Oficina d'Accés a la Universitat	Pàgina 1 de 4
PAU 2014	
Pautes de correcció	**Electrotècnia**

SÈRIE 3

Primera part

Exercici 1

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

Exercici 2

a) $A_1 = \dfrac{U_1}{R_1} = \dfrac{100}{100} = 1 \text{ A}$

b) $A_2 = \dfrac{U_1}{R_2} = \dfrac{100}{200} = 0,5 \text{ A}$

c) $A_3 = 0 \text{ A}$

d) $W_1 = U_1 \cdot I = U_1 \cdot (A_1 + A_2) = 100 \cdot (1 + 0,5) = 150 \text{ W}$

OPCIÓ A

Exercici 3

a) $A_2 = \dfrac{V_2}{R_2} = \dfrac{200}{10} = 20 \text{ A}$

b) $r_t = \dfrac{U_{1N}}{U_{2N}} = \dfrac{400}{230} \quad \rightarrow \quad r_t = \dfrac{A_2}{A_1} = \dfrac{400}{230} \quad \rightarrow \quad A_1 = \dfrac{A_2}{r_t} = \dfrac{20 \cdot 230}{400} = 11,5 \text{ A}$

c) $W_1 = R_1 A_1^2 + R_2 A_2^2 \quad \rightarrow \quad R_1 = \dfrac{W_1 - R_2 A_2^2}{A_1^2} = \dfrac{5300 - 10 \cdot 20^2}{11,5^2} = 9,83 \ \Omega$

d) $U_1 = \dfrac{W_1}{A_1} = \dfrac{5300}{11,5} = 460,9 \text{ V}$

Exercici 4

a) $\eta(\%) = 100 \dfrac{P}{UI} = 100 \dfrac{250}{36 \cdot 7,62} = 91,13 \ \%$

b) $E = \dfrac{P}{I} = \dfrac{250}{7,62} = 32,81 \text{ V}; \quad R_i = \dfrac{U - E}{I} = \dfrac{36 - 32,81}{7,62} = 0,419 \ \Omega$

c) $E' = U - R_i \cdot 0,6 \cdot I = 36 - 0,419 \cdot 0,6 \cdot 7,62 = 34,08 \text{ V}$

$$n' = n \dfrac{E'}{E} = 3850 \dfrac{34,08}{32,81} = 3999 \text{ min}^{-1}$$

OPCIÓ B

Exercici 3

a) $X_C = \frac{1}{\omega C} = \frac{1}{2\pi f C} = \frac{1}{2\pi 50 \cdot 20 \cdot 10^{-6}} = 159{,}2 \ \Omega$

   $A_1 = \frac{U}{X_C} = \frac{400}{159{,}2} = 2{,}51 \ \text{A}$

b) $A_2 = \frac{U}{R} = \frac{400}{100} = 4 \ \text{A}$

c) $A_3 = \sqrt{A_1^2 + A_2^2} = \sqrt{2{,}51^2 + 4^2} = 4{,}72 \ \text{A}$

d) $A_4 = \sqrt{3} A_3 = \sqrt{3} \cdot 4{,}72 = 8{,}18 \ \text{A}$

e) $P_{\text{Total}} = 3 \cdot R \cdot A_2^2 = 3 \cdot 100 \cdot 4^2 = 4800 \ \text{W}$

Exercici 4

a) $f = \frac{1}{T} = \frac{1}{4 \cdot 1 \cdot 10^{-3}} = 250 \ \text{Hz}$

b) $U_{\text{màx}} = \frac{R_1 + R_2}{R_2} U_{\text{R2 màx}} = \frac{10 + 30}{30} \cdot 3{,}4 \cdot 20 = 90{,}67 \ \text{V}$

c) $U_{\text{RMS}} = \frac{U_{\text{màx}}}{\sqrt{2}} = \frac{90{,}67}{\sqrt{2}} = 64{,}11 \ \text{V}$

