SÈRIE 3

Primera part

Exercici 1

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

Exercici 2

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

b) $U(R_2) = R_2 I = 10$ V

c) $U(R_2) = U_2 = 10$ V

Alternativament

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

d) $P_1 = U_1 I = 20$ W; $P_2 = U_2 I_2 = 0$

OPCIÓ A

Exercici 3

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

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

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

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

Exercici 4

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

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

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

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

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

OPCIÓ B

Exercici 3

a) $Z = \sqrt{R^2 + X^2} = \sqrt{2^2 + 0,4^2} = 2,040 \quad \Omega$; $\quad I = \frac{\frac{U}{\sqrt{3}}}{Z} = \frac{\frac{230}{\sqrt{3}}}{2,040} = 65,11 \quad \text{A}$

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

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

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

Exercici 4

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

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

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

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

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