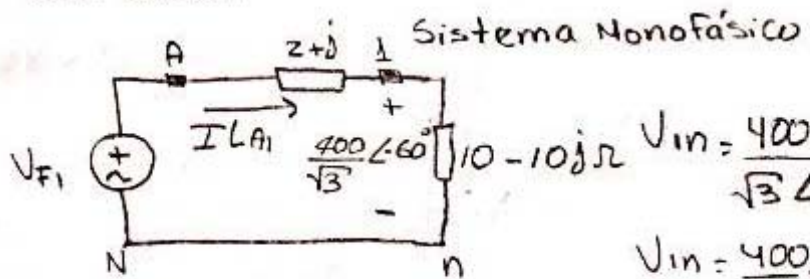


Datos: $V_{31} = 400 \angle 90^\circ \text{ V}$

Preguntas: (a) $P_{\text{carga}} = ?$; $P_{\text{gen}} = ?$; $w_1 = ?$; $w_2 = ?$ Corregir fp a 0,95 en atraso

(b) $w_1 = ?$
 $w_2 = ?$ } Despues de Correccion

$$\begin{cases} V_{L31} = 400 \angle 90^\circ \\ V_{L12} = 400 \angle -30^\circ - 120^\circ \\ V_{L32} = 400 \angle 210^\circ + 120^\circ \end{cases}$$



$$V_{in} = \frac{400 \angle -30^\circ}{\sqrt{3} \angle 30^\circ}$$

$$V_{in} = \frac{400 \angle -60^\circ}{\sqrt{3}}$$

$$I_{LA1} = \frac{400 \angle -60^\circ}{10 - 10j} = 16,3 \angle -15^\circ$$

$$I_{LA1} = 11,55 \angle -15 \text{ Arms}$$

$$\hat{S}_{2\phi} = \frac{(400)^2}{10 + 10j} = 1333,3 - 1333,3j \text{ VA}$$

$$\hat{S}_{2\phi_T} = 3 \times \hat{S}_{2\phi} = 4K - 4Kj \text{ VA} \Rightarrow P_{T2\phi} = 4KW$$

$$\hat{S}_{3\phi} = \sqrt{3} |V_L| |I_L| \angle 0 \quad \text{corroborando fórmulas}$$

$$\hat{S}_{3\phi} = \sqrt{3} \times \left(\frac{400}{\sqrt{3}} \right) (11,55) \angle -45^\circ$$

$$\hat{S}_{3\phi} = 4K - 4Kj \text{ VA}$$

$$P_{\text{carga}} = \sqrt{3} |V_L| |I_L| \cos 0$$

$$P_{\text{carga}} = \sqrt{3} \left(\frac{400}{\sqrt{3}} \right) (11,55) \cos(-45) = \boxed{4000 \text{ W}}$$

$$P_{Lin} = (11,55)^2 \times 2 = 266,8 \text{ W}$$

$$S_{Lin} = (11,55)^2 \times (2+j)$$

$$P_{TLin} = 3 \times 266,8 = 800 \text{ W}$$

$$P_{\text{gen}_T} = 4000 \text{ W} + 800 \text{ W} = 4800 \text{ W}$$

$$w_2 = |V_{LAC} \text{ rms}| \times |I_{A1} \text{ rms}| \cos(\angle V_{LAC} - \angle I_{A1})$$

$$V_{FAn} = (2+j)(11,55 \angle -15^\circ) + \frac{400 \angle -60^\circ}{\sqrt{2}\sqrt{3}}$$

$$V_{FAn} = 173,21 \angle -51,87^\circ \text{ Vrms}$$

$$V_{LAB} = V_{FAn} \times \sqrt{3} \angle 30^\circ = 300 \angle -21,87^\circ \text{ Vrms}$$

$$V_{LCA} = 300 \angle 98,13^\circ \text{ Vrms}$$

$$V_{LAC} = 300 \angle -21,87^\circ \text{ Vrms}$$

$$w_2 = |300| \times |11,55| \cos(-21,87 - (-15)) \Rightarrow \boxed{w_2 = 1361,12 \text{ W}}$$

$$W_1 = |300| \times |11,55| \cos(\angle V_{BC} - \angle I_{B2})$$

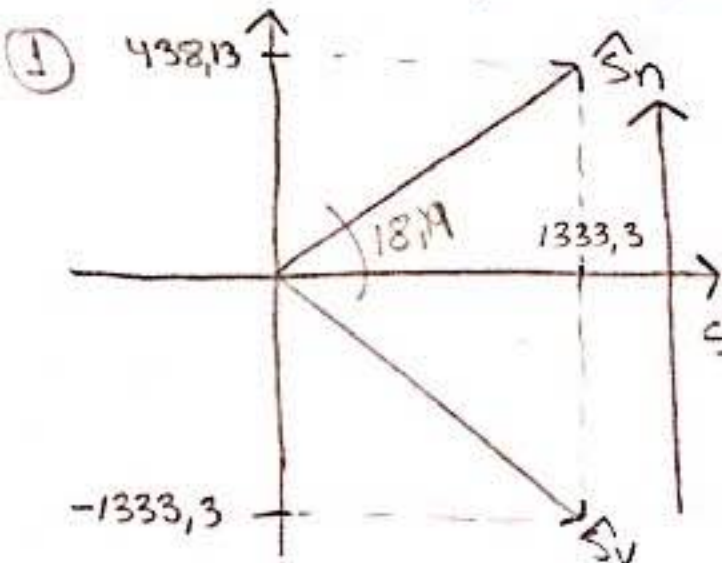
$$W_1 = |300| \times |11,55| \cos(-141,87 + 135)$$