SÈRIE 4

Primera part

Exercici 1

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

Exercici 2

a)

$$\begin{cases} R_1 I_1 + R_2(I_1 + I_2) = U_1 + U_2 + U_3 \\ R_3 I_2 + R_2(I_1 + I_2) = U_4 \end{cases} \rightarrow \begin{cases} (R_1 + R_2)I_1 + R_2 I_2 = U_1 + U_2 + U_3 \\ R_2 I_1 + (R_2 + R_3)I_2 = U_4 \end{cases}$$

$$\begin{bmatrix} R_1 + R_2 & R_2 \\ R_2 & R_2 + R_3 \end{bmatrix}\begin{bmatrix} I_1 \\ I_2 \end{bmatrix} = \begin{bmatrix} U_1 + U_2 + U_3 \\ U_4 \end{bmatrix} \rightarrow \begin{bmatrix} 13 & 10 \\ 10 & 15 \end{bmatrix}\begin{bmatrix} I_1 \\ I_2 \end{bmatrix} = \begin{bmatrix} 22 \\ 10 \end{bmatrix}$$

$$I_1 = 2{,}421 \text{ A}$$
$$I_2 = -0{,}947 \text{ A}$$

b) $P_{R2} = R_2(I_1 + I_2)^2 = 10(2{,}421 - 0{,}947)^2 = 21{,}73 \text{ W}$

c)

$$P_{U1} = U_1 I_1 = 5 \cdot 2{,}421 = 12{,}105 \text{ W}$$
$$P_{U2} = U_2 I_1 = 7 \cdot 2{,}421 = 16{,}947 \text{ W}$$
$$P_{U3} = U_3 I_1 = 10 \cdot 2{,}421 = 24{,}21 \text{ W}$$
$$P_{U4} = U_4 I_2 = 10 \cdot (-0{,}947) = -9{,}47 \text{ W}$$

OPCIÓ A

Exercici 3

a) $p = 4$

b) $\Gamma = \dfrac{P}{\omega} = \dfrac{4000}{728\frac{2\pi}{60}} = 52{,}47 \text{ N m}$

c) $\eta(\%) = 100\dfrac{P}{\sqrt{3}UI\cos\varphi} = 100\dfrac{4000}{\sqrt{3}\cdot400\cdot10{,}2\cdot0{,}67} = 84{,}48 \text{ \%}$

d) 4 kW

Exercici 4

b) $I = \frac{P}{U} = \frac{12}{15} = 0,8$ A

$$230 = RI + 12 \cdot U \quad \rightarrow \quad R = \frac{230 - 12 \cdot U}{I} = \frac{230 - 12 \cdot 15}{0,8} = 62,5 \ \Omega$$

b) $P_R = RI^2 = 62,5 \cdot 0,8^2 = 40$ W

c) $P_{Total} = P_R + 12 \cdot P_{Làmpada} = 40 + 12 \cdot 12 = 184$ W

d) $P = 0$ W

OPCIÓ B

Exercici 3

a) $V_2 = R_2 A_2 = 50 \cdot 1,437 = 71,85$ V

b) $A_3 = \frac{V_2}{X_L - X_C} = \frac{71,85}{50 - 30} = 3,593$ A

c) $A_1 = \sqrt{A_2^2 + A_3^2} = \sqrt{1,437^2 + 3,593^2} = 3,87$ A

d) $W_2 = R_2 A_2^2 = 50 \cdot 1,437^2 = 103,25$ W

e) $W_1 = R_1 A_1^2 + W_2 = 50 \cdot 3,87^2 + 103,25 = 852,1$ W

Exercici 4

a) $\eta(\%) = 100 \frac{P}{U \cdot I} = 100 \frac{60}{36 \cdot 2} = 83,33$ %

b) $\Gamma = \frac{P}{\omega} = \frac{60}{7840 \frac{2\pi}{60}} = 73,08$ mN m

c) $E = \frac{P}{I} = \frac{60}{2} = 30$ V

$R_i = \frac{U - U_b - E}{I} = \frac{36 - 1,2 - 30}{2} = 2,4 \ \Omega$

d) $E' = U' - R_i \cdot 0,7 \cdot I - U_b = 30 - 2,4 \cdot 0,7 \cdot 2 - 1,2 = 25,44$ V

$n' = n \frac{E'}{E} = 7840 \frac{25,44}{30} = 6648,3$ min^{-1}