

Primera part**Exercici 1**

Q1 a Q2 d Q3 a Q4 b Q5 a

Exercici 2

a) $R_{34} = R_3 + R_4 = 6 \Omega$

$$U_2 - U_1 + R_2 I_3 = 0 \Rightarrow I_3 = \frac{U_1 - U_2}{R_2} = \frac{44 - 36}{4} = 2 \text{ A}$$

b) $I_2 + I_3 = \frac{U_2}{R_{34}} = \frac{36}{6} = 6 \text{ A}$

$$I_2 = (I_2 + I_3) - I_3 = 6 - 2 = 4 \text{ A}$$

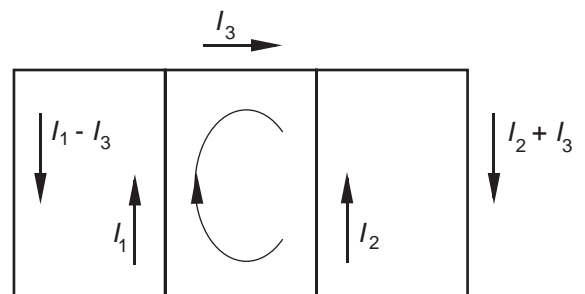
c) $I_1 - I_3 = \frac{U_1}{R_1} = \frac{44}{8,8} = 5 \text{ A}$

$$I_1 = (I_1 - I_3) + I_3 = 5 + 2 = 7 \text{ A}$$

d) $V_1 = U_2 \frac{R_4}{R_{34}} = 36 \frac{4}{6} = 24 \text{ V}$

e) $P_1 = U_1 I_1 = 44 \cdot 7 = 308 \text{ W}$

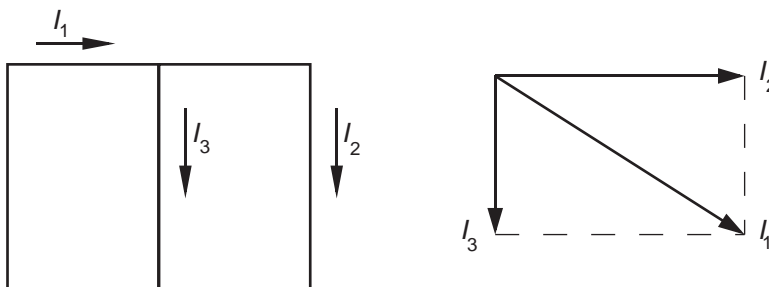
$$P_2 = U_2 I_2 = 36 \cdot 4 = 144 \text{ W}$$

**Segona part**

OPCIÓ A

Exercici 3

a) $\bar{I}_1 = \bar{I}_2 + \bar{I}_3$; $I_1^2 = I_2^2 + I_3^2 \Rightarrow I_3 = \sqrt{I_1^2 - I_2^2} = \sqrt{13^2 - 11^2} = 6,928 \text{ A}$



$$b) R = \frac{V_1}{I_2} = \frac{220}{11} = 20 \Omega$$

$$c) X_L = \frac{V_1}{I_3} = \frac{220}{6,928} = 31,75 \Omega$$

$$L = \frac{X_L}{\omega} = \frac{X_L}{2\pi f} = \frac{31,75}{2\pi 50} = 0,1011 \text{ H}$$

$$d) P = V_1 I_2 = 220 \cdot 11 = 2420 \text{ W}$$

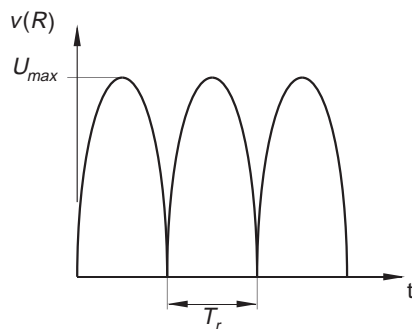
$$Q = V_1 I_3 = 220 \cdot 6,928 = 1524 \text{ VAR}$$

