

$$X_1 = 0,04 \times \frac{440^2}{2,5 \times 10^6} = 3,1 \times 10^{-3} \Omega$$

$$X_2 = 0,03 \times \frac{440^2}{2 \times 10^6} = 2,904 \times 10^{-3} \Omega$$

$$X_1 + X_2 = 6 \times 10^{-3} \Omega$$

$$X_L = 3 \times 10^{-5} \times 100 = 3 \times 10^{-3} \Omega$$

$$X_3 = 0,124 \times \frac{440^2}{4 \times 10^6} = 6 \times 10^{-3} \Omega$$

$$X_4 = 0,03 \times \frac{440^2}{3 \times 10^6} = 1,936 \times 10^{-3} \Omega$$

$$V_f = \frac{30 \times 10^3}{\sqrt{3}} \times \frac{440}{6300} = \frac{419}{\sqrt{3}} V$$

2) Y₁ Jo e D₁ Jo.

3) T₁) $I_{N1}^{63} = \frac{2,5 \times 10^6}{\sqrt{3} \times 6300} = 294,41 A \Rightarrow I_{N1}^{440} = 3289,5 A$

T₂) $I_{N2}^{440} = \frac{2 \times 10^6}{\sqrt{3} \times 440} = 2627,4 A$

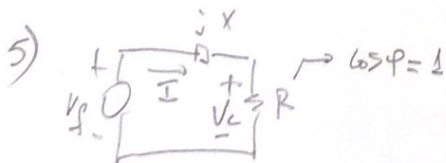
T₃) $I_{N3}^{440} = \frac{4 \times 10^6}{\sqrt{3} \times 440} = 5254,9 A$

T₄) $I_{N4}^{440} = \frac{3 \times 10^6}{\sqrt{3} \times 440} = 3941,1 A$

gi: $I = I_{N4}^{440} \Rightarrow T_4$ esta al limite y $I_1 = I_2 = \frac{I_{N4}^{440}}{2} = 1970,4 A < \begin{cases} I_{N1}^{440} \\ I_{N2}^{440} \\ I_{N3}^{440} \end{cases}$

\Rightarrow limite $I = I_{N4}^{440} \Rightarrow \underline{I^{220} = 7882,2 A}$

- 4) T₄) 100% T₃) 385%
 T₂) 75% T₁) 60%



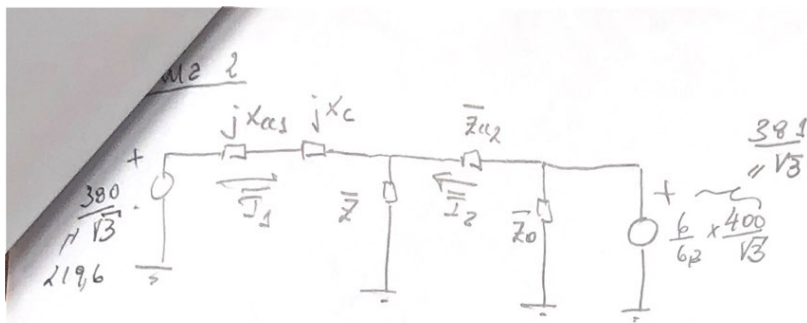
$$X = 3 \times 10^{-3} + 3 \times 10^{-3} + 1,936 \times 10^{-3} = 8 \times 10^{-3} \Omega$$

$$V_f = jX I + \bar{V}_c$$

$$V_c = \sqrt{V_f^2 - (X I)^2} \quad I = 1970,4 A$$

$$V_c = 249,1 V \Rightarrow U = 415,4 V @ 440 V$$

$$\underline{U^{220} = 207,7 V}$$



$$X_{c1} = 0,04 \times \frac{380^2}{700 \times 10^3} = 8,25 \times 10^{-3}$$

$$X_c = 0,5 \times 0,03 = 15 \mu\Omega$$

$$\bar{Z}_{a2} = \frac{220 / \sqrt{3}}{65} \angle \arccos \frac{20 \times 10^3}{\sqrt{3} \times 220 \times 65}$$

