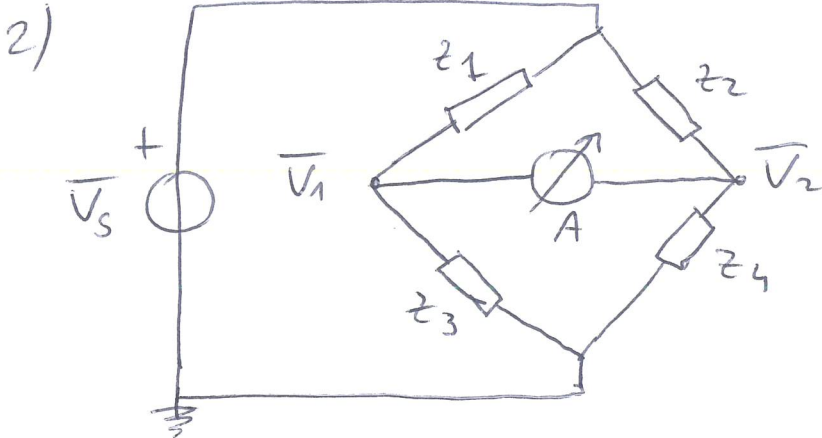


AC REGIME 2



$$\Re \quad \bar{I}_A = 0 \Rightarrow \bar{V}_1 = \bar{V}_2$$

$$\frac{z_3}{z_1 + z_3} = \frac{z_4}{z_2 + z_4} \Rightarrow z_1 z_4 = z_2 z_3$$

$$z_1 = \frac{R_1}{1 + j\omega R_1 C} \quad ; \quad z_2 = R_2 \quad ; \quad z_3 = R_3 \quad ; \quad z_4 = R_x + j\omega L_x$$

$$R_2 R_3 = \frac{R_1 (R_x + j\omega L_x)}{1 + j\omega R_1 C}$$

$$R_2 R_3 + j\omega C R_1 R_2 R_3 = R_1 R_x + j\omega R_1 L_x$$

$$R_1 R_x = R_2 R_3 \Rightarrow R_x = \frac{R_2 R_3}{R_1}$$

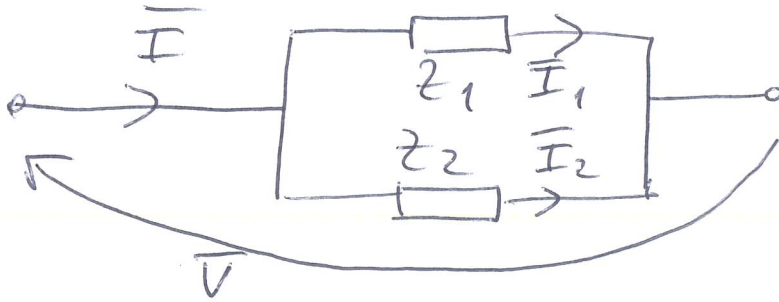
$$R_1 L_x = C R_1 R_2 R_3 \Rightarrow L_x = C R_2 R_3$$

$$\Re : R_1 = 10 \text{ k}\Omega, C = 0.5 \mu\text{F}, R_2 = 400 \Omega, R_3 = 600 \Omega$$

$$R_x = 24 \Omega \quad ; \quad L_x = 120 \text{ mH}$$

AC REGIME 2

3)



$$z_1 = 4 + j4 \Omega \quad ; \quad z_2 = 12 + j6 \Omega$$

$$Q = 2500 \text{ VAR}$$

$$Y_p = Y_1 + Y_2 = 0.192 - 0.158j = 0.25 e^{-0.6904} \Omega^{-1}$$

$$\frac{P}{Q} = \cot \varphi \Rightarrow P = Q \cot \varphi = 3026 \text{ W}$$

$$P = G |\bar{V}|^2 \quad ; \quad Q = -B |\bar{V}|^2$$

$$|\bar{V}|^2 = \frac{Q}{-B} = \frac{2500}{0.158} = 15822 \text{ V}^2$$

$$|\bar{V}| = 126 \text{ V}$$

$$P_{\text{eff}} = \sqrt{P^2 + Q^2} = 3925 \text{ VA} \Rightarrow |\bar{I}| = \frac{P_{\text{eff}}}{|\bar{V}|} = 31 \text{ A}$$

$$|\bar{I}_1|^2 = \frac{|z_2|^2}{|z_1 + z_2|^2} |\bar{I}|^2 \Rightarrow |\bar{I}_1| = 22.2 \text{ A}$$

$$|\bar{I}_2|^2 = \frac{|z_1|^2}{|z_1 + z_2|^2} |\bar{I}|^2 \Rightarrow |\bar{I}_2| = 9.37 \text{ A}$$

