



$$Z_i = 1 [\Omega]$$

$$i = \{1, 2, 3, 4, 5\}$$

$$\begin{aligned} \underline{Z}_1 &= 1 \\ \underline{Z}_2 &= -j \\ \underline{Z}_3 &= 1 \\ \underline{Z}_4 &= 1 \\ \underline{Z}_5 &= j \end{aligned}$$

$$\begin{aligned} \underline{Z} &= \frac{1}{\underline{Y}} \\ \underline{Y} &= \frac{1}{\underline{Z}} \end{aligned}$$

$$\underline{Y}_{23} = \underline{Y}_2 + \underline{Y}_3$$

$$\underline{Y}_{23} = \frac{1}{(-j)} + \frac{1}{1} = j + 1$$

$$\underline{Z}_{23} = \frac{1}{\underline{Y}_{23}} = \frac{1}{j+1} = \frac{1}{j+1} \cdot \frac{1-j}{1-j} = \frac{1-j}{j+1-1-j} = \frac{1-j}{2} = \frac{1-j}{2} = \frac{1}{2} - \frac{j}{2}$$

$$\underline{Y}_{45} = \underline{Y}_4 + \underline{Y}_5 = \frac{1}{1} + \frac{1}{j} = 1 - j$$

$$\underline{Z}_{45} = \frac{1}{\underline{Y}_{45}} = \frac{1}{1-j} = \frac{1}{1-j} \cdot \frac{1+j}{1+j} = \frac{1+j}{1+j-j+1} = \frac{1+j}{2} = \frac{1}{2} + \frac{j}{2}$$

$$\begin{aligned} \underline{Z}_{AB} &= \underline{Z}_1 + \underline{Z}_{23} + \underline{Z}_{45} = 1 + \left(\frac{1}{2} - \frac{j}{2}\right) + \left(\frac{1}{2} + \frac{j}{2}\right) = \\ &= 1 + \frac{1}{2} + \frac{j}{2} - \frac{j}{2} + \frac{1}{2} = 2 \end{aligned}$$

$$\underline{Z}_{AB} = 2 [\Omega]$$