

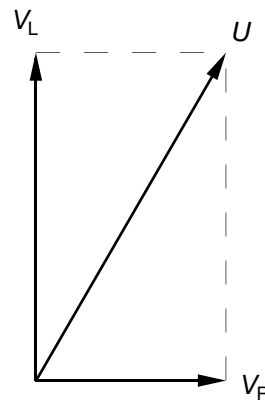
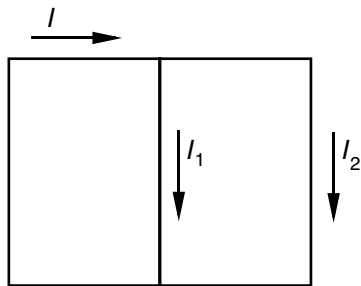
**Sèrie 4****Primera part****Exercici 1**

Q1 a   Q2 d   Q3 c   Q4 b   Q5 c

**Exercici 2**

a)  $P = RI^2 \Rightarrow I = \sqrt{\frac{P}{R}} = \sqrt{\frac{250}{10}} = 5 \text{ A}$

b)



$$V_R = RI = 10 \cdot 5 = 50 \text{ V}$$

$$V_L = \sqrt{U^2 - V_R^2} = \sqrt{100^2 - 50^2} = 86,6 \text{ V}$$

c)  $X_1 = \frac{V_L}{I_1} = \frac{86,6}{2} = 43,3 \text{ } \Omega$

$$L_1 = \frac{X_1}{\omega} = \frac{X_1}{2 \cdot \pi \cdot f} = \frac{43,3}{2 \cdot \pi \cdot 50} = 137,8 \text{ mH}$$

**Segona part**

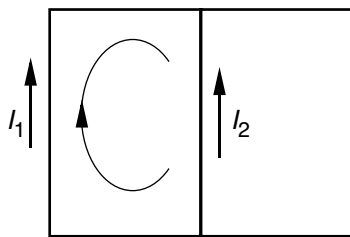
## OPCIÓ A

**Exercici 3**

a)  $R_{34} = R_3 + R_4 = 4 + 6 = 10 \Omega$

$$\frac{1}{R_{234}} = \frac{1}{R_{34}} + \frac{1}{R_2} \Rightarrow R_{234} = \frac{R_{34}R_2}{R_{34} + R_2} = \frac{10 \cdot 10}{10 + 10} = 5 \Omega$$

b)



$$-U_1 + R_1 I_1 + U_2 = 0 \Rightarrow I_1 = \frac{U_1 - U_2}{R_1} = \frac{60 - 40}{5} = 4 \text{ A}$$

$$I_1 + I_2 = \frac{U_2}{R_{234}} = \frac{40}{5} = 8 \text{ A}$$

$$I_2 = (I_1 + I_2) - I_1 = 8 - 4 = 4 \text{ A}$$

c)  $P_1 = U_1 I_1 = 60 \cdot 4 = 240 \text{ W}$

$$P_2 = U_2 I_2 = 40 \cdot 4 = 160 \text{ W}$$

$$P_{\text{tot}} = P_1 + P_2 = 240 + 160 = 400 \text{ W}$$

**Exercici 4**

a)  $k = \frac{E}{n} = \frac{250}{1500} = 0,1667 \frac{\text{V}}{\text{min}^{-1}}$

b)  $E' = U - R_f I = 200 - 1,2 \cdot 10 = 188 \text{ V}$

$$n' = \frac{E'}{k} = \frac{188}{0,1667} = 1128 \text{ min}^{-1}$$

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

$$P_{\text{elèctrica}} = UI = 200 \cdot 10 = 2000 \text{ W}$$

$$P_{\text{útil}} = P_{\text{elèctrica}} - P_{\text{pèrdues}} = 2000 - 120 = 1880 \text{ W}$$

$$\eta(\%) = 100 \frac{P_{\text{útil}}}{P_{\text{elèctrica}}} = 100 \frac{1880}{2000} = 94 \%$$

## OPCIÓ B

## Exercici 3

a)  $Z = \sqrt{R^2 + X^2} = \sqrt{10^2 + 10^2} = 14,14 \ \Omega$

$$I_b = \frac{U}{Z} = \frac{400}{14,14} = 28,28 \text{ A}$$

$$I_1 = \sqrt{3}I_b = \sqrt{3} \cdot 28,28 = 48,99 \text{ A}$$

b)  $\text{fdp} = \cos \varphi = \frac{R}{Z} = \frac{10}{14,14} = 0,707$

c)  $S = \sqrt{3} \cdot U \cdot I_1 = \sqrt{3} \cdot 400 \cdot 48,99 = 33,94 \text{ kVA}$

$$P = S \cdot \cos \varphi = 33,94 \cdot 10^3 \cdot 0,707 = 24 \text{ kW}$$

$$Q = S \cdot \sin \varphi = 33,94 \cdot 10^3 \cdot \sqrt{1 - 0,707^2} = 24 \text{ kVAr}$$

## Exercici 4

a)  $R_2 = \frac{V_{23}}{I_2} = 30 \ \Omega$

b)  $I_3 = I_1 - I_2 = 6 \text{ A} ; R_3 = \frac{V_{23}}{I_3} = 20 \ \Omega$

c)  $R_1 = \frac{U - V_{23}}{I_1} = 8 \ \Omega$

d)  $I_4 = \frac{U}{R_4} = 20 \text{ A} ; I = I_4 + I_1 = 30 \text{ A}$

e)  $P = U \cdot I = 200 \cdot 30 = 6000 \text{ W}$