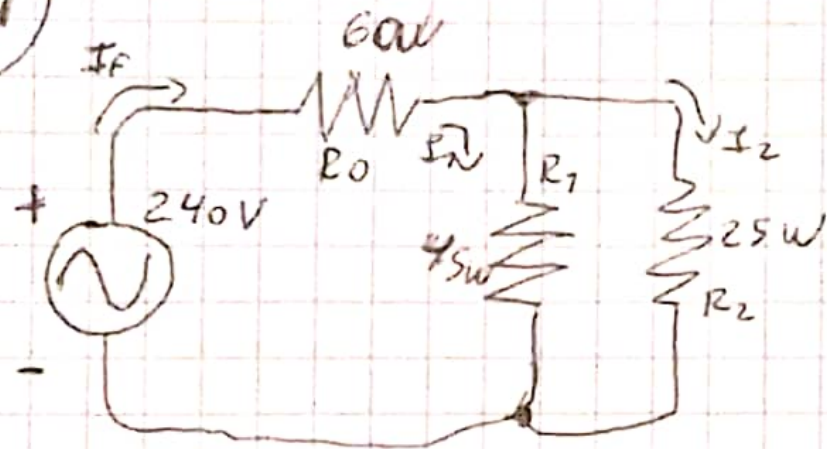


1



a - Sumo las potencias

$$60W + 45W + 25W = \boxed{130W}$$

b - $P_R = I_{rms} \cdot V_{rms} \cdot \cos(\varphi_z) = 0VAR$
es resistivo, el ángulo es 0.

$$P_S = 130 VA$$

c - $I_f = \frac{130W}{240V} = \boxed{0,542A}$

d - $V_{R0} = \frac{60W}{0,542A} = 110,77V$

$$240V - 110,77V = 129,23V$$

V_{R1} y V_{R2} son iguales a 129,23V

$$\frac{45W}{129,23V} = I_{R1} = \boxed{0,348A}$$

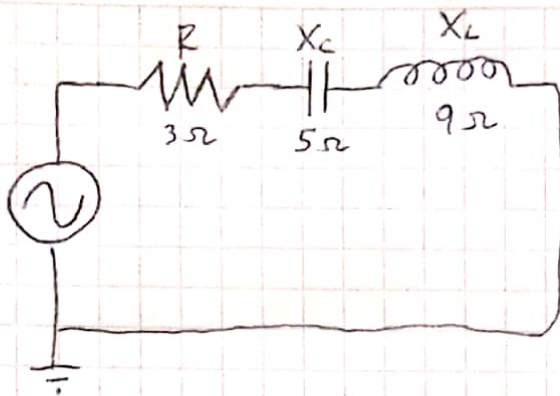
$$\frac{25W}{129,23V} = I_{R2} = \boxed{0,193A}$$

$$R_0 = \frac{110,77V}{0,542A} = \boxed{204\Omega}$$

$$R_1 = \frac{129,23V}{0,348A} = \boxed{371\Omega}$$

$$R_2 = \frac{129,23V}{0,193A} = \boxed{669\Omega}$$

2



$$a - Z_T = 3\Omega + j4\Omega$$

$$Z_T = 5 e^{j53,13^\circ}$$

$$I = \frac{50 e^{j0^\circ}}{5 e^{j53,13^\circ}} = 10 e^{-j53,13^\circ}$$

$$P_R = I \cdot I \cdot R = 100 A^2 \cdot 3\Omega = \boxed{300 W}$$

$$\left. \begin{array}{l} P_C = \boxed{0 W} \\ P_L = \boxed{0 W} \end{array} \right\} \begin{array}{l} \text{solo tienen potencia} \\ \text{reactiva.} \end{array}$$

