

SÈRIE 1

Primera part

Exercici 1

Q1 a Q2 a Q3 a Q4 c Q5 a

Exercici 2

$$a) I_2 = \frac{U_1 + U_2}{R_2 + R_3} = \frac{50}{12} = 4,17 \text{ A}$$

$$b) I(U_1) = I_1 + I_2 = \frac{U_1}{R_1} + I_2 = \frac{20}{10} + 4,17 = 6,17 \text{ A}$$

$$P(U_1) = U_1 \cdot I(U_1) = 20 \cdot 6,17 = 123,3 \text{ W};$$

$$P(U_2) = U_2 \cdot I(U_2) = 30 \cdot 4,17 = 125 \text{ W}$$

$$c) R_{12} = \frac{R_1 \cdot R_2}{R_1 + R_2} = \frac{10 \cdot 10}{10 + 10} = 5 \Omega; \quad I(U_1)' = I_1' = \frac{U_1}{R_{12}} = \frac{20}{5} = 4 \text{ A}$$

$$d) P(R_3) = \frac{U_2^2}{R_3} = \frac{30^2}{2} = 450 \text{ W}$$

OPCIÓ A

Exercici 3

$$a) P = V_1 \cdot I_1 = 140 \cdot 10 = 1400 \text{ W}$$

$$b) R = \frac{V_1}{I_1} = \frac{140}{10} = 14 \Omega$$

$$c) X_C = \frac{V_2}{I_1} = \frac{200}{10} = 20 \Omega$$

$$d) Z = \frac{V_3}{I_1} = \sqrt{R^2 + (X_L - X_C)^2} \Rightarrow (X_L - X_C)^2 = Z^2 - R^2 \Rightarrow |X_L - X_C| = \sqrt{\left(\frac{V_3}{I_1}\right)^2 - R^2}$$

$$|X_L - 20| = \sqrt{\left(\frac{230}{10}\right)^2 - 14^2} \Rightarrow \begin{cases} X_L - 20 = 18,24 \Omega \\ 20 - X_L = 18,24 \Omega \end{cases} \Rightarrow \begin{cases} X_L = 38,24 \Omega \\ X_L = 1,76 \Omega \end{cases}$$

Exercici 4

$$a) \eta(\%) = 100 \frac{P}{\sqrt{3}UI \cos \varphi} = 100 \frac{75000}{\sqrt{3} \cdot 400 \cdot 131 \cdot 0,88} = 93,90\%$$

b) $p = 1$ parell de pols

$$c) \Gamma = \frac{P}{\omega} = \frac{75000}{2977 \frac{2\pi}{60}} = 240,6 \text{ Nm}$$

d) Triangle, $I_{\text{línia}} = 131 \text{ A}$

OPCIÓ B

Exercici 3

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

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

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

$$d) Q = 3 \cdot X_L \cdot I_B^2 = 3 \cdot 20 \cdot 15,43^2 = 14,28 \text{ kvar}$$

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

Exercici 4

$$a) V_O = 5 \text{ V}$$

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

$$c) P = \frac{V_{\text{cc}}^2}{R} = \frac{5^2}{1} = 25 \text{ mW}$$

d)

I_1	I_2	O
0	0	0
1	0	0
0	1	0
1	1	1

 Funció I (AND)