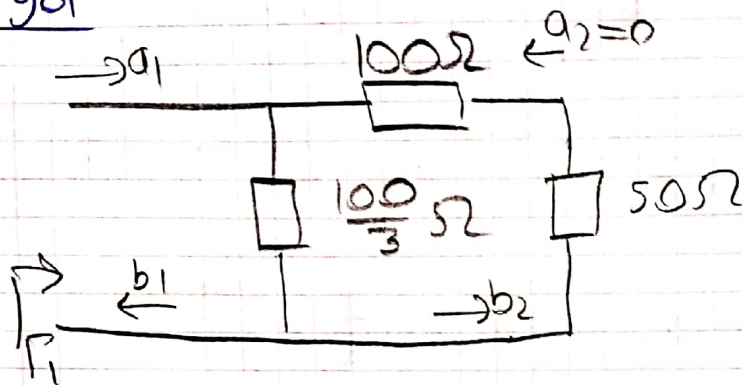


$$S = \begin{bmatrix} -5/17 & 4/17 \\ 4/17 & 7/17 \end{bmatrix} = \frac{1}{17} \begin{bmatrix} -5 & 4 \\ 4 & 7 \end{bmatrix}$$

2. yol



$$S_{11} = \left. \frac{b_1}{a_1} \right|_{a_2=0} = \frac{((50+100) \parallel \frac{100}{3}) - 50}{((50+100) \parallel \frac{100}{3}) + 50} = \frac{-250}{850}$$

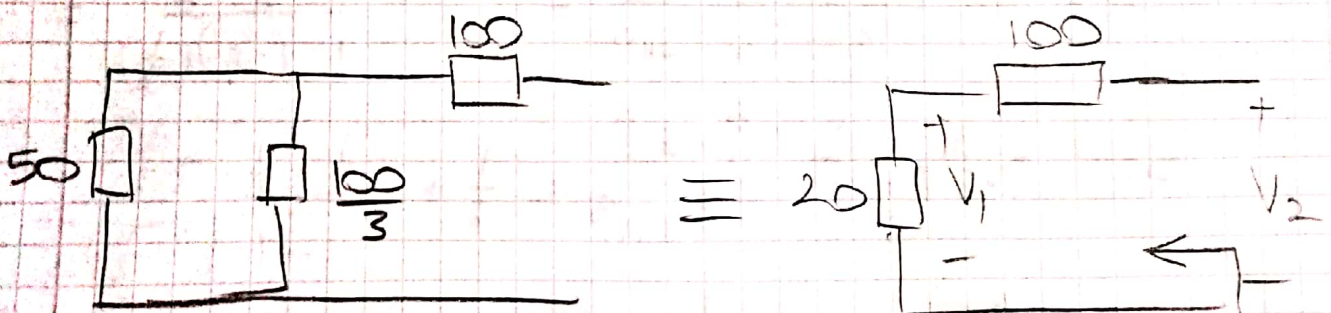
$$S_{11} = -\frac{5}{17}$$

$$V_1 \cdot \frac{50}{150} = V_2 \Rightarrow V_1 = 3 V_2$$

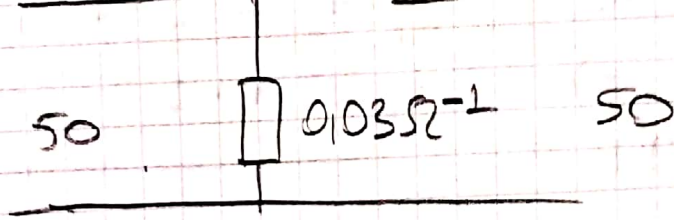
$$V_{a1} + V_{b1} = 3 V_{b2} \rightarrow \sqrt{Z_0} \cdot (a_1 + b_1) = 3 \sqrt{Z_0} (b_2)$$

$$\frac{1}{3} + \frac{1}{3} \frac{b_1}{a_1} = \frac{b_2}{a_2} = \frac{1}{3} - \frac{5}{3 \cdot 17} = \frac{12}{3 \cdot 17} = \frac{4}{17}$$

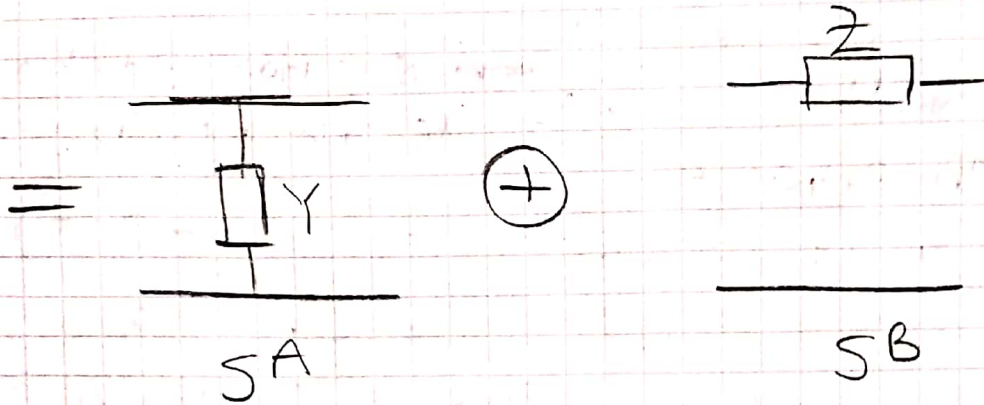
$$S_{21} = S_{12} = 4/17$$



$$S_{22} = \frac{120 - 50}{120 + 50} = \frac{7}{17}$$

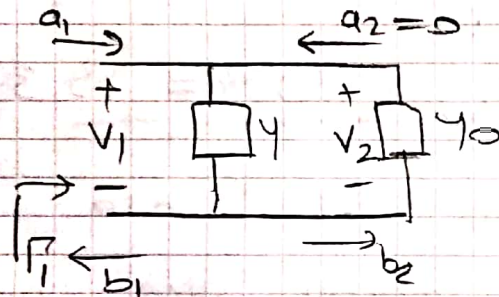


1. yol. (Kaskad)