$$b - P_Q = I_{rms} \cdot V_{rms} \cdot \cos(\varphi_z)$$

$$P_{QR} = I_{rms} \cdot V_{rms} \cdot \cos(0) = \boxed{0 VAR}$$

$\cos(0) = 1$

$$P_{QC} = 500 W \cdot \cos(-90^\circ) = \boxed{-500 VAR}$$

$$P_{QL} = 900 W \cdot \cos(90^\circ) = \boxed{900 VAR}$$

$$c - P_S = \sqrt{P^2 + P_Q^2}$$

$$P_{SR} = P_R = \boxed{300 VA}$$

$$P_{SC} = P_{RC} = \boxed{-500 VA}$$

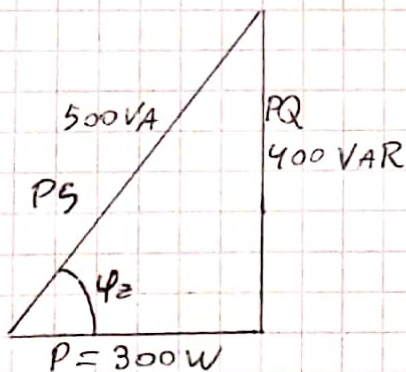
$$P_{SL} = P_{QL} = \boxed{900 VA}$$

$$d - \left. \begin{array}{l} P_T = \boxed{300 W} \\ P_{QT} = \boxed{400 VAR} \end{array} \right\}$$

$$P_{ST} = \sqrt{300^2 + 400^2} = \boxed{500 VA}$$

$$F_P = \cos(-53,13^\circ) = \frac{P_T}{P_{ST}} = \boxed{0,6}$$

e-



$$f - E_R = V \cdot I \cdot T_1 \quad T_1 = \frac{1}{f_1} \Rightarrow E_R = \frac{V \cdot I}{f_1}$$

V, I en valores pico

$$E_R = \frac{50 \cdot \sqrt{2} V \cdot 10 \cdot \sqrt{2} A}{60 Hz} = \boxed{76,67 J}$$

$$g - E_L = \frac{L \cdot (I_{rms})^2}{2}$$

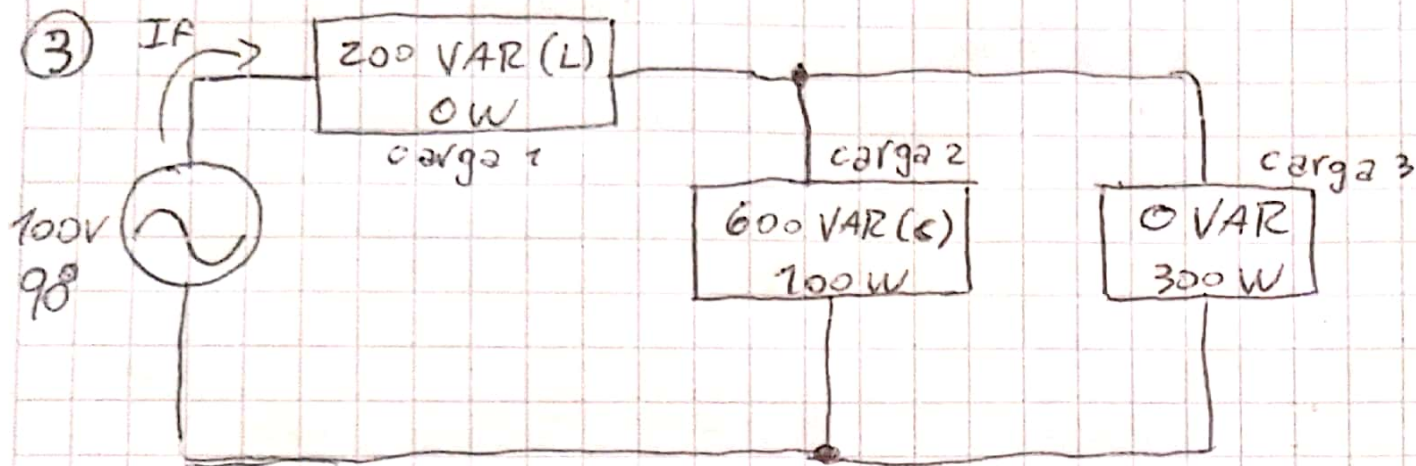
$$X_L = \omega L \Rightarrow \frac{9\Omega}{2\pi \cdot 60 Hz} = L = 23,87 mH$$

$$E_L = \frac{23,87 mH \cdot 100 A^2}{2} = \boxed{1,1935 J}$$

$$E_C = \frac{C \cdot (V_{rms})^2}{2}$$

$$X_C = \frac{1}{\omega C} \Rightarrow C = \frac{1}{\omega X_C} = \frac{1}{2\pi \cdot 60 Hz \cdot 9\Omega} = 530 pF$$

