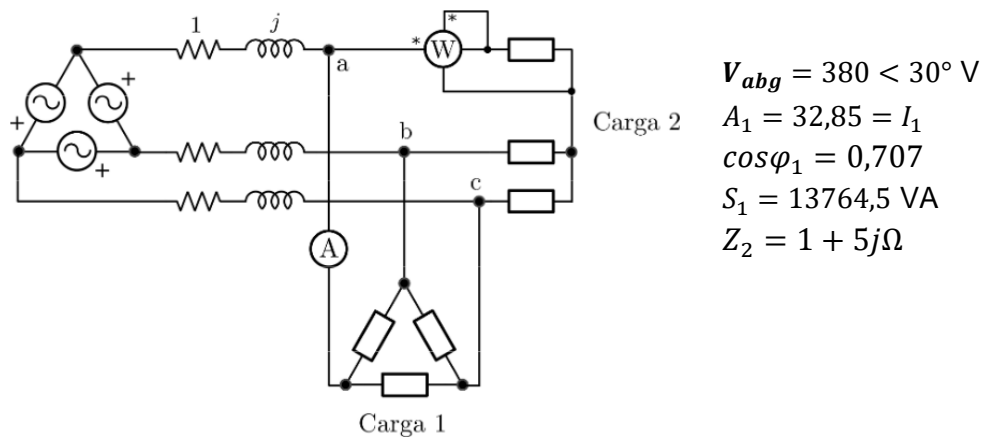


Examen 16 diciembre 2021 – Trifásica – M21.



$$V_{abg} = 380 \angle 30^\circ \text{ V}$$

$$A_1 = 32,85 = I_1$$

$$\cos\varphi_1 = 0,707$$

$$S_1 = 13764,5 \text{ VA}$$

$$Z_2 = 1 + 5j\Omega$$

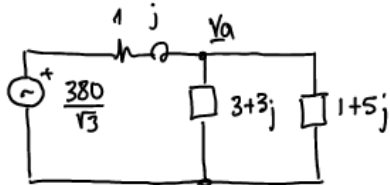
1.  $S_1 = 13764,5 < 45 \text{ VA}$  porque  $\varphi_1 = \arccos 0,707$

$$S_1 = 9733 + 9733j \text{ VA.}$$

$$S_1 = 3 \cdot I_1^2 \cdot Z_1 \rightarrow Z_1 = \frac{13764,5 \angle 45^\circ}{3 \cdot 32,85^2} = 4,25 \angle 45^\circ = 3 + 3j$$

Luego  $Z_{1\Delta} = 9 + 9j\Omega$

2.



$$(3 + 3j) // (1 + 5j) = 2,42 \angle 60,26^\circ$$

$$\text{Luego } I = \frac{380/\sqrt{3}}{2,42 \angle 60,26^\circ + 1 + j} = 57,7 \angle -54,64^\circ$$

$$V_a = I \cdot Z_{12} = 57,7 \angle -54,64^\circ \cdot 2,42 \angle 60,26^\circ = 139,67 \angle 5,6^\circ \text{ V}$$

Entonces  $V_{F1} = V_{ab} = 241,9 \angle 35,65^\circ \text{ V}$

3. Habiendo calculado el paralelo entre las dos impedancias por fase de las cargas, se puede saber que  $\cos\varphi_{12} = \cos 60,26 = 0,496$  inductivo.

4. Para calcular la capacidad es necesario conocer la potencia activa consumida por las dos cargas,  $P_{12}$ .

$$S_{12} = 3 \cdot V_a I^* = 3 \cdot 139,67 \angle 5,6^\circ \cdot 57,7 \angle -54,64^\circ = 24176,9 \angle -49^\circ = 12000 + 21000j \text{ VA}$$

$$\text{Entonces } C_y = \frac{1200 \text{ tg} 60,26^\circ - \text{tg} 36,9^\circ}{3 \cdot 139,67^2 \cdot 100\pi} = 652,4 \mu\text{F} \rightarrow Z_y = -4,88j\Omega$$

$$\cos\varphi'_{12} = 0,8 ; \varphi'_{12} = 36,9$$

$$5. P_{12} = P'_{12} = 3 \cdot V_a I' \cdot \cos\varphi'_1 ; 12000 = 3 \cdot 139,67 \cdot I' \cdot 0,8 ; I'_1 = 35,8 \text{ A}$$

$$\varphi' = \varphi_v - \varphi'_i ; 36,9 = 5,6 - \varphi'_i ; \varphi'_i = -31,3^\circ \text{ luego:}$$

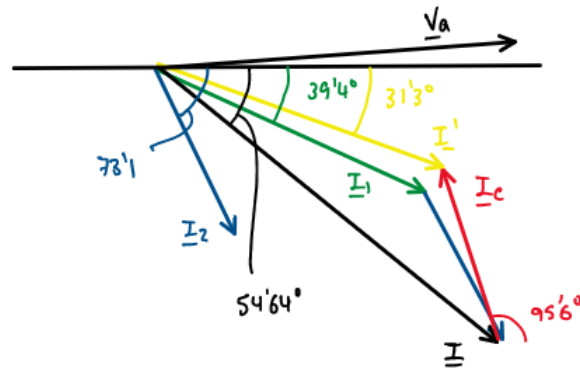
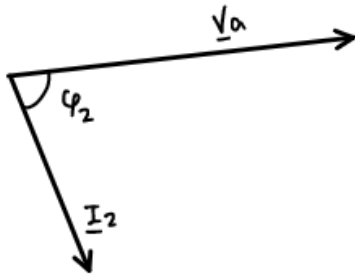
$$I' = 35,8 \angle -31,3^\circ \text{ frente a } 57,7 \angle -54,64^\circ$$

$$I_c = \frac{139,67 \angle 5,6}{-4,88j} = 28,6 \angle 95,6^\circ \text{ A}$$

$$I_1 = \frac{139,67 \angle 5,6}{3+3j} = 32,9 \angle -39,4^\circ \text{ A}$$

$$I_2 = \frac{139,67 \angle 5,6}{1+5j} = 27,4 \angle -73,1^\circ \text{ A}$$

6.



$$W = V_L I_L \cdot \cos\varphi = \frac{P_2}{3} = 750,8 \text{ W}$$

$$P_2 = 3 \cdot 27,4^2 \cdot 1 = 2252,3 \text{ W}$$

