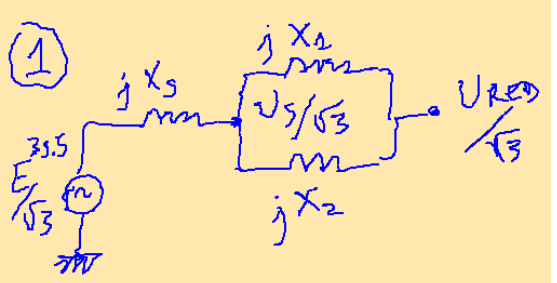
(1)



$E^{31.5} = 225 \angle \frac{31.5}{11.5} = \boxed{616.3\,j}$

$X_1 = .085 \times \frac{31.5^2}{7} = \boxed{12.03\,\Omega}$

$X_2 = .087 \times \frac{31.5^2}{7} = \boxed{9.923\,\Omega}$

$X_S = 1 \times \frac{31.5^2}{13} = \boxed{76.33\,\Omega}$

(2) Entre T_1 y T_2 limita T_2

$I_{n_{T_1}} = I_{n_{T_2}} = \frac{7000}{\sqrt{3} \times 32.5} = 128.3\,A$

$I_{max\,trafos} = 128.3 \left(1 + \frac{7}{8.5}\right) = 234.0\,A$

$I_{n\,MS} = \frac{13000}{\sqrt{3} \times 31.5} = 238.3\,A$

$> I_{max\,trafos}$

$\Rightarrow$ límite en corriente es $\boxed{234\,A}$ limita T_2

Máxima potencia activa entregable $= 11\,MW - 50\,kW =$

$= \boxed{10.95\,MW} = P_{máx}$

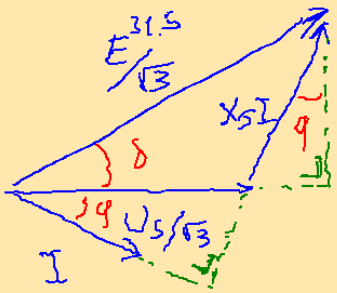
$S_{máx} = \sqrt{3} \times 234 \times 31.5 =$

$= \boxed{12.77\,MVA} < S_{n\,MI.}$

$\Rightarrow \cos\varphi = \frac{P_{máx}}{S_{máx}} = \boxed{0.8582}$

MS Sobreexitada:

Hallar E para $I = 234\,A$



$\frac{E^{31.5}}{\sqrt{3}} = \left[(I X_S \cos\varphi)^2 + \left(\frac{U_S}{\sqrt{3}} + I X_S \sin\varphi \right)^2 \right]^{1/2}$

$= \frac{54.31}{\sqrt{3}}\,kV$

$\Rightarrow i = \frac{54310}{616.3} = 88.13\,A$

$88.13\,A > 80\,A \Rightarrow$ limita la excitación de MS $\Rightarrow E^{31.5} = 616.3 \times 80 =$

$= \boxed{49.30\,kV}$

$\frac{E^{31.5}}{\sqrt{3}} \sin\delta = X_S I \cos\varphi$

$P = \sqrt{3}\, U_S I \cos\varphi$

$\Rightarrow \delta = \arcsen\left(\frac{X_S P}{E^{31.5} U_S} \right) =$

$= \boxed{32.56^\circ}$

$\bar{I} = \frac{\bar{E}/\sqrt{3} - \bar{U}_S/\sqrt{3}}{j X_S} =$

$= \left\{ (\cos\delta + j \sin\delta) \times 49300 - 31500 \right\} \times \frac{1}{\sqrt{3} \times 76.33\,j} =$

$= (200.7 - j\,76.03)\,A$

$S_{MS} = \sqrt{3}\, U_S I^* =$

$10.95\,MW + j\,4.148\,MVAr$

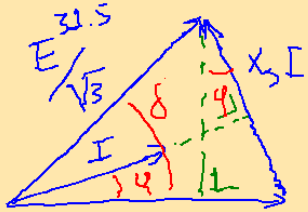
$\boxed{P_{RED} = 10.95\,MW}$

$Q_{RED} = Q_{MS} - 3I^2 (X_1 // X_2) =$

$= \boxed{3.396\,MVAr}$

$\Rightarrow \boxed{S_{RED} = 11.46\,MVA}$

MS Subexitada



Seguramente $i < 80\,A$

$\Rightarrow I = 234\,A$

$\frac{E^{31.5}}{\sqrt{3}} = \left[(X_S I \cos\varphi)^2 + \left(\frac{U_S}{\sqrt{3}} - X_S I \sin\varphi \right)^2 \right]^{1/2} =$

$= \frac{30.80\,kV}{\sqrt{3}}$

$\cos\varphi = \frac{10.95}{12.77}$

$\Rightarrow i = 49.98\,A < 80\,A$, suposición correcta

$\Rightarrow Q_{MS} =$

$= -\sqrt{12.77^2 - 10.95^2} =$

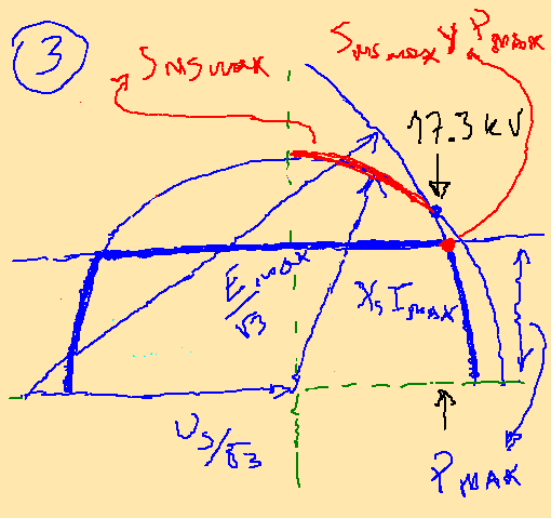
$= -6.57\,MVAr$

$Q_{RED} = Q_{MS} - 3I^2 (X_1 // X_2) =$

$= -7.464\ MVAr$

$P_{RED} = 10.95\ MW$

$S_{RED} = 13.25\ MVA$



$\frac{E^{31.5}_{MAX}}{\sqrt{3}} = \frac{49.30}{\sqrt{3}} = 28.46 kV$

$X_S I_{MAX} = 76.33 \times 234 =$

$= 17.86 kV$

$\frac{U_S}{\sqrt{3}} = 18.18 kV$

$\frac{E^{31.5}}{\sqrt{3}} \operatorname{sen}\delta = \frac{X_S P}{U_S \sqrt{3}} =$

$= \frac{76.33 \times 10950}{31.5\sqrt{3}} =$

$= 15.32 kV \ (P_{MAX})$