SA 'yı yapalım;

① Hattın sonuna admittance uydurma;



$$V_1 = V_2$$

$$Va_1 + Vb_1 = Vb_2$$

$$\cancel{\sqrt{Z_0}}(a_1 + b_1) = \cancel{\sqrt{Z_0}}(b_2)$$

$$\frac{1}{a_1} / a_1 + b_1 = b_2 \rightarrow 1 + \underbrace{\frac{b_1}{a_1}}_{-\frac{3}{7}} = \frac{b_2}{a_1} = \frac{4}{7}$$

$$S_{11} = \Gamma_1 = \frac{Y_0 - (Y + Y_0)}{Y_0 + Y + Y_0}$$

$$S_{11} = \frac{-Y}{Y + 2Y_0} = \frac{-0,03}{0,03 + 2 \cdot 0,02}$$

$$S_{11} = -\frac{3}{7}$$

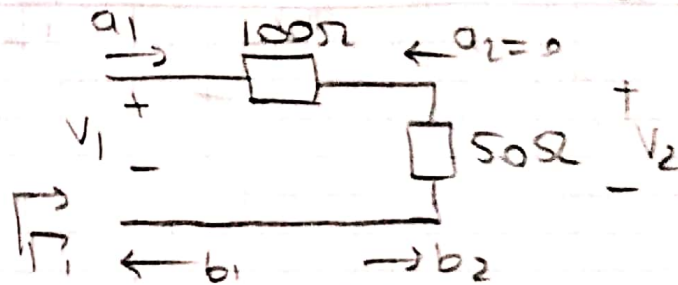
② Hattın başına admittance uydurunca da aynı sayılar gelir her şey aynı zaten

$$S_{11} = S_{22} = -\frac{3}{7}$$

$$S_{12} = S_{21} = \frac{4}{7}$$

SB;

① Hattin sawna empedans uyduralim



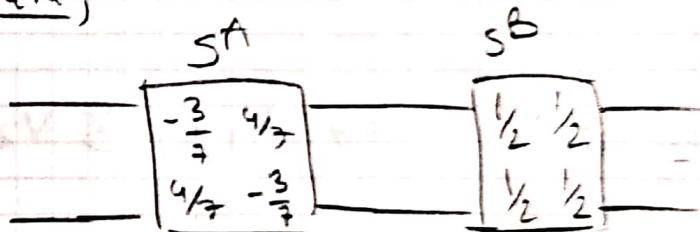
$$S_{11} = \Gamma_1 = \frac{(100+50)-50}{100+50+50} = \frac{1}{2} = S_{22}$$

$$V_1 \cdot \frac{50}{100+50} = V_2 \rightarrow V_1 \cdot \frac{1}{3} = V_2$$

$$(V_{a1} + V_{b1}) = 3 V_{b2}$$

$$\sqrt{Z_0} \frac{(a_1 + b_1)}{a_1} = 3 \sqrt{Z_0} \frac{b_2}{a_1} \Rightarrow \frac{b_2}{a_1} = \frac{1}{3} \left(1 + \frac{b_1}{a_1} \right) = \frac{1}{2}$$

Sonuçta;



Normalde

$$S_{11} = S_{11}^A + \frac{S_{21}^A S_{12}^A S_{11}^B e^{-j2\beta l}}{1 - S_{22}^A S_{33}^B e^{-j2\beta l}}$$

$$S_{22} = S_{44}^A + \frac{S_{43}^A S_{24}^A S_{22}^B e^{-j2\beta l}}{1 - S_{22}^A S_{33}^B e^{-j2\beta l}}$$

$$S_{12} = \frac{S_{21}^A S_{43}^B e^{-j2\beta l}}{1 - S_{22}^A S_{33}^B e^{-j2\beta l}}$$

Bu sonu için,

$$S_{11} = S_{11}^A + \frac{S_{21}^A S_{12}^A S_{11}^B}{1 - S_{22}^A S_{11}^B} = -\frac{3}{7} + \frac{\frac{4}{7} \cdot \frac{4}{7} \cdot \frac{1}{2}}{1 - (-\frac{3}{7})(\frac{1}{2})} = -\frac{5}{17}$$

$$S_{22} = S_{22}^B + \frac{S_{12}^B S_{21}^B S_{22}^A}{1 - S_{22}^A S_{11}^B} = \frac{1}{2} + \frac{\frac{1}{2} \cdot \frac{1}{2} \cdot (-\frac{3}{7})}{1 - (-\frac{3}{7})(\frac{1}{2})} = \frac{7}{17}$$

$$S_{12} = S_{21} = \frac{S_{21}^A S_{21}^B}{1 - S_{22}^A S_{11}^B} = \frac{\frac{4}{7} \cdot \frac{1}{2}}{\frac{17}{17}} = \frac{2}{17}$$