SÈRIE 2

Primera part

Exercici 1

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

Exercici 2

a) $L = \frac{X_L}{2\cdot\pi\cdot f} = \frac{\frac{72}{0,9}}{2\cdot\pi\cdot 50} = 254{,}65\ \text{mH}$

b) $C = \frac{1}{2\cdot\pi\cdot f\cdot X_C} = \frac{1}{2\cdot\pi\cdot 50\cdot\frac{280}{0,9}} = 10{,}23\ \mu\text{F}$

c) $A_1 = \frac{230}{100} = 2{,}3\ \text{A}$

d) En estar el circuit en ressonància, *fdp* = 1

Segona part

OPCIÓ A

Exercici 3

a) $I_R = \frac{U_{ab}}{R} = \frac{400}{10} = 40\ \text{A}$ $\quad I_{X_L} = \frac{U_{ab}}{X_L} = \frac{400}{10} = 40\ \text{A}$

$I_1 = \sqrt{I_R^2 + I_{X_L}^2} = \sqrt{40^2 + 40^2} = 56{,}57\ \text{A}$

b) $I_2 = \sqrt{3}\cdot I_1 = \sqrt{3}\cdot 56{,}57 = 97{,}98\ \text{A}$

c) $P = 3\cdot\frac{U_{ab}^2}{R} = 3\cdot\frac{400^2}{10} = 48\ \text{kW}$ $\quad Q = 3\cdot\frac{U_{ab}^2}{X_L} = 3\cdot\frac{400^2}{10} = 48\ \text{kvar}$

$S = \sqrt{3}\cdot U_{ab}\cdot I_2 = \sqrt{3}\cdot 400\cdot 97{,}98 = 67{,}88\ \text{kVA}$

Exercici 4

a) $I_1 = \frac{U_1}{R_1} = \frac{15}{10} = 1{,}5\ \text{A}$

b) $I_1 = \frac{U_2}{R_1+R_2} = \frac{15}{10+5} = 1\ \text{A}$

c) $I_1 = \frac{U_1}{R_1} = \frac{15}{10} = 1{,}5\ \text{A}$

d) $P_{\text{Font}} = \frac{U_2^2}{R_1+R_2} = \frac{15^2}{10+5} = 15\ \text{W}$

OPCIÓ B

Exercici 3

a) $\eta(\%) = 100 \cdot \frac{P}{\sqrt{3} \cdot U \cdot I \cdot \cos\varphi} = 100 \cdot \frac{15000}{\sqrt{3} \cdot 400 \cdot 32{,}7 \cdot 0{,}75} = 88{,}28\ \%$

b) p = 3 parells de pols

c) $\Gamma = \frac{P_{\mathrm{N}}}{\omega_{\mathrm{N}}} = \frac{15000}{968 \cdot \frac{2 \cdot \pi}{60}} = 147{,}97\ \mathrm{Nm}$

d) $Q = S \cdot \sin\varphi = \sqrt{3} \cdot U \cdot I \cdot \sqrt{1 - (\cos\varphi)^2} = \sqrt{3} \cdot 400 \cdot 32{,}7 \cdot \sqrt{1 - 0{,}75^2} = 14{,}985\ \mathrm{kvar}$

Exercici 4

a) $P(R_1) = 2 \cdot R_1 \cdot I_1^2$ $\qquad I_1 = \frac{2 \cdot U_1}{2 \cdot R_1 + \frac{(R_2 + R_3) \cdot R_4}{(R_2 + R_3) + R_4}} = \frac{2 \cdot 48}{2 \cdot 0{,}5 + \frac{(14{,}5 + 20{,}25) \cdot 68}{(14{,}5 + 20{,}25) + 68}} = 4\ \mathrm{A}$

$P(R_1) = 2 \cdot 0{,}5 \cdot 4^2 = 16\ \mathrm{W}$

b) $P(R_2, R_3, R_4) = R_{\mathrm{Eq.}} \cdot I_1^2 = \frac{(R_2 + R_3) \cdot R_4}{(R_2 + R_3) + R_4} \cdot I_1^2 = \frac{(14{,}5 + 20{,}25) \cdot 68}{(14{,}5 + 20{,}25) + 68} \cdot 4^2 = 368\ \mathrm{W}$

c) $\eta(\%) = 100 \cdot \frac{P_{\mathrm{Útil}}}{P_{\mathrm{Total}}} = 100 \cdot \frac{368}{368 + 16} = 95{,}83\ \%$

d) $I_1' = \frac{2 \cdot U_1}{2 \cdot R_1 + \frac{R_2 \cdot R_4}{R_2 + R_4}} = \frac{2 \cdot 48}{2 \cdot 0{,}5 + \frac{14{,}5 \cdot 68}{14{,}5 + 68}} = 7{,}41\ \mathrm{A}$

e) $I_{\mathrm{SW}} = \frac{R_4}{R_2 + R_4} \cdot I_1' = \frac{68}{14{,}5 + 68} \cdot 7{,}41 = 6{,}11\ \mathrm{A}$