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) $P = \frac{U^2}{R} = \frac{230^2}{10} = 5\,290\,\text{W}$

c) $fdp = \cos\varphi = \frac{P}{S} = \frac{P}{U \cdot I} = \frac{5\,290}{230 \cdot 32{,}53} = 0{,}707\,\text{(i)}$

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) $\eta(\%) = 100\dfrac{P}{\sqrt{3}UI\cos\varphi} = 100\dfrac{90\,000}{\sqrt{3}\cdot 230\cdot 282\cdot 0{,}85} = 94{,}25\,\%$

b) p = 2 parells de pols

c) $\Gamma = \dfrac{P}{\omega} = \dfrac{90\,000}{1484\dfrac{2\pi}{60}} = 579{,}1\,\text{Nm}$

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

Exercici 4

a) $V_O = 0$ V

b) $V_O = 5$ V

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

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

OPCIÓ A

Exercici 3

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

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

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) Consum simètric $\Rightarrow I_N = 0$

Exercici 4

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

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

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

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

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

OPCIÓ B

Exercici 3

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

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

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

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

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

Exercici 4

a) $\eta = 100\dfrac{P}{\sqrt{3}UI\cos\varphi} = 100\dfrac{68000}{\sqrt{3}400\cdot 123\cdot 0{,}85} = 93{,}88\%$

b) $p = 2$

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

d) Estrella $I_\text{l} = 123\ \text{A}$