$$S = \sqrt{P^2 + Q^2} = \sqrt{2420^2 + 1524^2} = 2860 \text{ VA}$$

$$\text{fdp} = \cos \varphi = \frac{P}{S} = \frac{2420}{2860} = 0,8461$$

Exercici 4

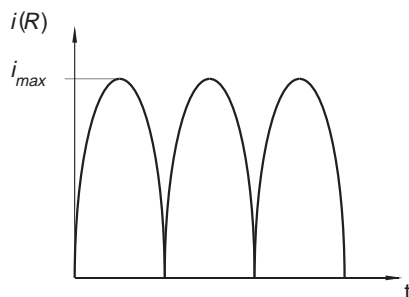
a)



$$U_{\text{m}\ddot{a}\text{x}} = \frac{U}{r_t} \sqrt{2} = \frac{220}{10} \sqrt{2} = 31,11 \text{ V};$$

$$T_r = \frac{T}{2} = \frac{1}{2f} = \frac{1}{2 \cdot 50} = 10 \text{ ms}$$

b)



$$I_{\text{m}\ddot{a}\text{x}} = \frac{U_{\text{m}\ddot{a}\text{x}}}{R} = \frac{31,11}{10} = 3,111 \text{ A}$$

$$c) U_{\text{m}\ddot{a}\text{x}} = \frac{U}{r_t} \sqrt{2} - 2V_F = 29,11 \text{ V}$$

$$I_{\text{m}\ddot{a}\text{x}} = \frac{U_{\text{m}\ddot{a}\text{x}}}{R} = \frac{29,11}{10} = 2,911 \text{ A}$$

$$P_{\text{m}\ddot{a}\text{x}} = 2 V_F I_{\text{m}\ddot{a}\text{x}} = 5,822 \text{ W}$$

OPCIÓ B

Exercici 3

a) $C_{eq} = C_1 + C_2 + C_{3x} \Rightarrow C_{3x} = C_{eq} - C_1 - C_2 = 50 - 20 - 22 = 8 \mu\text{F}$

$$\frac{1}{C_3} + \frac{1}{C_x} = \frac{1}{C_{3x}} \Rightarrow C_x = \frac{C_3 C_{3x}}{C_3 - C_{3x}} = \frac{8 \cdot 10}{10 - 8} = 40 \mu\text{F}$$

b) $\tau = RC = 100 \cdot 50 \cdot 10^{-6} = 5 \text{ ms}$

c) $U(C_1) = U(C_2) = V = 100 \text{ V}$

$$Q_{3x} = C_{3x} V = 8 \cdot 10^{-6} \cdot 100 = 0,8 \cdot 10^{-3} \text{ C}$$

$$U(C_3) = \frac{Q_{3x}}{C_3} = \frac{0,8 \cdot 10^{-3}}{10 \cdot 10^{-6}} = 80 \text{ V}$$

$$U(C_x) = \frac{Q_x}{C_x} = \frac{0,8 \cdot 10^{-3}}{40 \cdot 10^{-6}} = 20 \text{ V}$$

Exercici 4

a) $E = U - R_i I = 300 - 1,2 \cdot 10 = 288 \text{ V}$

$$\frac{E}{n} = k\Phi_{\max} = \frac{E_0}{n_0} \Rightarrow n = \frac{E}{E_0} n_0 = \frac{288}{300} 1600 = 1536 \text{ min}^{-1}$$

b) $P_{\text{pèrdues}} = R_i I^2 = 1,2 \cdot 10^2 = 120 \text{ W}$

$$P_{\text{elèctrica}} = VI = 300 \cdot 10 = 3000 \text{ W}$$

$$P_{\text{útil}} = P_{\text{elèctrica}} - P_{\text{pèrdues}} = 3000 - 120 = 2880 \text{ W}$$

$$\eta(\%) = 100 \frac{P_{\text{útil}}}{P_{\text{elèctrica}}} = 100 \frac{2880}{3000} = 96 \%$$

c) $\Gamma' = \Gamma \Rightarrow k\Phi' I' = k\Phi I \Rightarrow I' = \frac{\Phi}{\Phi'} I = \frac{1}{0,8} 10 = 12,5 \text{ A}$