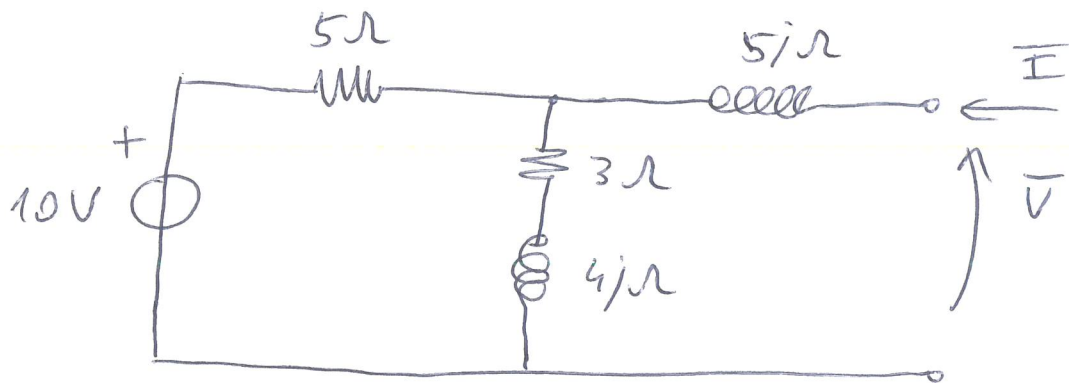
$$P_1 + P_2 = P \quad ; \quad Q_1 + Q_2 = Q$$

$$P_1 = R_1 |\bar{I}_1|^2 = 1974 \text{ W} \quad P_2 = R_2 |\bar{I}_2|^2 = 1053 \text{ W}$$

$$Q_1 = X_1 |\bar{I}_1|^2 = 1974 \text{ VAR} \quad Q_2 = X_2 |\bar{I}_2|^2 = 526 \text{ VAR}$$

AC REGIME 2

7)



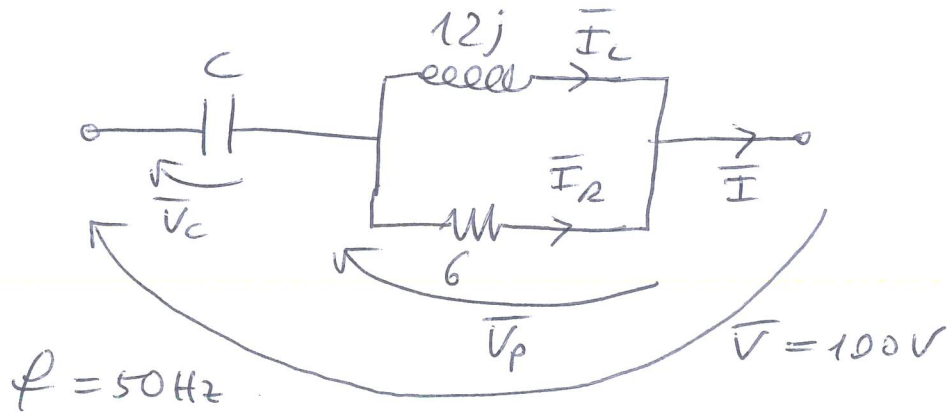
$$\bar{z}_{ep} = \frac{5(3+4j)}{5+3+4j} + 5j = 2.5 + 6.25j \Omega$$

$$\bar{V}_{ep} = \frac{3+4j}{5+3+4j} 10 = 5.6 e^{j0.463} \text{ V}$$

$$\bar{I}_{ep} = \frac{10}{5 + \frac{5j(3+4j)}{3+4j+5j}} \cdot \frac{3+4j}{3+4j+5j} = 0.83 e^{-j0.726} \text{ A}$$

AC REGIME 2

10)



$$Z = -\frac{j}{\omega C} + \frac{6(12j)}{6+12j} = 4.8 + j2.4 - j\frac{1}{\omega C}$$

$$\text{Re } \frac{1}{\omega C} = 2.4 \Rightarrow Z = 4.8 \Omega \quad \bar{V} \text{ in phase with } \bar{I}$$

$$C = 1.327 \mu\text{F} \quad ; \quad \bar{I} = \frac{\bar{V}}{4.8} = 20.8 \text{ A}$$