$$W_1 = 3440,12 \text{ W}$$

$$W_T = W_1 + W_2$$

$$W_T = 4801 \text{ W}$$

Corregimos fp a 0,95 en atraso $\hat{S}_{V2A} = 1333,3 - 1333,3 \text{ jVA}$



$$\textcircled{2} \theta_n = \cos^{-1}(0,95) = 18,19^\circ$$

$$\textcircled{3} \hat{S}_n = 1333,3 + \frac{1333,3}{0,95} \times \sin(\cos^{-1}(0,95))$$

$$\hat{S}_n = 1333,3 + 438,13 \text{ jVA}$$

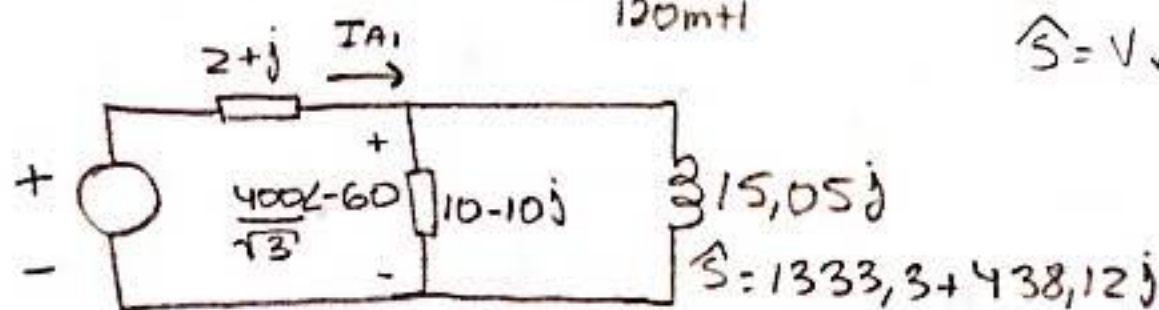
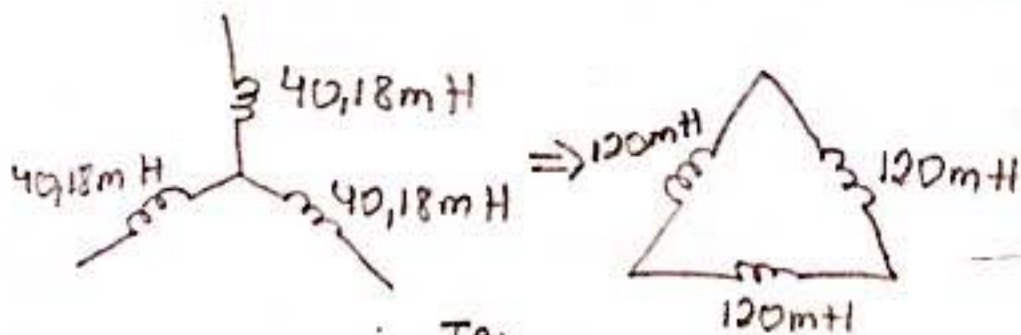
$$\textcircled{4} S_L = \hat{S}_V - \hat{S}_n \Rightarrow S_L = 1333,3 + 438,13$$

$$S_L = 1771,46 \text{ jVA}$$

$$\hat{S}_L = \frac{|V|^2}{Z^*} \quad Z = \left(\frac{|V|^2}{S_L} \right)^* \Rightarrow Z = \left(\frac{(400)^2}{1771,46 \text{ j}} \right)^* \Rightarrow Z = 15,05 \text{ j}$$

$$15,05 \text{ j} = \omega L$$

$$L = \frac{15,05}{2\pi 60} \Rightarrow L = 40,18 \text{ mH}$$



$$\hat{S} = V \cdot I^* \quad I_{LA1m} = \left(\frac{S}{V} \right)^*$$

$$I_{LA1m} = \frac{1333,3 + 438,12 \text{ j}}{\frac{400 \angle -60}{\sqrt{3}}}$$

$$I_{LA1m} = 8,59 \angle -78 \text{ Arms}$$

$$V_{Fin \text{ nuevo}} = (8,59 \angle -78)(2 + j) + \frac{400}{\sqrt{3}} \angle -60^\circ$$

$$V_{Fin \text{ nuevo}} = 182,32 \angle -59,10^\circ \text{ Vrms}$$

$$V_{LAB \text{ nuevo}} = (18,32 \angle -59,10) \times (\sqrt{3} \angle 30^\circ) \Rightarrow V_{LAB \text{ nuevo}} = 315,78 \angle -29,10^\circ$$

Nueva Lectura del vatímetro después de la corrección

$$W_2 = V_{LAC} \cdot I_{LAI} \cos(\phi_{V_{LAC}} - \phi_{I_{LAI}})$$

$$W_2 = (315,78) \cdot (8,59) \cos(90,9 + 78)$$

$$W_2 = 2661,80 \text{ W}$$

$$W_1 = (315,78) \cdot (8,59) \cos(\phi_{V_{LBC}} - \phi_{I_{LB2}})$$

$$W_1 = (315,78) \cdot (8,59) \cos(-149,1 + 198)$$

$$W_1 = 1783,16 \text{ W}$$

$$P_{gen} = W_1 + W_2 = 4444,96 \text{ W}$$