$$\bar{Z}_{a2}^{63} = 1,96 \Omega \angle 36,1^\circ = (1,58 + j1,15) \Omega$$

$$\Rightarrow \bar{Z}_{a2} = \left(\frac{400}{6300} \right)^2 \bar{Z}_{a2}^{63} = 7,9 \mu\Omega \angle 36,1^\circ$$

$$(6,4 + j4,65) \mu\Omega$$

$$\bar{Z}_0 = jX_0 = \frac{400^2}{692} = 231,2 \Omega$$

2) $\bar{Z} = \frac{220 / \sqrt{3}}{I_z} \angle \arccos 0,7$
 $X_{c1} + X_c = 23,25 \mu\Omega$

$$I_z^* = \frac{127 \times 10^3}{\sqrt{3} \times 220} = 333,7 A$$

$$\bar{Z} = 0,38 \angle 45,6^\circ \Omega$$

$$0,266 + j0,271$$

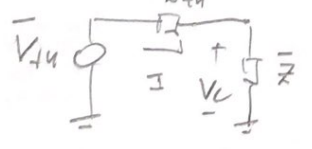
$$V_{tu} = \frac{381}{\sqrt{3}} - \bar{Z}_{a2} \bar{I}_{circ}$$

$$\bar{I}_{circ} = \frac{1 / \sqrt{3}}{\bar{Z}_{a2} + jX_{c1} + X_c} = \frac{1 / \sqrt{3}}{(j27,9 + 6,4) \mu\Omega} = \frac{1 / \sqrt{3}}{28,6 \times 10^{-3} \angle 77,1^\circ} = 0,578 \angle -77,1^\circ = 20,2 A$$

$$\bar{Z}_{a2} \bar{I}_{circ} = 0,165 \angle -41^\circ = 0,12 - j0,11 \Rightarrow V_{tu} \approx \frac{381}{\sqrt{3}}$$

$$\bar{Z}_{tu} = \bar{Z}_{a2} \parallel j(X_{c1} + X_c) = \frac{7,9 \times 23,25 \times 10^{-6} \angle 126,1^\circ}{(6,4 + j27,9) \times 10^{-3}} = \frac{183,7 \times 10^{-3} \angle 126,1^\circ}{28,6 \times 10^{-3} \angle 77,1^\circ} = 6,42 \angle 49^\circ \times 10^{-3}$$

$$\bar{Z}_{tu} = 6,42 \times 10^{-3} \angle 49^\circ = (4,2 + j4,8) \times 10^{-3}$$



$$\bar{I} = \frac{V_{tu}}{\bar{Z}_{tu} + \bar{Z}} = \frac{220,2}{0,1268 + j0,276} = \frac{220,2}{0,385 \angle 45,8^\circ} = 571,9 \angle -45,8 A$$

$$\frac{571,9 \angle -45,8^\circ \times 381 / \sqrt{3}}{\approx \text{fase cero}} V_c = 217,3 \Rightarrow U_c = 376 V$$

$$I_1 = \frac{219,6 - 217,3}{j23,25 \times 10^{-3}} = 99 A \angle -90^\circ$$

$$I_2 = \frac{220,2 - 217,3}{7,9 \times 10^{-3} \angle 36,1} = 370,1 \angle -36,1$$

3) $\frac{I_1}{I_N} = 0,093 \Rightarrow 9,3\%$ $\frac{I_2}{I_N} = 0,34 \Rightarrow 34\%$ (sin aproximaciones resultado: 12% y 44%)

4) $S_{a2} = \sqrt{3} \times 381 \times 370,1 \angle 36,1 = 243944 \angle 36,1 \Rightarrow P = 197,1 kW$

$$Q_{otc} = \frac{381^2}{231,2} = 628 VAR$$

$$Q = 144,3 KVAR$$