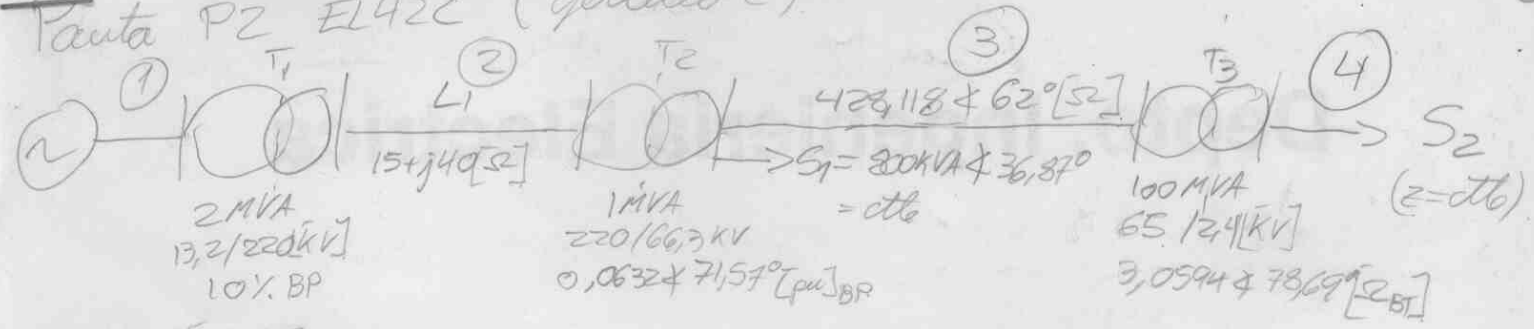


Tarea P2 EL42C (Ejercicio 2)



$S_B = 1 [MVA]$
 $V_{Base1} = 13.2 [kV]$ $V_{Base2} = 220 [kV]$ $V_{Base3} = 66.3 kV$ $V_{Base4} = \frac{66.3 \cdot 2.4}{65}$
 $V_{Base4} = 2.44 [kV]$

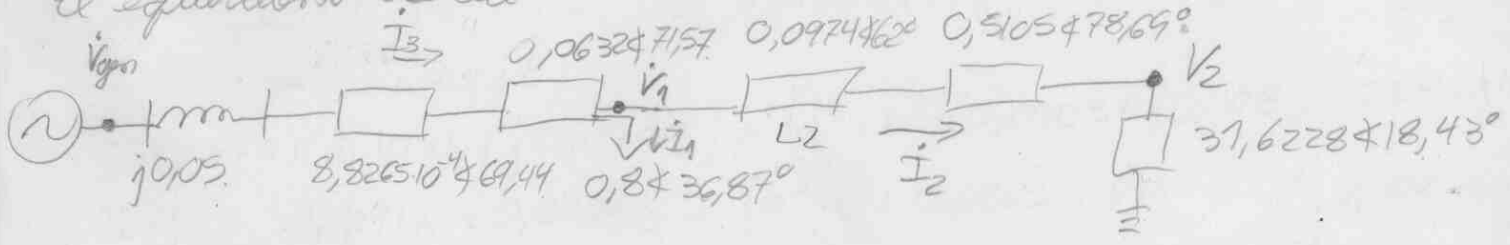
a)

Seteamos
 $Z_{B2} = \frac{220^2}{1} = 48.4 [k\Omega]$; $Z_{B3} = \frac{66.3^2}{1} = 4.3957 [k\Omega]$; $Z_{B4} = 5.9927 [\Omega]$

$\Rightarrow X_{T1} = \frac{0.1}{2} = 0.05 [pu]$
 $Z_{L1} = 8.8265 \cdot 10^{-4} \angle 69.44^\circ [pu] = 3.0998 \cdot 10^{-4} + j 8.2643 \cdot 10^{-4}$
 $Z_{T2} = 0.0632 \angle 71.57^\circ [pu] = 0.01998 + j 0.05996$
 $Z_{L2} = 0.0974 \angle 62^\circ [pu] = 0.0457 + j 0.086j$
 $S_1 = 0.8 \angle 36.87^\circ [pu] = 0.64 + j 0.48$
 $Z_{T3} = \frac{3.0594 \angle 78.69^\circ}{5.9927} = 0.5105 \angle 78.69^\circ = 0.1001 + j 0.5006$

Sabemos además $Z_{S2} = \left(\frac{|V|^2}{S_2} \right)^*$ en condiciones nominales,
 $|V| = 1 [pu]$ y $S_2 = 0.0316 \angle 18.43^\circ \Rightarrow 31.6228 \angle 18.43^\circ = Z_{S2} [pu]$
 $30.0009 + j 9.9974 = Z_{S2}$

