

SÈRIE 3

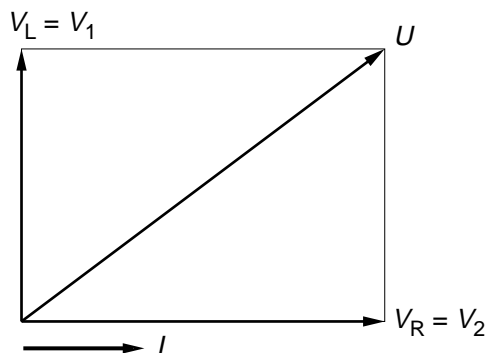
Primera part

Exercici 1

Q1 a Q2 c Q3 b Q4 d Q5 b

Exercici 2

a)



$$b) X_L = \frac{V_1}{I} = 115 \Omega; \quad R = \frac{V_2}{I} = 115 \Omega$$

$$c) U = \sqrt{V_1^2 + V_2^2} = \sqrt{115^2 + 115^2} = 162,6 \text{ V}$$

$$d) P = V_2 I = 115 \text{ W}$$

OPCIÓ A

Exercici 3

$$a) P = 3 \frac{1}{R} \left(\frac{U}{\sqrt{3}} \right)^2 \rightarrow R = \frac{U^2}{P} = \frac{400^2}{10000} = 16 \Omega$$

$$b) Q = -3 X_C \left(\frac{U}{\sqrt{3}} \right)^2 \rightarrow X_C = \frac{U^2}{-Q} = \frac{400^2}{-10000} = 16 \Omega; \quad C = \frac{1}{\omega \cdot X_C} = \frac{1}{100 \cdot \pi \cdot 16} = 198,9 \mu\text{F}$$

$$c) \text{fdp} = \cos \varphi = \frac{P}{S} = \frac{P}{\sqrt{P^2 + Q^2}} = \frac{10}{\sqrt{10^2 + 10^2}} = 0,7071 \text{ (c)}$$

$$d) I_L = \sqrt{I_R^2 + I_C^2} = \sqrt{\left(\frac{U}{\sqrt{3}R} \right)^2 + \left(\frac{U}{\sqrt{3}X_C} \right)^2} = \frac{U}{\sqrt{3}} \sqrt{\frac{1}{R^2} + \frac{1}{X_C^2}} = \frac{400}{\sqrt{3 \cdot 16}} \sqrt{2} = 20,41 \text{ A}$$

Exercici 4

$$a) \eta(\%) = 100 \frac{P}{UI} = 100 \frac{60}{24 \cdot 3} = 83,33 \%$$

$$b) \Gamma = \frac{P}{\omega} = \frac{60}{2500 \frac{2\pi}{60}} = 0,2292 \text{ Nm}$$

c) En condicions nominals:

$$R_{\text{f}} = \frac{U \cdot I - P}{I^2} = \frac{24 \cdot 3 - 60}{3^2} = 1,333 \Omega; E = U - R_{\text{f}}I = 24 - 1,333 \cdot 3 = 20 \text{ V}$$

En les noves condicions:

$$E' = U' - R_{\text{f}}I = 20 - 1,333 \cdot 3 = 16 \text{ V}; n' = n \frac{E'}{E} = 2500 \frac{16}{20} = 2000 \text{ min}^{-1}$$

d) Noves condicions:

$$\left\{ \begin{array}{l} I'' = 0 \\ U = 24 \text{ V} \end{array} \right\} \rightarrow E'' = U; n'' = n \frac{E''}{E} = 2500 \frac{24}{20} = 3000 \text{ min}^{-1}$$

OPCIÓ B

Exercici 3

$$a) \left\{ \begin{array}{l} U_1 = R_1 I_1 + R_3(I_1 + I_2) \\ U_2 = R_2 I_2 + R_3(I_1 + I_2) \end{array} \right\} \rightarrow \left\{ \begin{array}{l} 50 = 10I_1 + 10(I_1 + I_2) \\ 50 = 10I_2 + 10(I_1 + I_2) \end{array} \right\} \rightarrow I_1 = I_2 = I = 1,667 \text{ A}$$

$$b) P_1 = P_2 = U_1 I = 83,33 \text{ W}$$

$$c) P(R_3) = 0 \Rightarrow I_1 + I_2 = 2I = 0 \Rightarrow I = 0 \Rightarrow U_3 = U_1 = 50 \text{ V};$$

Exercici 4

$$a) I = \frac{U}{\sqrt{R^2 + (X_L - X_C)^2}} = \frac{24}{\sqrt{1 + (10 - X_C)^2}}$$

$$b) I \text{ màxim quan } X_C = X_L = 10 \Omega \rightarrow I = 24 \text{ A}$$

$$c) P = RI^2 = \frac{24^2}{1 + (10 - X_C)^2}$$

$$d) P \text{ màxima quan } X_C = X_L = 10 \Omega \rightarrow P = 24^2 = 576 \text{ W}$$