

## SÈRIE 4

### Primera part

#### Exercici 1

Q1 d      Q2 a      Q3 c      Q4 c      Q5 b

#### Exercici 2

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

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

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

#### OPCIÓ A

#### Exercici 3

$$a) I_L = \frac{\frac{U}{\sqrt{3}}}{\sqrt{R^2 + X_L^2}} = \frac{\frac{690}{\sqrt{3}}}{\sqrt{40^2 + 20^2}} = 8,908 \text{ A}$$

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

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

$$d) \text{fdp} = \cos \varphi = \frac{P}{S} = \frac{P}{\sqrt{3} U \cdot I_L} = \frac{9522}{\sqrt{3} \cdot 690 \cdot 8,908} = 0,8944$$

#### Exercici 4

$$a) I_L = \frac{P}{U} = \frac{1800}{230} = 7,826 \text{ A}$$

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

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

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

c) 10 A

OPCIÓ B

**Exercici 3**

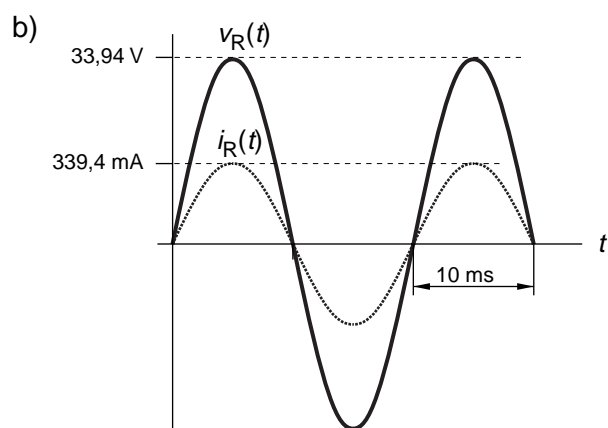
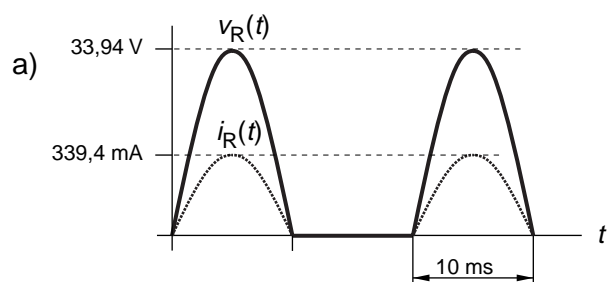
a)  $P = R \cdot I^2 \Rightarrow I = \sqrt{\frac{P}{R}} = \sqrt{\frac{100}{25}} = 2 \text{ A}$

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**



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

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

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

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

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

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

#### OPCIÓ A

#### Exercici 3

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

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

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

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

**Exercici 4**

$$a) \eta(\%) = 100 \frac{P}{\sqrt{3}UI \cos \varphi} = 100 \frac{132000}{\sqrt{3} \cdot 400 \cdot 241 \cdot 0,85} = 93\%$$

$$b) p = 3 \text{ parells de pols}$$

$$c) \Gamma = \frac{P}{\omega} = \frac{132000}{985 \frac{2\pi}{60}} = 1280 \text{ Nm}$$

d)

$$Q = \sqrt{S^2 - P^2} = \sqrt{(\sqrt{3} \cdot U \cdot I)^2 - (\sqrt{3} \cdot U \cdot I \cdot \cos \varphi)^2} = \sqrt{3} \cdot U \cdot I \cdot \sqrt{1 - \cos^2 \varphi}$$
$$Q = \sqrt{3} \cdot 400 \cdot 241 \cdot \sqrt{1 - 0,85^2} = 87,96 \text{ kvar}$$

**OPCIÓ B**

**Exercici 3**

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

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

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

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

**Exercici 4**

$$a) V_O = V_1 \frac{R_2}{R_1 + R_2} = 10 \frac{100}{100 + 100} = 5 \text{ V}$$

$$b) V_O = 10 \text{ V}$$

$$c) V_O = 0 \text{ V}$$

$$d) V_O = V_2 = 10 \text{ V}$$

$$e) P = \frac{V_O^2}{R_2} = \frac{10^2}{100} = 1 \text{ W}$$