SÈRIE 3

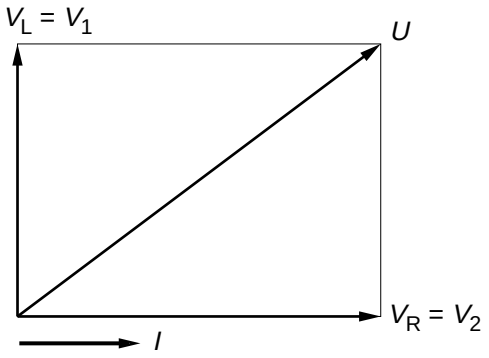
Primera part

Exercici 1

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

Exercici 2

a)



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

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

d) $P = V_2 I = 115$ 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) $Q = -3X_C\left(\frac{U}{\sqrt{3}}\right)^2 \rightarrow X_C = \frac{U^2}{-Q} = \frac{400^2}{10000} = 16\ \Omega$; $C = \frac{1}{\omega \cdot X_C} = \frac{1}{100 \cdot \pi \cdot 16} = 198{,}9\ \mu$F

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

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

Exercici 4

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

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

c) En condicions nominals:

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

En les noves condicions:

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

d) Noves condicions:

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

OPCIÓ B

Exercici 3

a) $\left.\begin{matrix} U_1 = R_1I_1 + R_3(I_1 + I_2) \\ U_2 = R_2I_2 + R_3(I_1 + I_2) \end{matrix}\right\} \ \rightarrow\ \left\{\begin{matrix} 50 = 10I_1 + 10(I_1 + I_2) \\ 50 = 10I_2 + 10(I_1 + I_2) \end{matrix}\right\} \ \rightarrow I_1 = I_2 = I = 1{,}667\ \text{A}$

b) $P_1 = P_2 = U_1I = 83{,}33\ \text{W}$

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) $I = \dfrac{U}{\sqrt{R^2 + (X_\text{L} - X_\text{C})^2}} = \dfrac{24}{\sqrt{1 + (10 - X_\text{C})^2}}$

b) I màxim quan $X_\text{C} = X_\text{L} = 10\ \Omega\ \ \rightarrow\ \ I = 24\ \text{A}$

c) $P = RI^2 = \dfrac{24^2}{1 + (10 - X_\text{C})^2}$

d) P màxima quan $X_\text{C} = X_\text{L} = 10\ \Omega\ \ \rightarrow\ \ P = 24^2 = 576\ \text{W}$