Weritson F. de O. Alves - 96708 - ELT 492

4.9 Carga: Desequilibrada, (Y), sem neutro, $Z_A = 10$, $Z_B = 15\angle 30^\circ$, $Z_C = 10\angle -30^\circ$

Fonte: $V_L = 208$ V

$I_L = ?$, $V_{F} = ?$, $P_F = ?$, $Q_F = ?$

Fonte:

$\dot{V}_{AN} = 120.1\angle 0^\circ$, $\dot{V}_{AB} = 208\angle 30^\circ$ V

$\dot{V}_{BN} = 120.1\angle -120^\circ$, $\dot{V}_{BC} = 208\angle -90^\circ$ V

$\dot{V}_{CN} = 120.1\angle 120^\circ$, $\dot{V}_{CA} = 208\angle 150^\circ$ V

Carga:

$Y_A = 0.1$, $Y_B = 0.07\angle -30^\circ$, $Y_C = 0.1\angle 30^\circ$ $\frac{1}{\Omega}$

$V_{NN'} = -\dfrac{Y_A V_{AN} + Y_B V_{BN} + Y_C V_{CN}}{Y_A + Y_B + Y_C + Y_N}$

$= 23.21\angle -24.5$ V

$\hat{I}_A = \dfrac{V_{AN} + V_{NN'}}{Z_A} = 14.14\angle -3.9^\circ$ A

$\hat{I}_B = 8.00\angle -138.9^\circ$ A

$\hat{I}_C = 10.2\angle 142.4^\circ$ A

$V_{AN'} = \dot{I}_A \dot{Z}_A = 141.45\angle -3.9^\circ$ V

$V_{BN'} = 120.01\angle -108.9^\circ$ V

$V_{CN'} = 102.00\angle 112.41^\circ$ V

$\dot{S}_0 = \dot{V}_{AN'} \times \hat{I}_A^* + \dot{V}_{BN'} \times \hat{I}_B^* + \dot{V}_{CN'} \hat{I}_C^* = 3733.6\angle -0.61^\circ$ VA

$P = 3733.6 \cos(-0.61) = 3733.4 \cong 3.73$ KW

$Q = 3733.6 \,\text{sen}(-0.61) = -39.75 \cong -0.04$ KVAr

4.10 Unidade trifásica: 1.5 KW, FP = 1

Motor: 5 HP, $\eta = 0.8$, FP = 0.85

Fonte: $V_L = 208$ V, 3 fios

$I_L = ?$, $FP_F = ?$

Unidade de aquecimento

$S_{UA} = \dfrac{P}{FP} = \dfrac{1.5k}{1} = 1.5$ KVA $= \dot{S}_{UA}$

Motor: 5 HP = 3.73 KW

$\eta = \dfrac{P_S}{P_E} \Rightarrow P_E = 4660.63$ W

$S = \dfrac{P_E}{FP} = 5483.09$ VA $\Rightarrow \dot{S} = 5483.09\angle 31.79^\circ$ VA

$\dot{S}_T = \dot{S}_m + \dot{S}_{UA} = 5483\angle 31.79^\circ + 1500\angle 0 =$

$= 6804.11\angle 25.12^\circ$ VA

$S_T = V_L I_L \sqrt{3} = |\dot{S}_T| \Rightarrow I_L = 18.89$ A

$FP_F = \cos(25.12^\circ) = 0.91$ indutivo

4.11 Transformador: 15 KVA, 13.8 KV/220 V

$I_P = ?$, $I_S = ?$

$S_P = S_S \Rightarrow$ (i) $S_P = V_P I_P \sqrt{3} \Rightarrow I_P = \dfrac{15k}{\sqrt{3} \cdot 13.8k} = 0.63$ A

(ii) $S_S = V_S I_S \sqrt{3} \Rightarrow I_S = \dfrac{15k}{220\sqrt{3}} = 39.36$ A

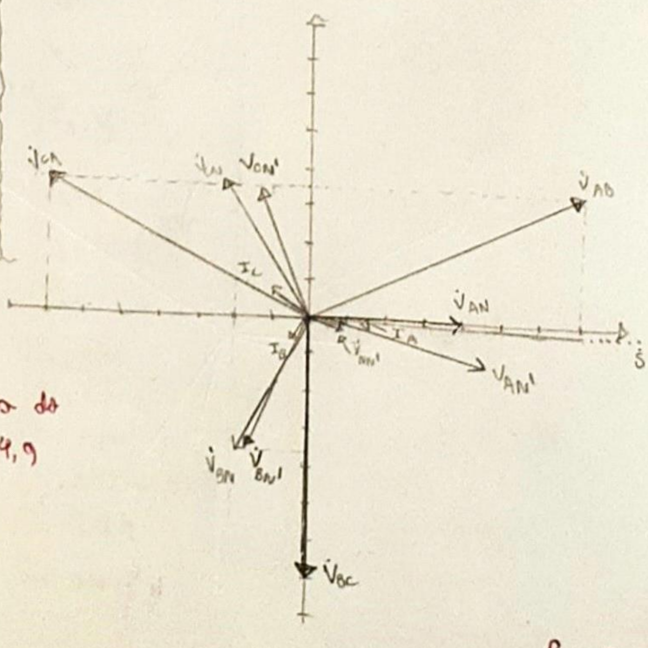

Diagrama do Exercício 4,9