

SÈRIE 2**Primera part****Exercici 1**

Q1 d Q2 d Q3 a Q4 b Q5 d

Exercici 2

$$a) R_2 = R_3 = \frac{W_1}{\left(\frac{A_1}{2}\right)^2} = \frac{16,875}{\left(\frac{1,5}{2}\right)^2} = 30 \Omega$$

$$b) U = R_1 A_1 + R_3 \frac{A_1}{2} + R_4 A_1 \rightarrow R_4 = \frac{U}{A_1} - R_1 - \frac{R_3}{2} = \frac{75}{1,5} - 30 - \frac{30}{2} = 5 \Omega$$

$$c) P_{R1} = R_1 A_1^2 = 30 \cdot 1,5^2 = 67,5 \text{ W}$$

$$d) P_{\text{Total}} = U \cdot A_1 = 75 \cdot 1,5 = 112,5 \text{ W}$$

Segona part**OPCIÓ A****Exercici 3**

$$a) A_2 = \sqrt{\frac{W_2}{R_2}} = \sqrt{\frac{109,3}{25}} = 2,09 \text{ A}$$

Alternativament,

$$r_t = \frac{U_{\text{Nom. Primari}}}{U_{\text{Nom. Secundari}}} = \frac{110}{50} = 2,2 \quad A_2 = \frac{U_2}{R_2} = \frac{r_t}{R_2} = \frac{115}{25} = 2,09 \text{ A}$$

$$b) W_1 = 300 \text{ W} = P_{R1} + W_2 = \frac{U_1^2}{R_1} + W_2 = \frac{115^2}{R_1} + 109,3$$

$$R_1 = \frac{115^2}{300 - 109,3} = 69,35 \Omega$$

$$c) A_1 = \frac{W_1}{U_1} = \frac{300}{115} = 2,61 \text{ A}$$

$$d) R_{\text{Eq.}} = \frac{U_1}{A_1} = \frac{115}{2,61} = 44,06 \Omega$$

Alternativament,

$$R_{\text{Eq.}} = \frac{R_1 r_t^2 R_2}{R_1 + r_t^2 R_2} = \frac{69,35 \cdot 2,2^2 \cdot 25}{69,35 + 2,2^2 \cdot 25} = 44,08 \Omega$$

Exercici 4

$$a) \eta (\%) = 100 \frac{P_N}{U_N I_N + U_{eN} I_{eN}} = 100 \frac{43000}{420 \cdot 121 + 200 \cdot 6} = 82,66 \%$$

$$b) \Gamma = \frac{P_N}{\omega_N} = \frac{P_N}{n_N \frac{2\pi}{60}} = \frac{43000}{1133 \frac{2\pi}{60}} = 362,4 \text{ N m}$$

$$c) E_N = \frac{P_N}{I_N} = \frac{43000}{121} = 355,37 \text{ V} \quad \rightarrow \quad R_i = \frac{U_N - E_N}{I_N} = \frac{420 - 355,37}{121} = 0,534 \Omega$$

$$d) R_e = \frac{U_{eN}}{I_{eN}} = \frac{200}{6} = 33,33 \Omega$$

e) En el punt de funcionament:

$$E' = U_N - R_i \frac{3I}{4} = 420 - 0,534 \frac{3 \cdot 121}{4} = 371,54 \text{ V}$$

$$n' = \frac{E'}{E_N} n_N = \frac{371,54}{355,37} 1133 = 1184,6 \text{ min}^{-1}$$

OPCIÓ B**Exercici 3**

$$a) A_1 = \frac{U}{Z} = \frac{\frac{U}{\sqrt{3}}}{\sqrt{R^2 + (X_L - X_C)^2}} = \frac{\frac{400}{\sqrt{3}}}{\sqrt{50^2 + (25 - 5)^2}} = 4,29 \text{ A}$$

$$b) V_1 = R A_1 = 50 \cdot 4,29 = 214,5 \text{ V}$$

$$c) V_2 = (X_L - X_C) A_1 = (25 - 5) 4,29 = 85,8 \text{ V}$$

$$d) W_1 = R A_1^2 = 50 \cdot 4,29^2 = 920,2 \text{ W}$$

Exercici 4

$$a) U_{\text{Pic}} = (R_1 + R_3) I_+ = (R_1 + R_3) \frac{\text{Canal } 1_{\text{Pic}}}{R_1} = (10 + 20) \frac{20}{10} = 60 \text{ V}$$

$$U = \frac{U_{\text{Pic}}}{\sqrt{2}} = \frac{60}{\sqrt{2}} = 42,43 \text{ V}$$

$$b) U_{\text{Pic}} = (R_2 + R_3) I_- = (R_2 + R_3) \frac{\text{Canal } 2_{\text{Pic}}}{R_2} = \text{Canal } 2_{\text{Pic}} + \text{Canal } 2_{\text{Pic}} \frac{R_3}{R_2}$$

$$\text{Canal } 2_{\text{Pic}} \frac{R_3}{R_2} = U_{\text{Pic}} - \text{Canal } 2_{\text{Pic}} \quad \rightarrow \quad R_2 = \frac{R_3 \text{ Canal } 2_{\text{Pic}}}{U_{\text{Pic}} - \text{Canal } 2_{\text{Pic}}} = \frac{20 \cdot 30}{60 - 30} = 20 \Omega$$

$$c) f = \frac{1}{T} = \frac{1}{0,040} = 25 \text{ Hz}$$