SÈRIE 3

Primera part

Exercici 1

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

Exercici 2

a) $I_1 = \frac{U_1 - U_2}{R_1} = \frac{48-36}{24} = 0{,}5 \text{ A}$

b) $I_{R_4} = \frac{U_2}{\frac{R_2 R_3}{R_2+R_3}+R_4} = \frac{36}{\frac{24\cdot 24}{24+24}+24} = 1 \text{ A}$

$I_2 = I_{R_4} - I_1 = 1 - 0{,}5 = 0{,}5 \text{ A}$

c) $P_{R_3} = R_3 I_{R_3}^2 = R_3 \left(\frac{I_{R_4}}{2}\right)^2 = 24 \left(\frac{1}{2}\right)^2 = 6 \text{ W}$

d) $I_{R_4} = \frac{U_2}{R_2+R_4} = \frac{36}{24+24} = 0{,}75 \text{ A}$

$I_2 = I_{R_4} - I_1 = 0{,}75 - 0{,}5 = 0{,}25 \text{ A}$

$P_U = U_1 I_1 + U_2 I_2 = 48 \cdot 0{,}5 + 36 \cdot 0{,}25 = 33 \text{ W}$

e) $P_{R_3} = 0 \text{ W}$

OPCIÓ A

Exercici 3

a) $p = 2$

b) $\Gamma = \frac{P_N}{\omega_N} = \frac{7500}{1460 \frac{2\pi}{60}} = 49{,}05 \text{ N m}$

c) $P = \sqrt{3}\, U_N\, I_N \cos\varphi_N = \sqrt{3} \cdot 400 \cdot 15{,}3 \cdot 0{,}8 = 8{,}48 \text{ kW}$

d) $\eta(\%) = 100\, \frac{P_N}{P} = 100\, \frac{7{,}5}{8{,}48} = 88{,}44\ \%$

e) $U_{\text{N Estrella}} = \sqrt{3}\, U_{\text{N Triangle}} = \sqrt{3} \cdot 400 = 692{,}8 \text{ V}$

En realitat els motors tenen, a la placa de característiques, les tensions normalitzades 690/400 V

$I_{\text{N Estrella}} = \frac{I_{\text{N Triangle}}}{\sqrt{3}} = \frac{15{,}3}{\sqrt{3}} = 8{,}83 \text{ A}$

Exercici 4

a) $R_{\text{Calef}} = \frac{U^2_{\text{Nom Calef}}}{P_{\text{Nom Calef}}} = \frac{230^2}{2000} = 26{,}45\ \Omega$

$R_{\text{Línia}} = \rho\ \frac{l}{S} = 0{,}01786 \cdot 10^{-6}\ \frac{30}{2{,}5 \cdot 10^{-6}} = 0{,}21432\ \Omega$

$I = \frac{U_{\text{Calef}}}{R_{\text{Calef}}} = \frac{230\ (1-0{,}05)}{25{,}46} = \frac{218{,}5}{26{,}45} = 8{,}26\ \text{A}$

$R_{\text{Allarg}} = \frac{U - U_{\text{Calef}} - 2\ R_{\text{Línia}}\ I}{2\ I} = \frac{230 - 218{,}5 - 2 \cdot 0{,}21432 \cdot 8{,}26}{2 \cdot 8{,}26} = 0{,}4818\ \Omega$

$l_{\text{Màx Allarg}} = \frac{R_{\text{Allarg}}\ s}{\rho} = \frac{0{,}4818 \cdot 2{,}5 \cdot 10^{-6}}{0{,}01786 \cdot 10^{-6}} = 67{,}4\ \text{m}$

b) $P_{\text{Calef}} = U_{\text{Calef}}\ I = 218{,}5 \cdot 8{,}26 = 1805\ \text{W}$

c) $I_{\text{CC}} = \frac{U}{2\ (R_{\text{Línia}} + R_{\text{Allarg}})} = \frac{230}{2\ (0{,}21432 + 0{,}4818)} = 165{,}2\ \text{A}$

OPCIÓ B

Exercici 3

a) $R_1\ I_1 = R_2\ I_2 \quad \rightarrow \quad I_2 = \frac{R_1}{R_2}\ I_1 = \frac{48}{24}\ I_1 = 2\ I_1$

$W = R_1\ I_1^2 + R_2\ I_2^2 = R_1\ I_1^2 + R_2\ (2\ I_1)^2 = (R_1 + 4\ R_2)\ I_1^2 \quad \rightarrow \quad I_1 = \sqrt{\frac{W}{R_1 + 4\ R_2}}$

$I_1 = \sqrt{\frac{500}{48 + 4 \cdot 24}} = 1{,}863\ \text{A} \qquad I_2 = 2\ I_1 = 2 \cdot 1{,}863 = 3{,}726\ \text{A}$

b) $U = \frac{P}{I_3} = \frac{P}{I_1 + I_2} = \frac{500}{1{,}863 + 3{,}726} = 89{,}46\ \text{V}$

c) $I_{\text{L}} = \frac{U}{X_{\text{L}}} = \frac{U}{\omega\ L} = \frac{U}{2\ \pi\ f\ L} = \frac{89{,}46}{2\ \pi\ 50 \cdot 2 \cdot 10^{-3}} = 142{,}38\ \text{A}$

