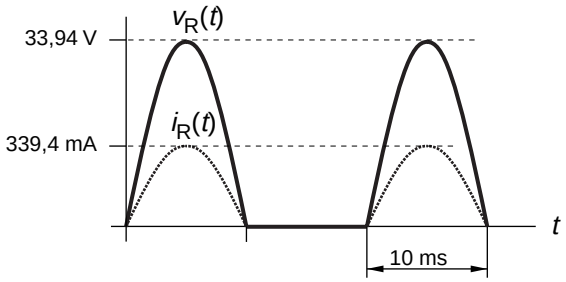
b) $Z = \sqrt{R^2 + X_C^2} = \sqrt{25^2 + 20^2} = 32{,}01\Omega$; $U = Z \cdot I = 32{,}01 \cdot 2 = 64{,}02\,\text{V}$

c) $V_2 = I \cdot X_L = 2 \cdot 20 = 40\,\text{V}$

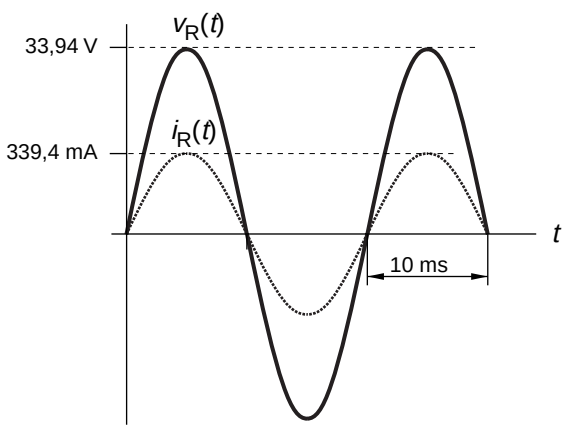
d) $Q = -V_2 \cdot I = -40 \cdot 2 = -80\,\text{var}$

Exercici 4

a)



b)



c) Amb l'interruptor tancat: $P = \frac{U^2}{R} = \frac{24^2}{100} = 5{,}76\,\text{W}$

Amb l'interruptor obert: $P = \frac{1}{2}\frac{U^2}{R} = \frac{1}{2}\frac{24^2}{100} = 2{,}88\,\text{W}$

Sèrie 3

Primera part

Exercici 1

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

Exercici 2

a) $I_B = \dfrac{U}{\sqrt{R^2 + {X_C}^2}} = \dfrac{690}{\sqrt{40^2 + 20^2}} = 15,43 \text{ A}$

b) $I_L = \sqrt{3}\, I_B = 26,72 \text{ A}$

c) $P = 3 \cdot R \cdot I_B^2 = 3 \cdot 40 \cdot 15,43^2 = 28,57 \text{ kW}$

d) $Q = -3 \cdot X_C \cdot I_B^2 = -3 \cdot 20 \cdot 15,43^2 = -14,29 \text{ kvar}$

e) $fdp = \cos\varphi = \dfrac{P}{S} = \dfrac{P}{\sqrt{P^2 + Q^2}} = \dfrac{28,57}{\sqrt{28,57^2 + 14,28^2}} = 0,894 \text{ (c)}$

OPCIÓ A

Exercici 3

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

b) $\Delta U_{\text{màx.}} = 0,03 \cdot U = 0,03 \cdot 230 = 6,9 \text{ V}$; $R_{\text{màx.}} = \dfrac{\Delta U_{\text{màx.}}}{I} = \dfrac{6,9}{8,696} = 0,7935 \,\Omega$

$R_{\text{màx.}} = \rho \dfrac{2 \cdot L_{\text{màx.}}}{S} \Rightarrow L_{\text{màx.}} = \dfrac{R_{\text{màx.}} \cdot S}{2 \cdot \rho} = \dfrac{0,7925 \cdot 1,5}{2 \cdot 0,01786} = 33,32 \text{ m}$

c) $I_{cc} = \dfrac{U}{R_{\text{màx.}}} = \dfrac{230}{0,7925} = 290 \text{ A}$

Exercici 4

a) $\eta(\%) = 100\dfrac{P}{\sqrt{3}UI\cos\varphi} = 100\dfrac{132\,000}{\sqrt{3}\cdot 400\cdot 241\cdot 0{,}85} = 93\%$

b) p = 3 parells de pols

c) $\Gamma = \dfrac{P}{\omega} = \dfrac{132\,000}{985\dfrac{2\pi}{60}} = 1280\ \text{Nm}$

d)

$$Q = \sqrt{S^2 - P^2} = \sqrt{\left(\sqrt{3}\cdot U\cdot I\right)^2 - \left(\sqrt{3}\cdot U\cdot I\cdot\cos\varphi\right)^2} = \sqrt{3}\cdot U\cdot I\cdot\sqrt{1-\cos\varphi^2}$$

$$Q = \sqrt{3}\cdot 400\cdot 241\cdot\sqrt{1-0{,}85^2} = 87{,}96\ \text{kvar}$$

OPCIÓ B

Exercici 3

a) $I_1 = \dfrac{U_1}{R_1} = \dfrac{40}{10} = 4\ \text{A}$

b) $I_2 = \dfrac{2\cdot U_1}{2\cdot R_2} = \dfrac{U_1}{R_2} = \dfrac{40}{4} = 10\ \text{A}$

c) $V_2 = R_2\cdot I_2 = 4\cdot 10 = 40\ \text{V}$

d) $P(U_1) = U_1\cdot\left(I_1 + I_2\right) = 40\cdot 14 = 560\ \text{W}$

Exercici 4

a) $V_\text{O} = V_1\dfrac{R_2}{R_1+R_2} = 10\dfrac{100}{100+100} = 5\ \text{V}$

b) $V_\text{O} = 10\ \text{V}$

c) $V_\text{O} = 0\ \text{V}$

d) $V_\text{O} = V_2 = 10\ \text{V}$

e) $P = \dfrac{V_\text{O}^2}{R_2} = \dfrac{10^2}{100} = 1\text{W}$