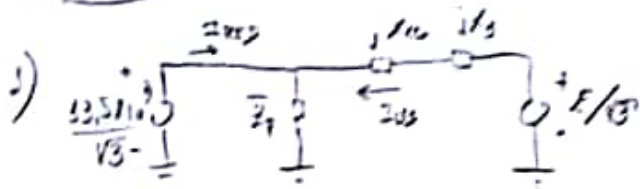


Problema 2.



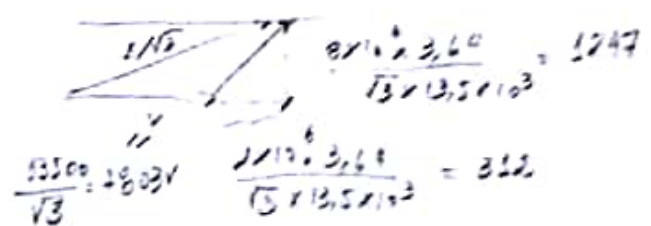
$$x_c = 0,1 \cdot \frac{13,5^2}{10} = 1,82 \Omega$$

$$x_{cc} = 0,2 \cdot \frac{13,5^2}{10} = 3,64 \Omega$$

$$E = 10000 \text{ V}$$

$$x_1 + x_{cc} = 3,64 \Omega$$

1) $P_{110} = 0 \text{ MW}$ $Q_{110} = 2 \text{ MVAR}$



$$E = \sqrt{3} \sqrt{(7800 - 312)^2 + 12927^2} = 14204 \text{ V}$$

$$\Rightarrow i = 14,2 \text{ A}$$

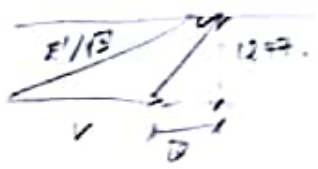
2) $P_{red} = 4 \text{ MW}$ $Q_{red} = 0 \Rightarrow I_{red} = \frac{4 \times 10^6}{\sqrt{3} \cdot 13500} = 171,3 \text{ A}$

$$I_{110} = \frac{\sqrt{8^2 + 2^2} \times 10^6}{\sqrt{3} \cdot 13500} = 353 \text{ A}$$

$$I_{110} = \frac{10 \times 10^6}{\sqrt{3} \cdot 13500} = 428,2 \text{ A} \Rightarrow 22,5\%$$

$$I_{UT} = \frac{12 \times 10^6}{\sqrt{3} \cdot 13500} = 513,8 \text{ A} \Rightarrow 68,7\%$$

4) $E' = 0,95 \cdot 14204 = 13494 \text{ V} \Rightarrow \frac{E'}{\sqrt{3}} = 7800 \text{ V}$



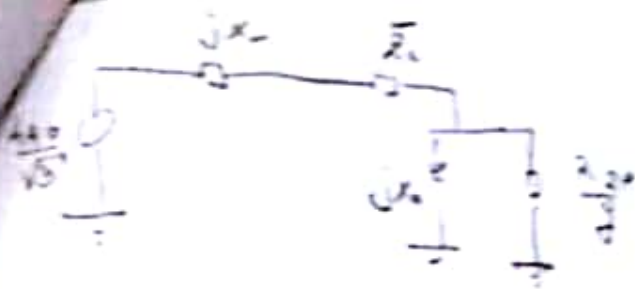
$$V + \delta = \sqrt{7800^2 - 1249^2} = 7999 \text{ V}$$

$$\Rightarrow \delta = 96 = \frac{Q \cdot 3,64}{\sqrt{3} \cdot 13500}$$

$$\Rightarrow Q_0 = 616 \text{ MVAR} \Rightarrow Q_{red} = 2,38 \text{ MVAR}$$

$$\Rightarrow \tan \varphi = \frac{1,38}{4} = 19,1^\circ \Rightarrow \cos \varphi = 0,94 \text{ inductivo}$$

$$P_{red} = 4 \text{ MW}$$



$$X_1 = 0,06 \cdot \frac{440^2}{300 \cdot 10^3} = 0,0232 \Omega$$

$$\bar{Z}_2 = (3,02 - j 0,001) \Omega$$

$$I_0 = \frac{440/\sqrt{3}}{500} = 0,54 \text{ A}$$

$$\frac{P}{S} = 0,02 \Rightarrow R_{21} = 0,0075 \Omega$$

$$500 \cdot 10^3 = \frac{1}{2} \sqrt{1-\eta} \frac{440^2}{R_{21}}$$

opcion (2) pots:
$$\begin{cases} I_{U_0} = I_{U_2} \\ U_{U_0} = U_{U_2} \\ U_{Z_1} = U_{Z_2} \end{cases}$$

A = 1475 rpm $\Rightarrow \eta = 0,012 \Rightarrow \frac{R_{21}}{\frac{S}{P}} = 0,44 \Omega$

$$0,44 \cdot 0,54 = \frac{112 \cdot 10^3}{1,35 \cdot 10^3}$$

$$0,44 / 0,54 = 0,43 \text{ A} = (0,42 + j 0,075) \text{ A}$$

$$\bar{I} = \frac{440/\sqrt{3}}{0,44 - j 0,075} = \frac{254,3}{0,45 \angle 9,8^\circ} = 565,1 \text{ A}$$

$$V_H = 0,43 \times 565,1 = 243 \text{ V} \Rightarrow U_H = 420 \text{ V}$$

$$X_{T2} = 0,06 \times \frac{440^2}{300 \times 10^3} = 0,0382 \Omega$$

$$X_1 / X_{T2} = \frac{0,0232}{0,0382} = 0,607 \Omega$$

$$\bar{I} = \frac{254,3}{0,44 + j 0,0905}$$

$$\Rightarrow \bar{I} = 566 \text{ A} \Rightarrow U_H = 426 \text{ V}$$

$$I_{T2} = \frac{0,0382}{0,0232 + 0,0382} \times 566 = 352,8 \text{ A}$$

$$I_{T2} = \frac{0,0232}{0,0232 + 0,0382} \times 566 = 214,5 \text{ A}$$

$$I_{U2} = \frac{500 \times 10^3}{13 \times 440} = 656,9 \text{ A}$$

$$I_{U2} = \frac{300 \times 10^3}{\sqrt{3} \times 440} = 398,6 \text{ A}$$

$$T_1) 53,8\%$$

$$T_2) 53,8\%$$