Exercici 4

a) $\Gamma = \frac{P}{\omega} = \frac{129000}{878\ \frac{2\pi}{60}} = 1403\ \text{Nm}$

b) $E = \frac{P}{I} = \frac{129000}{278} = 464{,}03\ \text{V}; \quad R_{\text{i}} = \frac{U - E}{I} = \frac{520 - 464{,}03}{278} = 0{,}2013\ \Omega$

c) $E' = U' - R_{\text{i}}\ \frac{I}{2} = 450 - 0{,}2013\ \frac{278}{2} = 422{,}02\ \text{V}$

$N' = N\ \frac{E'}{E} = 878\ \frac{422{,}02}{464{,}03} = 798{,}5\ \text{min}^{-1}$

Sèrie 5

Primera part

Exercici 1

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

Exercici 2

a) $R_1 = \frac{U^2}{W_1} = \frac{50^2}{250} = 10\ \Omega$

b) $R_2 = \frac{U^2}{W_2 - W_1} = \frac{50^2}{350-250} = 25\ \Omega$

c) $A_1 = \frac{U}{R_1} + \frac{U}{R_2} + \frac{U}{R_3} \quad \rightarrow \quad R_3 = \frac{U}{A_1 - \frac{U}{R_1} - \frac{U}{R_2}} = \frac{50}{17 - \frac{50}{10} - \frac{50}{25}} = 5\ \Omega$

d) $W_3 = U \cdot A_1 = 50 \cdot 17 = 850\ \text{W}$

OPCIÓ A

Exercici 3

a) $r_\text{t} = \frac{U_\text{primari}}{U_\text{secundari}} = \frac{230}{125} = 1{,}84 \qquad U_2 = \frac{U_1}{r_\text{t}} = \frac{225}{1{,}84} = 122{,}3\ \text{V}$

$W_2 = \frac{U_2^2}{R_2} = \frac{122{,}3^2}{10} = 1495\ \text{W}$

b) $A_1 = \frac{U_1}{R_1} = \frac{225}{20} = 11{,}25\ \text{A}$

c) $A_\text{T} = A_1 + A_{21} = A_1 + \frac{A_2}{r_\text{t}} = A_1 + \frac{\frac{U_2}{R_2}}{r_\text{t}} = 11{,}25 + \frac{\frac{122{,}3}{10}}{1{,}84} = 17{,}9\ \text{A}$

Exercici 4

a) $\eta\ (\%) = 100\ \frac{P}{U\,I} = 100\ \frac{2400}{200 \cdot 14} = 85{,}71\ \%$

b) $\Gamma = \frac{P}{\omega} = \frac{P}{n\frac{2\,\pi}{60}} = \frac{2400}{1206\frac{2\,\pi}{60}} = 19\ \text{N m}$

c) En condicions nominals:

$E = \frac{P}{I} = \frac{2400}{14} = 171{,}43\ \text{V} \quad \rightarrow \quad R_\text{i}\,I = U - E = 200 - 171{,}43 = 28{,}57\ \text{V}$

En el punt de funcionament:

$E' = U' - R_\text{i}\,I = 180 - 28{,}57 = 151{,}43\ \text{V} \rightarrow n' = \frac{E'}{E}\,n = \frac{151{,}43}{171{,}43}\ 1206 = 1065{,}3\ \text{min}^{-1}$

OPCIÓ B

Exercici 3

a) $V_1 = \frac{U}{\sqrt{3}} = \frac{400}{\sqrt{3}} = 230{,}9\ \text{V}$

b) $A_1 = \frac{V_1}{Z} = \frac{V_1}{\sqrt{R^2 + X_\text{L}^2}} = \frac{230{,}9}{\sqrt{250^2 + 100^2}} = 0{,}858\ \text{A}$

c) $V_2 = X_\text{L}\, A_1 = 100 \cdot 0{,}858 = 85{,}8\ \text{V}$

d) $W_1 = R\, A_1^2 = 250 \cdot 0{,}858^2 = 184{,}04\ \text{W}$

Exercici 4

a) $U = \frac{\text{Canal 1}_\text{màx}}{\sqrt{2}} = \frac{20 \cdot 3{,}4}{\sqrt{2}} = 48{,}08\ \text{V}$

b) $\text{Desfasament Canal 1} - \text{Canal 2} = 1{,}6\ \text{div} \cdot 5\ \frac{\text{ms}}{\text{div}} = 8\ \text{ms}$

c) $\text{Canal 2}_\text{màx} = 5\ \frac{\text{V}}{\text{div}}\ 2{,}2\ \text{div} = 11\ \text{V}$