

## Sèrie 2

## Primera part

## Exercici 1

Q1 c    Q2 d    Q3 b    Q4 b    Q5 c

## Exercici 2

$$a) I_R = \frac{U}{R} = \frac{230}{10} = 23 \text{ A}; I_L = \frac{U}{X_L} = \frac{230}{5} = 46 \text{ A}; I_C = \frac{U}{X_C} = \frac{230}{10} = 23 \text{ A}$$

$$I = \sqrt{I_R^2 + (I_C - I_L)^2} = \sqrt{23^2 + 23^2} = 32,53 \text{ A}$$

$$b) P = \frac{U^2}{R} = \frac{230^2}{10} = 5290 \text{ W}$$

$$c) \text{fdp} = \cos \varphi = \frac{P}{S} = \frac{P}{U \cdot I} = \frac{5290}{230 \cdot 32,53} = 0,707 \text{ (i)}$$

## OPCIÓ A

## Exercici 3

$$a) P(U_2) = 0 \Rightarrow I(U_2) = 0 \Rightarrow I(R_1) = I(R_2) \Rightarrow U_2 = U_1 \frac{R_2}{R_1 + R_2} = 60 \frac{8}{12} = 40 \text{ V}$$

$$b) I(R_2) = \frac{U_2}{R_2} = \frac{20}{8} = 2,5 \text{ A}; I(R_1) = \frac{U_1 - U_2}{R_1} = \frac{40}{4} = 10 \text{ A}$$

$$c) P(U_1) = U_1 \cdot I(R_1) = 60 \cdot 10 = 600 \text{ W}$$

$$P(U_2) = U_2 \cdot I(U_2) = U_2 \cdot (I(R_2) - I(R_1)) = 20 \cdot (2,5 - 10) = -150 \text{ W}$$

## Exercici 4

$$a) \Gamma = k \cdot I \Rightarrow k = \frac{\Gamma}{I} = \frac{4}{20} = 0,2 \frac{\text{Nm}}{\text{A}}; E = k \cdot \omega = 0,2 \cdot \frac{1000}{\frac{60}{2\pi}} = 20,94 \text{ V}$$

$$b) U = R \cdot I + E = 0,15 \cdot 20 + 20,94 = 23,94 \text{ V}$$

$$c) \eta(\%) = 100 \frac{P_{\text{mec.}}}{P_{\text{elec.}}} = 100 \frac{\Gamma \cdot \omega}{U \cdot I} = 100 \frac{4 \cdot 1000 \frac{2\pi}{60}}{23,94 \cdot 20} = 87,5\%$$

## OPCIÓ B

## Exercici 3

$$a) \eta(\%) = 100 \frac{P}{\sqrt{3}UI \cos \varphi} = 100 \frac{90000}{\sqrt{3} \cdot 230 \cdot 282 \cdot 0,85} = 94,25\%$$

b)  $p = 2$  parells de pols

$$c) \Gamma = \frac{P}{\omega} = \frac{90000}{1484 \frac{2\pi}{60}} = 579,1 \text{ Nm}$$

d) Estrella,  $I_{\text{línia}} = 163 \text{ A}$

## Exercici 4

a)  $V_O = 0 \text{ V}$

b)  $V_O = 5 \text{ V}$

$$c) P = \frac{V_O^2}{R} = \frac{5^2}{1} = 25 \text{ mW}$$

d)

$I_1$	$I_2$	$O$
0	0	0
1	0	1
0	1	1
1	1	1

Funció O (OR)

**SÈRIE 5****Primera part****Exercici 1**

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

**Exercici 2**

$$a) P = RI^2 \Rightarrow I = \sqrt{\frac{P}{R}} = \sqrt{\frac{9000}{10}} = 30 \text{ A}$$

$$b) Q = XI^2 \Rightarrow X = \frac{Q}{I^2} = \frac{1800}{30^2} = 2 \Omega$$

$$c) U = ZI = I\sqrt{R^2 + X^2} = 30\sqrt{10^2 + 2^2} = 305,9 \text{ V}$$

$$d) \text{fdp} = 1 \Rightarrow S' = P; \quad i' = \frac{S'}{U} = \frac{P}{U} = \frac{9000}{305,9} = 29,42 \text{ A}$$

**OPCIÓ A****Exercici 3**

$$a) I_R = \frac{U}{\sqrt{3}R} = \frac{660}{\sqrt{3} \cdot 20} = 19,05 \text{ A}; \quad I_X = \frac{U}{\sqrt{3}X} = \frac{660}{\sqrt{3} \cdot 120} = 3,175 \text{ A}$$

$$I_L = \sqrt{I_R^2 + I_X^2} = \sqrt{19,05^2 + 3,175^2} = 19,32 \text{ A}$$

$$b) P = 3 \frac{\left(\frac{U}{\sqrt{3}}\right)^2}{R} = \frac{U^2}{R} = \frac{660^2}{20} = 21,78 \text{ kW}$$

$$Q = 3 \frac{\left(\frac{U}{\sqrt{3}}\right)^2}{X} = \frac{U^2}{X} = \frac{660^2}{120} = 3,63 \text{ kvar}$$

$$S = \sqrt{P^2 + Q^2} = \sqrt{21,78^2 + 3,63^2} = 22,08 \text{ kVA}$$

$$c) \text{Consum simètric} \Rightarrow I_N = 0$$

**Exercici 4**

$$a) \eta = 100 \frac{P}{UI} = 100 \frac{400}{48 \cdot 10} = 83,33\%$$

$$b) \Gamma = \frac{P}{\omega} = \frac{400}{1200 \frac{2\pi}{60}} = 3,183 \text{ Nm}$$

$$c) E_{48} = \frac{P}{I} = \frac{400}{10} = 40 \text{ V}; \quad (R_i I)_{48} = U_{48} - E_{48} = 48 - 40 = 8 \text{ V}$$

$$(R_i I)_{48} = (R_i I)_{24}; \quad E_{24} = U_{24} - (R_i I)_{48} = 24 - 8 = 16 \text{ V}$$

$$n' = n \frac{E_{24}}{E_{48}} = 1200 \frac{16}{40} = 480 \text{ min}^{-1}$$

**OPCIÓ B****Exercici 3**

$$a) I = \frac{P}{U} = \frac{4000}{230} = 17,39 \text{ A}$$

$$\Delta U_{\text{màx}} = 0,05U = 11,5 \text{ V}; \quad 2R_{\text{màx}} = \frac{\Delta U_{\text{màx}}}{I} = 0,6613 \Omega; \quad R_{\text{màx}} = 0,3306 \Omega$$

$$S_{\text{mín}} = \rho \frac{L}{R_{\text{màx}}} = 17,86 \cdot 10^{-3} \frac{100}{0,3306} = 5,402 \text{ mm}^2$$

$$b) S = 6 \text{ mm}^2$$

$$c) cdt\% = 5 \frac{S_{\text{mín}}}{S} = 5 \frac{5,402}{6} = 4,502\%$$

**Exercici 4**

$$a) \eta = 100 \frac{P}{\sqrt{3}UI \cos \varphi} = 100 \frac{68000}{\sqrt{3} \cdot 3400 \cdot 123 \cdot 0,85} = 93,88\%$$

$$b) p = 2$$

$$c) \Gamma = \frac{P}{\omega} = \frac{68000}{1450 \frac{2\pi}{60}} = 447,8 \text{ Nm}$$

$$d) \text{ Estrella } I_l = 123 \text{ A}$$