

SÈRIE 3

Primera part

Exercici 1

Q1 b Q2 c Q3 a Q4 c Q5 c

Exercici 2

$$a) I = \frac{U_1}{R_1 + R_2} = \frac{20}{10 + 10} = 1 \text{ A}$$

$$b) U(R_2) = R_2 I = 10 \text{ V}$$

$$c) U(R_2) = U_2 = 10 \text{ V}$$

Alternativament

$$\begin{cases} U_1 = R_1 I + R_2 (I_2 + I) \\ U_2 = R_3 I_2 + R_2 (I_2 + I) \\ I_2 = 0 \end{cases}; \begin{cases} 20 = 10 I + 10 (I_2 + I) \\ U_2 = 5 I_2 + 10 (I_2 + I) \\ I_2 = 0 \end{cases} \Rightarrow \begin{cases} U_2 = 10 \text{ V} \\ I = 1 \text{ A} \\ I_2 = 0 \end{cases}$$

$$d) P_1 = U_1 I = 20 \text{ W}; \quad P_2 = U_2 I_2 = 0$$

OPCIÓ A

Exercici 3

$$a) k = \frac{\Gamma}{I} = \frac{50}{40} = 1,25 \text{ V} \frac{\text{rad}}{\text{s}}$$

$$E = k\omega = 1,25 \cdot 764 \frac{2\pi}{60} = 100 \text{ V}$$

$$b) U = R_1 I + E = 0,25 \cdot 40 + 100 = 110 \text{ V}$$

$$c) \eta = 100 \frac{EI}{UI} = 100 \frac{100}{110} = 90,91 \%$$

Exercici 4

$$a) X_L = \omega L = 2\pi f L = 100 \cdot \pi \cdot 0,1 = 31,42 \ \Omega$$

$$Z = \sqrt{R^2 + X_L^2} = \sqrt{100^2 + 31,42^2} = 104,8 \ \Omega$$

$$I_R = \frac{U}{Z} = \frac{230}{104,8} = 2,194 \text{ A}$$

$$b) Q = X_L I_R^2 = 31,42 \cdot 2,194^2 = 151,2 \text{ var}$$

$$c) X_C = \frac{U^2}{Q} = \frac{230^2}{151,2} = 349,9 \text{ } \Omega ; \quad C = \frac{1}{\omega X_C} = \frac{1}{100 \cdot \pi \cdot 349,9} = 9,097 \text{ } \mu\text{F}$$

OPCIÓ B

Exercici 3

$$a) Z = \sqrt{R^2 + X^2} = \sqrt{2^2 + 0,4^2} = 2,040 \text{ } \Omega ; \quad I = \frac{U}{Z} = \frac{230}{2,040} = 65,11 \text{ A}$$

$$b) P = 3RI^2 = 3 \cdot 2 \cdot 65,11^2 = 25,43 \text{ kW}$$

$$c) Q = 3XI^2 = 3 \cdot 0,4 \cdot 65,11^2 = 5,087 \text{ kvar}$$

$$d) \text{fdp} = \cos \varphi = \frac{P}{\sqrt{P^2 + Q^2}} = \frac{25,43}{\sqrt{25,43^2 + 5,087^2}} = 0,9806$$

Exercici 4

$$a) I = \frac{P}{U} = \frac{200}{230} = 0,8696 \text{ A}$$

$$b) \Delta U_{\text{màx}} = 0,03 \cdot U = 6,9 \text{ V}$$

$$\Delta U_{\text{màx}} = 2R_{\text{màx}}I \Rightarrow R_{\text{màx}} = \frac{\Delta U_{\text{màx}}}{2I} = \frac{6,9}{2 \cdot 0,8696} = 3,967 \text{ } \Omega$$

$$L_{\text{màx}} = R_{\text{màx}} \frac{S}{\rho} = 3,967 \frac{1,5}{0,01786} = 333,2 \text{ m}$$

$$c) I_{\text{cc}} = \frac{U}{2R_{\text{màx}}} = \frac{230}{2 \cdot 3,967} = 28,99 \text{ A}$$