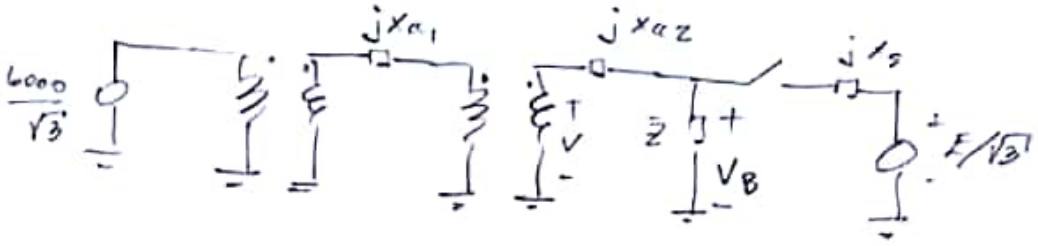
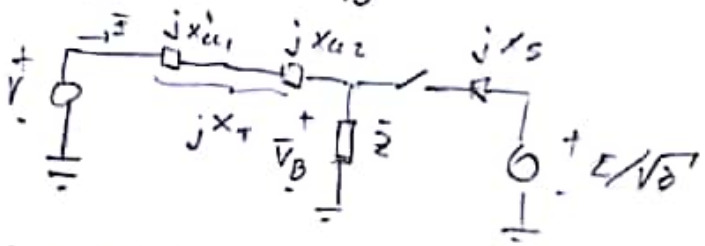
1)



$$V = \frac{6000}{\sqrt{3}} \cdot \frac{400}{6300} \times \frac{230}{400} = \frac{219}{\sqrt{3}} = 126{,}6\ V$$



$$X'_{cc1} + X_{cc2} = X_T = 12{,}9\ m\Omega$$

$$X'_{cc1} = 905 \times \frac{230^2}{400 \times 10^3}$$

$$X'_{cc1} = 6{,}6\ m\Omega$$

$$X_{cc2} = 906 \cdot \frac{230^2}{500 \times 10^3}$$

$$X_{cc2} = 6{,}3\ m\Omega$$

$$\bar{Z} = \frac{230/\sqrt{3}}{I_c} \angle \arccos 0{,}92 = 0{,}16 \angle 23{,}1^\circ = 915 + j\,0{,}062$$

$$I_c = \frac{300 \times 10^3}{\sqrt{3} \times 230 \times 0{,}92} = 819{,}5\ A$$

@ 400V

$$I_{N1} = \frac{400 \times 10^3}{\sqrt{3}\ 400} = 578\ A \Leftarrow I_{N1}^{270} = 1005\ A$$

$$I_{N2} = \frac{500 \times 10^3}{\sqrt{3} \times 230} = 1256{,}6\ A$$

2)

$$\bar{I} = \frac{126{,}6}{j12{,}9 \times 10^{-3} + 916 \angle 23{,}1} = \frac{126{,}6}{0{,}157 + j\,0{,}076} = \frac{126{,}6}{0{,}17 \angle 9} = \underline{744{,}1 \angle -26{,}9^\circ}$$

$$V_B = 916 \times 744{,}1 = 119{,}1\ V \qquad \bar{V}_B = 119{,}1 \angle -3{,}8 \qquad \underline{U_B = 206\ V}$$

T3) 74% T2) 59%

3) $I = 0 = \frac{V - \bar{V}_B}{jX_T} \Rightarrow V = V_B$ ⇒ HS aporta todo la activa y reactiva que consume la carga

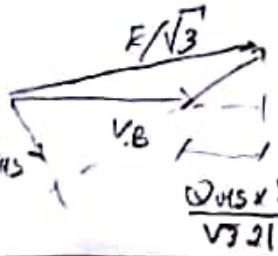
$$\bar{S}_2 = \sqrt{3}\ 219 \times \bar{I}_2^*$$

$$\bar{I}_2 = \frac{219 \angle -23{,}1}{0{,}16\sqrt{3}} = 791{,}2\ A \angle -23{,}1$$

$$P_2 = \sqrt{3}\ 219 \times 791{,}2 \angle 23{,}1 = 299{,}8 \times 10^3 (0{,}92 + j\,0{,}39) = 275{,}8\ KW + j\,117\ KVAR$$

$$\underline{P_{HS} = 275{,}8\ KW} \qquad \underline{Q_{HS} = 117\ KVAR}$$

4) $\frac{E}{\sqrt{3}} = jX_S \bar{I} + V_B \qquad X_S = 91 \times \frac{230^2}{500 \times 10^3} = 0{,}011\ \Omega$



$$\frac{P_{HS} \cdot X_S}{\sqrt{3} \times 219} = 8$$

$$\frac{Q_{HS} \times X_S}{\sqrt{3}\ 219} = 3{,}4$$

$$E = \sqrt{3} \times \sqrt{(126{,}6 + 3{,}4)^2 + 64} = \sqrt{3} \times 130 =$$

$$\underline{E = 225{,}3\ V} \qquad \underline{i = 2{,}25\ A}$$

14/12/2018

Problème 2

1) → HPD.

$20 \times 745 = \frac{400^2}{R_{2c}} g(1-g) \approx \frac{400^2}{0,36} g_N \Rightarrow g_N = 0,034 \rightarrow N_N = 1449 \text{ rpm}$

$I_{2N} = \frac{400/\sqrt{3}}{0,36} \times 0,034 = 21,8 \text{ A} \rightarrow \bar{I}_{2N} = 21,8 \text{ A} \angle 0$

$\bar{I}_0 = 10 \angle -90 \Rightarrow \bar{I}_N = \sqrt{21,8^2 + 10^2} \angle -\text{Arctg}\left(\frac{10}{21,8}\right) = 24 \angle -24,6°$

2) $\cos \varphi_N = \cos 24,6 = 0,91$

$P_{N\,in} = \sqrt{3} \times 400 \times 24 \times 0,91 = 15,1 \text{ kW} \qquad \eta_N = \frac{14700}{15100} = 0,987$

3) $f = 60 \text{ Hz} \Rightarrow N_s = 1800 \text{ rpm} \qquad P = 3,9 \times 10^{-5} \times 0,0625 \, N^3 = 2,44 \times 10^{-6} N^3$

$P_m = \frac{400^2}{0,36} g(1-g) = 2,44 \times 10^{-6} \times 1800^3 (1-g)^3 \Rightarrow g = 0,032(1-g)^2 \Rightarrow g = 0,03$

$N = 1800 \times 0,97 = 1746 \text{ rpm} \qquad Q = 109 \text{ l/m} \qquad P = 13 \text{ kW}$

$I_{2c} = \frac{400/\sqrt{3}}{0,36} \times 0,03 = 19,3 \text{ A} \qquad I_0 = \frac{400/\sqrt{3}}{\frac{6}{5} x_0} \angle -90 = \frac{5}{6} \cdot 10 \angle -10 = 8,33 \angle -$

$I = \sqrt{19,3^2 + 8,33^2} = 21 \text{ A}$

4) $Q = 100 \text{ l/min} \Rightarrow N = 1600 \text{ rpm} \rightarrow P = 7984 \text{ W} = \frac{400^2}{R_{2c}} \frac{U}{g}(1-g)$

$\Rightarrow g = 0,023 \Rightarrow 1600 = N_s(1 - 0,023) \Rightarrow N_s = 1638 \text{ rpm} = \frac{f \times 60}{2}$

$\boxed{f = 54,6 \text{ rpm}}$