

SÈRIE 4

Primera part

Exercici 1

Q1 c Q2 a Q3 a Q4 b Q5 d

Exercici 2

- a) $V_{ab} = \sqrt{3} \cdot V_{cn} = \sqrt{3} \cdot \sqrt{R^2 + X_C^2} \cdot A_1 = \sqrt{3} \cdot \sqrt{50^2 + 20^2} \cdot 7,4 = 690,23 \text{ V}$
 b) $P = 3 \cdot R \cdot A_1^2 = 3 \cdot 50 \cdot 7,4^2 = 8214 \text{ W}$
 $Q = 3 \cdot X_C \cdot A_1^2 = 3 \cdot 20 \cdot 7,4^2 = 3285,6 \text{ var}$
 $S = \sqrt{3} \cdot V_{ab} \cdot A_1 = \sqrt{3} \cdot 690,23 \cdot 7,4 = 8846,8 \text{ VA}$
 c) $A_n = 0; fdp = \frac{P}{S} = \frac{8214}{8846,8} = 0,9285$

Segona part

OPCIÓ A

Exercici 3

- a) $A_1 = \frac{U_1}{R_1 + R_2} = \frac{36}{12 + 30} = 0,857 \text{ A}$
 b) $V_{GF} = V(R_1) = R_1 \cdot A_1 = 12 \cdot 0,857 = 10,28 \text{ V}$
 c) $V_{FH} = \frac{\frac{R_2 \cdot R_4}{R_2 + R_4}}{\frac{R_2 \cdot R_4}{R_2 + R_4} + R_1} \cdot U_1 = \frac{\frac{30 \cdot 120}{30 + 120}}{\frac{30 \cdot 120}{30 + 120} + 12} \cdot 36 = 24 \text{ V}$
 $A_2 = \frac{V_{FH}}{R_4} = \frac{24}{120} = 0,2 \text{ A}$

Exercici 4

- a) $\Gamma = k \cdot I \rightarrow k = \frac{\Gamma}{I} = \frac{600}{120} = 5 \frac{\text{Nm}}{\text{A}}$
 $E = k \cdot \omega \rightarrow \omega = \frac{E}{k} = \frac{432}{5} \cdot \frac{60}{2\pi} = 825,1 \text{ min}^{-1}$
 b) $U = R_i I + E \rightarrow R_i = \frac{U - E}{I} = \frac{510 - 432}{120} = 0,65 \Omega$
 c) $\eta(\%) = 100 \frac{P_{\text{mec.}}}{P_{\text{elèc.}}} = 100 \frac{\Gamma \omega}{UI} = 100 \frac{600 \cdot 432}{510 \cdot 120} = 84,71 \%$

OPCIÓ B

Exercici 3

- a) $A_2 = \frac{V_2}{R_2} = \frac{26,84}{10} = 2,684 \text{ A}; \quad A_3 = \frac{V_2}{X_3} = \frac{26,84}{5} = 5,368 \text{ A}$
- b) $A_1 = \sqrt{A_2^2 + A_3^2} = \sqrt{2,684^2 + 5,368^2} = 6 \text{ A}$
- c) $P = R_1 A_1^2 + R_2 A_2^2 = 7 \cdot 6^2 + 10 \cdot 2,684^2 = 324,04 \text{ W}$
 $Q = X_3 A_3^2 = 5 \cdot 5,368^2 = 144,08 \text{ var}$

Exercici 4

- a) $R_{\text{Conductor}} = 150 \cdot 10^{-3} \cdot 3 = 0,45 \Omega$
 $X_{\text{Conductor}} = 150 \cdot 10^{-3} \cdot 1 \cdot 10^{-3} \cdot 2\pi 50 = 0,047 \Omega$
 $I = \frac{U_{\text{Xarxa}}}{Z} = \frac{U_{\text{Xarxa}}}{\sqrt{(2 \cdot R_{\text{Conductor}} + R_{\text{Consum}})^2 + (2 \cdot X_{\text{Conductor}} + X_{\text{Consum}})^2}}$
 $= \frac{230}{\sqrt{(2 \cdot 0,45 + 10)^2 + (2 \cdot 0,047 + 3)^2}} = 20,3 \text{ A}$
- b) $U = Z_{\text{Consum}} \cdot I = \sqrt{10^2 + 3^2} \cdot 20,3 = 211,94 \text{ V}$
- c) $\Delta U(\%) = 100 \frac{U_{\text{Xarxa}} - U}{U_{\text{Xarxa}}} = 100 \frac{230 - 211,94}{230} = 7,85 \%$