$$E_C = \frac{530 pF \cdot 2500 V^2}{2} = \boxed{0,6625 J}$$

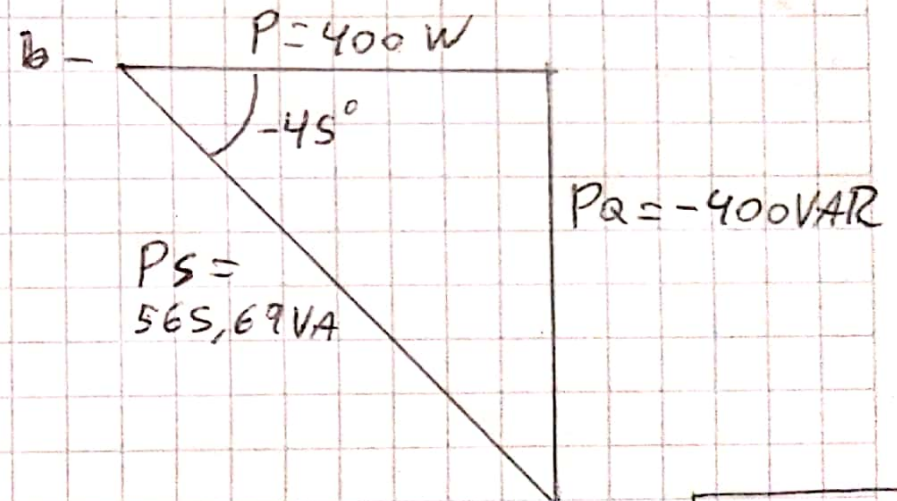


a - $100\text{ W} + 300\text{ W} = \boxed{400\text{ W}}$

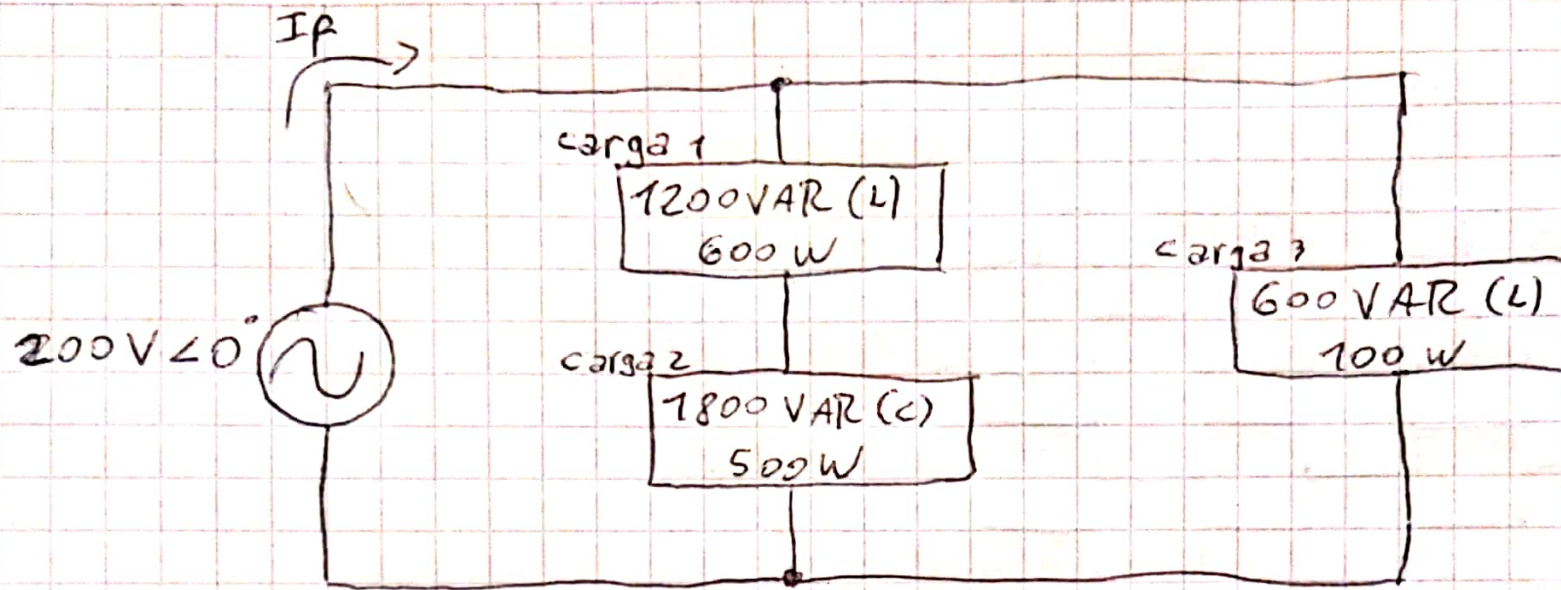
$200\text{ VAR} - 600\text{ VAR} = \boxed{-400\text{ VAR}}$