$$P = 100 \times 20.8 = 2083 \text{ W}$$

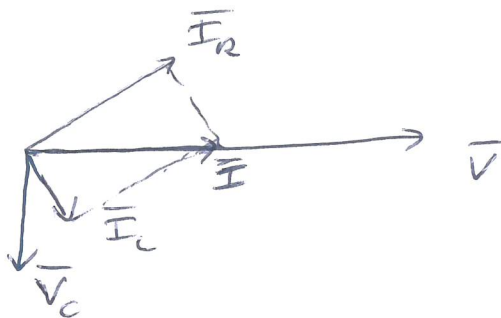
$$\bar{I}_R = \frac{12j}{6+12j} 20.8 = 18.6 e^{j0.46} \text{ A}$$

$$P_R = R |\bar{I}_R|^2 = 2083 \text{ W}$$

$$\bar{I}_L = \frac{6}{6+12j} 20.8 = 9.3 e^{-j1.107} \text{ A}$$

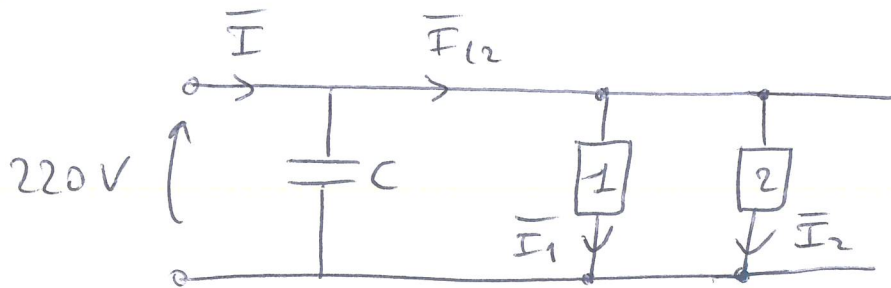
$$Q_L = \omega L |\bar{I}_L|^2 = 1038 \text{ VAR}$$

$$Q_C = -\frac{1}{\omega C} |\bar{I}|^2 = -1046 \text{ VAR}$$



AC REGIME 2

12) ©



$$P_1 = 50 \text{ kW}$$

$$\cos \varphi_1 = 0,60 \text{ (inductivo)}$$

$$P_2 = 20 \text{ kW}$$

$$\cos \varphi_2 = 0,95 \text{ (capacitivo)}$$

$$P_1^{\text{app}} = \frac{P_1}{\cos \varphi_1} = 83,3 \text{ kVA}$$

$$Q_1 = \sqrt{P_1^{\text{app}2} - P_1^2} = 66,6 \text{ kVAR}$$

$$|I_1| = \frac{P_1^{\text{app}}}{V} = 379 \text{ A}$$

$$P_2^{\text{app}} = \frac{P_2}{\cos \varphi_2} = 21,05 \text{ kVA}$$

$$Q_2 = -\sqrt{P_2^{\text{app}2} - P_2^2} = -6,57 \text{ kVAR}$$

$$|I_2| = \frac{P_2^{\text{app}}}{V} = 95,7 \text{ A}$$

$$P_{12} = P_1 + P_2 = 70 \text{ kW}$$

$$Q_{12} = Q_1 + Q_2 = 60,09 \text{ kVAR}$$

$$P_{12}^{\text{app}} = \sqrt{P_{12}^2 + Q_{12}^2} = 92,3 \text{ kVA}$$

$$|I_{12}| = \frac{P_{12}^{\text{app}}}{V} = 419,3 \text{ A} \quad \cos \varphi_{12} = \frac{P_{12}}{P_{12}^{\text{app}}} = 0,759$$

AC REGIME 2

12) (b)

RIF. TOTALE :

$$Q_c = -60.09 \text{ kVAR}$$

$$C = \frac{|Q_c|}{\omega V^2} = 3.952 \text{ mF}$$

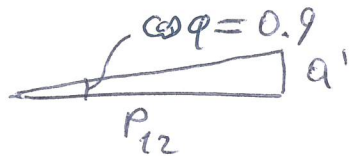
$$\Rightarrow P_R = P_{12} + P_c = P_1 + P_2 + P_c = 70 \text{ kW}$$

$$Q_R = Q_{12} + Q_c = 0$$

$$\cos \phi_R = 1$$

$$P_R = |I_R| \cdot V \Rightarrow |I_R| = \frac{P_R}{V} = 318 \text{ A}$$

RIF. PARZIALE :



$$P'_{12} = \frac{P_{12}}{0.9} = 77.7 \text{ kVA}$$

$$Q' = \sqrt{P'^2_{12} - P_{12}^2} = 33.7 \text{ kVAR}$$

$$|I'| = \frac{P'_{12}}{V} = 353.5 \text{ A}$$

$$C' = \frac{|Q'|}{\omega V^2} = \frac{33.7 \times 10^3}{\omega V^2} = 2.216 \text{ mF}$$