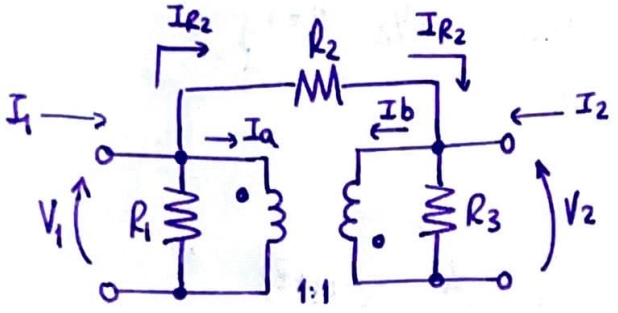

$$\begin{cases} I_1 = I_{R_1} + I_a + I_{R_2} \\ I_2 = I_{R_3} + I_b + I_{R_2} \end{cases} \qquad \begin{cases} I_{R_1} = \frac{V_1}{R_1} \\ I_{R_2} = \frac{V_1 - V_2}{R_2} \\ I_3 = \frac{V_2}{R_3} \end{cases}$$

$\{V_2 = -V_1 \quad I_a = +I_b\}$ por la configuración del transformador.

$$\begin{cases} I_1 = \frac{V_1}{R_1} + I_a + \frac{2V_1}{R_2} \\ I_2 = \frac{-V_1}{R_3} + I_a - \frac{2V_1}{R_2} \end{cases}$$

$$1 + \frac{4}{2} + \frac{1}{3} = \frac{6+12+2}{6} = \frac{20}{6} = \frac{10}{3}$$

$I_2 = 0 \rightarrow I_a = V_1\left(\frac{1}{R_3} + \frac{2}{R_2}\right) \rightarrow I_1 = V_1\left(\frac{1}{R_1} + \frac{2}{R_2} + \frac{1}{R_3} + \frac{2}{R_2}\right) = V_1\left(\frac{1}{R_1} + \frac{4}{R_2} + \frac{1}{R_3}\right)$

$$Z_{11} = \left.\frac{V_1}{I_1}\right|_{I_2=0} = \frac{3}{10} \qquad Z_{21} = \left.\frac{V_2}{I_1}\right|_{I_2=0} = \left.\frac{-V_1}{I_1}\right|_{I_2=0} = -\frac{3}{10}$$

$I_1 = 0 \rightarrow I_a = -V_1\left(\frac{1}{R_1} + \frac{2}{R_2}\right) \rightarrow I_2 = -V_1\left(\frac{1}{R_3} + \frac{2}{R_2} + \frac{1}{R_1} + \frac{2}{R_2}\right) = -V_1 \cdot \frac{10}{3} = V_2 \cdot \frac{10}{3}$

$$Z_{22} = \left.\frac{V_2}{I_2}\right|_{I_1=0} = \frac{3}{10} \qquad Z_{12} = \left.\frac{V_1}{I_2}\right|_{I_1=0} = \left.\frac{-V_2}{I_2}\right|_{I_1=0} = -\frac{3}{10}$$

$$Z = \frac{3}{10}\begin{pmatrix} 1 & -1 \\ -1 & 1 \end{pmatrix}$$