$\sqrt{400^2 + 400^2} = \boxed{565,69\text{ VA}}$

$F_p = \frac{400\text{ W}}{565,69\text{ VA}} = \boxed{0,707}$



c - $I_{rms} = \frac{565,69\text{ VA } e^{j-45}}{100\text{ V } e^{j90}} = \boxed{5,657 e^{j-135}}$



a - $P_T = 600 \text{ W} + 500 \text{ W} + 100 \text{ W} = \boxed{1200 \text{ W}}$

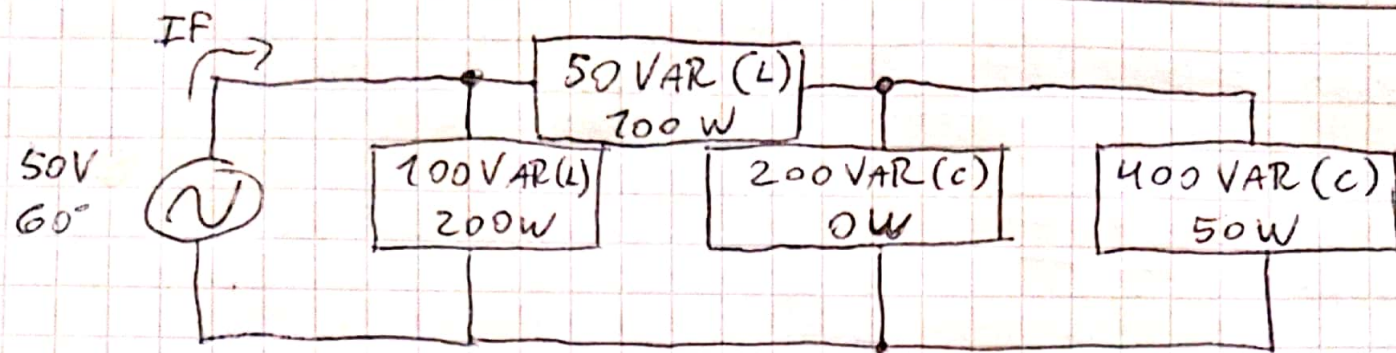
$P_{QT} = 1200 \text{ VAR} + 600 \text{ VAR} - 1800 \text{ VAR} = \boxed{0 \text{ VAR}}$

$P_{ST} = \boxed{1200 \text{ VA}}$

b - $\varphi_z = 0^\circ \quad \text{fp} = \cos(0^\circ) = \boxed{1}$

c - $\frac{P_S = 1200 \text{ VA}}{P = 1200 \text{ W}}$

d - $\frac{1200 \text{ VA} e^{j0^\circ}}{200 \text{ V} e^{j0^\circ}} = \boxed{6 \text{ A} e^{j0^\circ}}$



5) $2 - 200W + 100W + 50W = \boxed{350W}$

$100VAR + 50VAR - 200VAR - 400VAR = \boxed{-450VAR}$

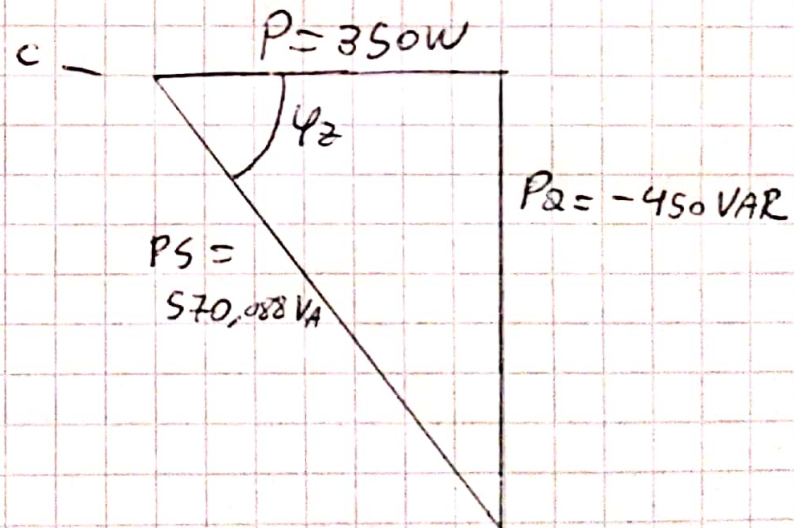
$\sqrt{350^2 + 450^2} = \boxed{570,088 VA}$

