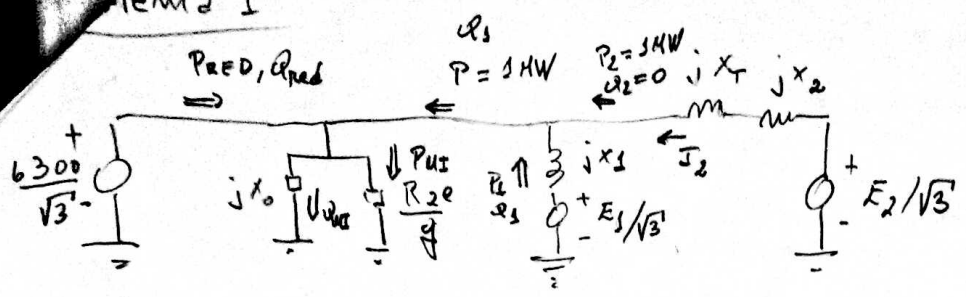
Problema 1



$x_T = 0,066 \times \frac{6,3^2}{1,5} = 1,746\,\Omega$

$x_1 = 0,1 \times \frac{6,3^2}{1,5} = 2,646\,\Omega$

$x_2 = 0,15 \frac{6,3^2}{2} = 2,977\,\Omega$.

$X = x_T + x_1 = 4,723\,\Omega$

MI: $X_0 = \frac{6300/\sqrt{3}}{45} = 81\,\Omega$.

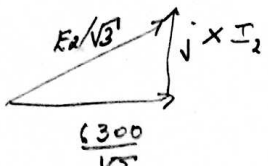
$g_N = \frac{1500-1455}{1500} = 0,03$

$1,6 \times 10^3 = g_N(1-g_N)\frac{6300^2}{R_{2e}} \Rightarrow R_{2e} = 972\,\Omega$

2) MS2: $I_2 = \frac{1 \times 10^6}{\sqrt{3} \times 6300} = 91,75\,A$

$P_2 = 1MW$

$Q_2 = 0$



$E_2 = \sqrt{3}\sqrt{(6300/\sqrt{3})^2 + (XI_2)^2} = 6344,4$

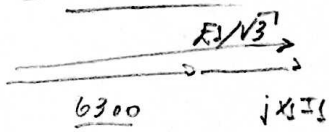
$i_2 = \frac{6344,4}{945} \times \frac{2}{6,3} = 2,13\,A$ #

MI: $Q_{MI} = \frac{6300^2}{81} = 490\,KVAR$ $\quad g = \frac{1500-1470}{1500} = 0,02$

$P_{MI} = \frac{6300^2}{0,72} \times 0,02 = 1,103\,MW \Rightarrow P_{Red} = 103\,kW$

$\cos\varphi = 0,95 \Rightarrow \varphi = 18,2° \Rightarrow Q_{Red} = 103\,tg\,18,2 = 33,9\,KVAR$

MS1: $P_1 = 0$ $\quad Q_1 = 490 - 33,9 = 456,1\,KVAR$



$I_1 = \frac{456,1 \times 10^3}{\sqrt{3} \times 6300} = 41,8\,A$ $\quad E_1 = \sqrt{3} \times \left(\frac{6300}{\sqrt{3}} + 2,646 \times 41,8\right) = 6491,1\,V$

$\Rightarrow i_1 = 3,25\,A$ #

3) $S_{Red} = \sqrt{103^2 + 33,9^2} = 108,4\,KVA = \sqrt{3}\,6300\,I_{Red} \Rightarrow I_{Red} = 9,95\,A$ #

4) MI solo consume reactiva $Q_{MI} = 490\,KVAR = Q_1 = \sqrt{3}\,6300\,I_1 \Rightarrow I_1 = 45\,A$

$E_1 = 6300 + \sqrt{3} \times 2,65 \times 45 = 6506\,V \Rightarrow i_1 = \frac{6506}{2000}$ #.

Problema 2 $\quad \bar{Z}_a = \frac{25/\sqrt{3}}{50} \angle \text{Arcos}\left(\frac{1600}{\sqrt{3} \times 25 \times 50}\right) = 0,29 \angle 42,3 = (0,21 + j\,0,19)\,\Omega$ $\quad R_L = \frac{0,48}{3} = 0,16\,\Omega$

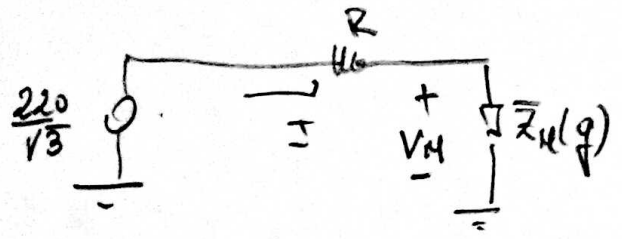
1) $\Rightarrow R_{2e} = 0,05\,\Omega$ $\quad X_1 + X_{2a} = 0,19\,\Omega$

$\bar{I}_0 = 20 \angle -90°$ $\quad 30 \times 10^3 = \frac{U_{d1}^2}{R_{2e}}(1-g_N)g_N$ (HPD) $\Rightarrow g_N = 0,932 \Rightarrow I_{2eN} = \frac{220/\sqrt{3}}{905} \times 0,932 = 81,3A$

$|\bar{I}_N| = \sqrt{81,3^2 + 20^2} = 83,7\,A$ $\quad \varphi = -\text{Arc tg}\left(\frac{20}{81,3}\right) = -13,8° \Rightarrow \bar{I}_N = 83,7 \angle -13,8°$

$I_N = 83,7\,A$ $\quad \cos\varphi_N = 0,97$ #

a)



$R = \frac{100}{57 \times 35} = 0,05\ \Omega$ $\quad g = \frac{1500-1455}{1500} = 0,03$

$\bar{Z}_M = j X_0 \,/\!/\, \frac{R_{20}}{g} = 1,6 \angle 14,8 = (1,54 + j\,0,4)\ \Omega$

MPD

$\bar{I} = \frac{220/\sqrt{3}}{0,05 + 1,54 + j\,0,4} = \frac{127}{1,64 \angle 8} = 77,4 \angle -8$

$V_M = Z_M I = 1,6 \times 77,4 = 123,84\,V$

$U_M = 214\,V$

3) Arranque $g = 1$

$I_{ARR} = \frac{220/\sqrt{3} \times 0,85}{0,05 + 0,21 + j\,0,19} = \frac{0,85 \times 127}{0,32 \angle \varphi_{ARR}} = 337,45\,A$

$Z_M(g=1) \simeq Z_a = 0,29\ \Omega$

$\rightarrow V_M = 0,29 \times 337,45 = 98\,V \Rightarrow U_M = 169,3\,V \neq$ 77%