El equivalente sería



(2)

$$) \text{ Si } V_2 = \frac{2532}{2448} = 1,0343 [\text{pu}], \text{ retiene } \dot{I}_2 = \frac{1,0343}{31,6228} \angle -18,43^\circ$$

$$\dot{I}_2 = 0,0327 \angle -18,43^\circ$$

$$\Rightarrow \dot{V}_1 = 1,0343 + 0,0327 \angle -18,43^\circ (0,0974 \angle 62^\circ + 0,5105 \angle 78,69^\circ)$$

$$0,6044 \angle 76,04^\circ$$

$$\dot{V}_1 = 1,045 \angle 0,92^\circ$$

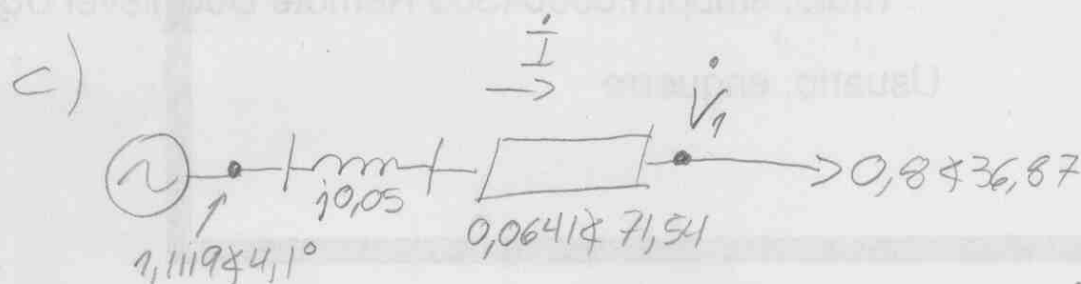
$$\text{con esto, } \dot{I}_1 = \left(\frac{0,8 \angle 36,87^\circ}{1,045 \angle 0,92^\circ} \right)^* = 0,7655 \angle -35,95^\circ$$

$$\dot{I}_3 = \dot{I}_1 + \dot{I}_2 = 0,7967 \angle -35,24^\circ$$

$$\Rightarrow \dot{V}_{gen} = 1,045 \angle 0,92^\circ + (0,0632 \angle 71,57^\circ + 8,8265 \cdot 10^{-4} \angle 69,44^\circ + j0,005) \dot{I}_3$$

$$\dot{V}_{gen} = 1,1119 \angle 4,1^\circ$$

$$\text{El voltaje en buses es } 14,6764 [\text{kV}] \angle 4,1^\circ$$



$$\text{LVRK } 1,1119 \angle 4,1^\circ = \dot{I} \cdot 0,1126 \angle 79,62^\circ + \dot{V}_1 \quad / \dot{I}^*$$

$$\dot{I}^* \cdot 1,1119 \angle 4,1^\circ = |\dot{I}|^2 0,1126 \angle 79,62^\circ + 0,8 \angle 36,87^\circ$$

$$\text{si } \dot{I} = a + jb$$

$$(a - jb)(1,1091 + j0,0795) = (a^2 + b^2)(0,0203 + j0,1108) + 0,64 + j0,48$$

$$\text{Re}\{\} \quad 1,1091a + 0,0795b = (a^2 + b^2) \cdot 0,0203 + 0,64 \quad / \cdot 0,1108$$

$$\text{Im}\{\} \quad -1,1091b + 0,0795a = 0,1108(a^2 + b^2) + 0,48 \quad / \cdot -0,0203$$

$$(1,1091 \cdot 0,1108 - 0,0795 \cdot 0,0203)a + (0,0795 \cdot 0,1108 + 0,0203 \cdot 1,1091)b$$

$$= 0,64 \cdot 0,1108 - 0,0203 \cdot 0,48$$

$$\Leftrightarrow 0,1213a + 0,0313b = 0,0612$$

$$a = 0,5045 - 0,258b$$

$$1,1091(0,5045 - 0,2586) + 0,0795b = 0,02036^2 + 0,0203(0,5045 - 0,2586)^2 + 0,64$$

$$\Rightarrow b = \begin{cases} -0,4467 \checkmark \\ -8,8536 \times \end{cases} \quad \left. \begin{array}{l} \\ \\ \end{array} \right\} \dot{I}_1 = 0,764 \angle -35,8^\circ$$

$$\Rightarrow a = 0,6197$$

$$y \quad \dot{V}_1 = 1,1119 \angle 4,1^\circ - 0,1126 \angle 79,62^\circ \cdot \dot{I}$$

$$\dot{V}_1 = 1,0472 \angle 1,09^\circ$$

$$\Rightarrow \text{El voltage pedido sera } V_1 = 69,429 [\text{KV}] \angle 1,09^\circ$$

Distribución de puntaje : 2 puntos cada parte.