b- $FP = \frac{350W}{570,088VA} = \boxed{0,614}$

d- $\varphi_z = \tan^{-1} \frac{-450VAR}{350W} = 307,875^\circ$

$I_F = \frac{570VA e^{j307^\circ}}{50V e^{j60^\circ}}$

$I_F = \boxed{11,4 A e^{j247^\circ}}$



$$\textcircled{a} \textcircled{a} \quad P = \frac{V^2}{Z} = \frac{60^2}{20\Omega} = 180 \text{ W} \quad Q = 0 \text{ VAR} \quad S = 180 \text{ VA}$$

$$\textcircled{b} \quad \frac{60^2}{10\Omega} = 360 \text{ VAR} = Q \quad P = 0 \text{ W} \quad S = 360 \text{ VA}$$

$$\textcircled{c} \quad 180 \text{ W} + 0 \text{ W} + 400 \text{ W} = P_T = 580 \text{ W}$$

$$0 \text{ VAR} + 360 \text{ VAR} + 600 \text{ VAR} = Q_T = 960 \text{ VAR}$$

$$\sqrt{580^2 + 960^2} = |S_T| = 1127,6 \text{ VA}$$

$$\tan^{-1} \frac{960 \text{ VAR}}{580 \text{ W}} = \varphi_T = 58,86^\circ$$

$$f_P = \cos \varphi_T = 0,577$$

$$\textcircled{d} \quad S = V_{rms} \cdot I_{rms}$$

$$I_{rms} = 18,68 \angle 28,86^\circ$$

$$\frac{1127 \angle 58,86^\circ}{60 \angle 30^\circ} = I_{rms}$$

$$(7) (a) P_R = \frac{V^2}{R} = \frac{20V^2}{2\Omega} = 200W \quad P_C = 0W \quad P_L = 0W$$

$$(b) Q_R = 0VAR \quad Q_C = \frac{20V^2}{-5\Omega} = -80VAR \quad Q_L = \frac{20V^2}{4\Omega} = 100VAR$$

$$(c) |S_R| = 200W \quad |S_C| = -80VAR \quad |S_L| = 100VAR$$

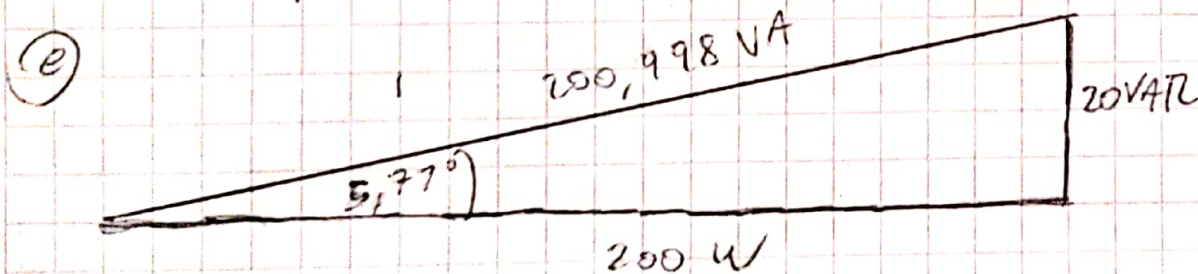
$$(d) 200W + 0W + 0W = 200W = P_T$$

$$-80VAR + 100VAR + 0VAR = 20VAR = Q_T$$

$$\sqrt{200^2 + 20^2} = 200,998 = |S_T|$$

$$\tan^{-1} \frac{20VAR}{200W} = 5,77^\circ = \phi_Z$$

$$f_p = \cos \phi_Z = 0,995$$



$$(f) S = V_{rms} \cdot I_{rms} \quad I_{rms} = \frac{200,998 e^{j5,77^\circ}}{20 e^{j0^\circ}}$$

$$I_{rms} = 10,0499 e^{j5,77^\circ}$$