

Sèrie 3

PAU-LOGSE Curs 2001-2002

ELECTROTÈCNIA

**Primera part****Exercici 1****Q1** c**Q2** c**Q3** b**Q4** b**Q5** b**Exercici 2**

$$a) I_1 = \frac{V_1}{R} = 7 \text{ A}$$

$$b) U_1 = V_2 - V_1 = 30 \text{ V}$$

$$c) U_2 - V_1 = R I_2 \Rightarrow I_2 = 5 \text{ A}$$

**OPCIÓ A****Exercici 3**

$$a) Z = \sqrt{R^2 + (X_L - X_C)^2} = 10,20 \, \Omega$$

$$b) I = \frac{U}{Z} = 10,79 \text{ A}$$

$$c) P = R I^2 = 1163 \text{ W}; \quad Q = (X_L - X_C) I^2 = -232,7 \text{ VAr}$$

$$d) L = \frac{X_L}{2\pi f} = 25,47 \text{ mH}; \quad C = \frac{1}{2\pi f X_C} = 318,3 \, \mu\text{F};$$

$$\omega' L = \frac{1}{\omega' C} \Rightarrow \omega' = 351,2 \frac{\text{rad}}{\text{s}} \Rightarrow f' = 55,9 \text{ Hz}$$

**Exercici 4**

$$a) Z = \sqrt{R^2 + X^2} = 6,325 \, \Omega; \quad I_2 = \frac{V_2 / \sqrt{3}}{Z} = 14,61 \text{ A}$$

$$b) V_1 = r_{tt} V_2 = 320 \text{ V}$$

$$c) I_1 = \frac{I_2}{r_{tt}} = 7,303 \text{ A}$$

$$d) P = 3 R I_2^2 = 3840 \text{ W}; \quad Q = 3 X I_2^2 = 1280 \text{ VAr}$$

## OPCIÓ B

## Exercici 3

$$a) \quad R_N = \frac{U_N^2}{R_N} \Rightarrow R_N = 484 \, \Omega \text{ (resistència de la bombeta, en calent);}$$

$$R_F = R_N \frac{1}{2} = 242 \, \Omega \text{ (resistència de la bombeta, en fred);}$$

$$b) \quad I_F = 3 \frac{U_N}{R_F} = 2,727 \, \text{A}; \quad P_F = U_N I_F = 600 \, \text{W}$$

$$c) \quad I_C = 3 \frac{U_N}{R_N} = 1,364 \, \text{A}; \quad P_C = U_N I_C = 300 \, \text{W}$$

## Exercici 4

$$a) \quad 3 \text{ parells de pols}$$

$$b) \quad \omega_N = 970 \, \text{min}^{-1} = 101,6 \, \frac{\text{rad}}{\text{s}}; \quad \Gamma = \frac{R_N}{\omega_N} = 492,2 \, \text{Nm}$$

$$c) \quad P_e = 3 \frac{U_N}{\sqrt{3}} I_N \cos \varphi_N = 56,81 \, \text{kW}; \quad \eta = \frac{P_N}{P_e} 100 = 88,01\%$$

$$d) \quad Q_e = 3 \frac{U_N}{\sqrt{3}} I_N \sqrt{1 - \cos^2 \varphi_N} = 39,65 \, \text{kVAr}$$

Sèrie 2

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ELECTROTÈCNIA

**Primera part****Exercici 1****Q1** c**Q2** d**Q3** a**Q4** c**Q5** d**Exercici 2**

a)  $U_1 - U_2 = (R_1 + R_2 + R_3)I_1 \Rightarrow I_1 = 1 \text{ A}$

b)  $V_2 = R_2 I_1 = 2 \text{ V}$

c)  $U_1 - U_2 = (R_1 + R_2)I_1' \Rightarrow I_1' = 10 \text{ A}$

d)  $V_2 = R_2 I_1' = 20 \text{ V}$

e)  $P_1 = U_1 I_1' = 500 \text{ W}$  ;  $P_2 = -U_2 I_1' = -100 \text{ W}$

**OPCIÓ A****Exercici 3**

a)  $\frac{1}{X_L} = \frac{1}{X_1} + \frac{1}{X_2} \Rightarrow X_L = 20 \text{ } \Omega$  ;  $Z = \sqrt{R^2 + (X_L - X_3)^2} = 28,28 \text{ } \Omega$

b)  $I = \frac{U}{Z} = 8,132 \text{ A}$

c)  $P = R I^2 = 1323 \text{ W}$  ;  $Q = (X_L - X_3) I^2 = -1323 \text{ VAR}$

d)  $S = \sqrt{P^2 + Q^2} = 1870 \text{ VA}$  ;  $\cos \varphi = \frac{P}{S} = 0,7071$  (capacitiu)

**Exercici 4**

a)  $U_b - U_e - E = R_i I \Rightarrow E = 18 \text{ V}$

b)  $P_m = E I = 360 \text{ W}$  ;  $\Gamma = \frac{P_m}{\omega} = 1,719 \text{ Nm}$

c)  $P_i = U_b I = 480 \text{ W}$  ;  $\eta = \frac{P_m}{P_i} 100 = 75\%$

d)  $E' = U_b - R_i \frac{I}{2} - U_e = 20 \text{ V}$  ;  $\omega' = \omega \frac{E}{E'} = 2222 \text{ min}^{-1}$

## OPCIÓ B

**Exercici 3**

$$\text{a) } I_R = \frac{U}{R} = 100 \text{ A}; I_C = \frac{U}{X_C} = 40 \text{ A}; I_2 = \sqrt{I_R^2 + I_C^2} = 107,7 \text{ A}$$

$$\text{b) } I_1 = \sqrt{3} I_2 = 186,5 \text{ A}$$

$$\text{c) } \cos \varphi = \frac{I_R}{I_2} = 0,9285 \text{ (capacitiu)}$$

$$\text{d) } P = 3 R I_R^2 = 120 \text{ kW}; Q = 3 X I_C^2 = 48 \text{ kVAr}; S = \sqrt{P^2 + Q^2} = 129,2 \text{ kVA}$$

**Exercici 4**

$$\text{a) } V_2 = \frac{U}{r_t} = 57,5 \text{ V}$$

$$\text{b) } I_2 = \frac{V_2}{R_2} = 5,75 \text{ A}$$

$$\text{c) } I_1 = \frac{I_2}{r_t} = 1,438 \text{ A}$$

$$\text{d) } P_{\text{TR}} = U I_1 = 330,6 \text{ W}$$

$$\text{e) } P_{\text{total}} = \frac{U^2}{R_1} + P_{\text{TR}} = 2094 \text{ W}$$