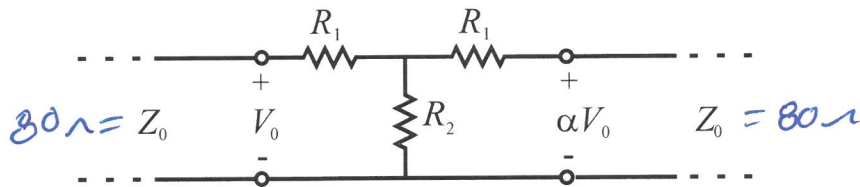


EE 481/581 Microwave Engineering Quiz #8 (Fall 2024)

Name Key A

Instructions: Open notes & text. Place answers in given spaces. **Show & clearly label** all work for partial credit.

Design, sketch, and find the overall $[S]$ -matrix for a resistive T-attenuator where $\alpha = 0.5$ and $Z_0 = 80 \Omega$.



Per HW problem 7.7, $R_1 = Z_0 \frac{1-\alpha}{1+\alpha}$, $R_2 = Z_0 \frac{2\alpha}{1-\alpha^2}$

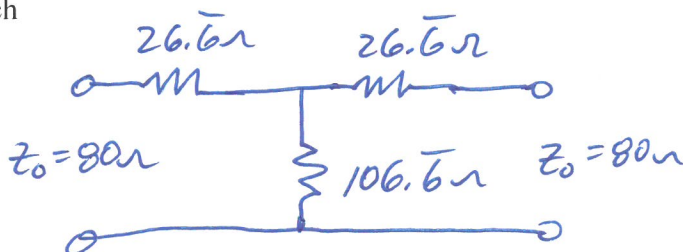
$S_{11} = S_{22} = 0$ (matched), and $S_{21} = S_{12} = \alpha$.

So, $S_{21} = S_{12} = 0.5$.

$$R_1 = 80 \left(\frac{1-0.5}{1+0.5} \right) = \underline{26.6 \Omega}$$

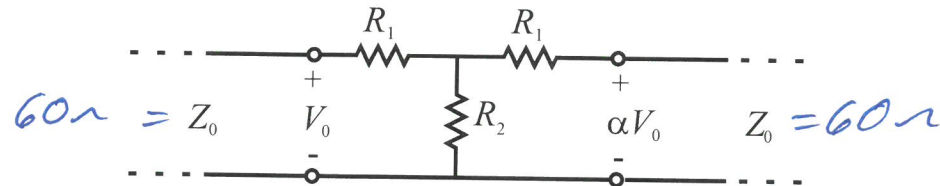
$$R_2 = 80 \left(\frac{2(0.5)}{1-0.5^2} \right) = \underline{106.6 \Omega}$$

Sketch



$$[S] = \begin{bmatrix} 0 & 0.5 \\ 0.5 & 0 \end{bmatrix}$$

EE 481/581 Microwave Engineering Quiz #8 (Fall 2024)

Name Key B**Instructions:** Open notes & text. Place answers in given spaces. **Show & clearly label** all work for partial credit.Design, sketch, and find the overall $[S]$ -matrix for a resistive T-attenuator where $\alpha = 0.5$ and $Z_0 = 60 \Omega$.

Per HW problem 7.7, $R_1 = Z_0 \frac{1-\alpha}{1+\alpha}$, $R_2 = Z_0 \frac{2\alpha}{1-\alpha^2}$,

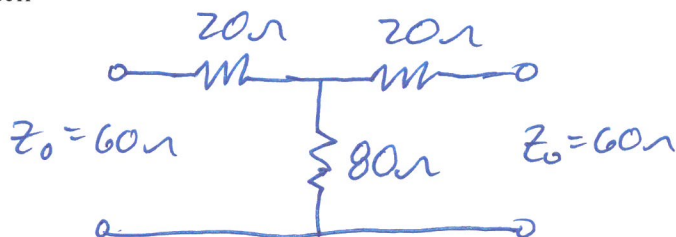
$S_{11} = S_{22} = 0$ (matched), and $S_{21} = S_{12} = \alpha$.

Here, $S_{21} = S_{12} = 0.5$

$$R_1 = 60 \left(\frac{1-0.5}{1+0.5} \right) = \underline{20 \Omega}$$

$$R_2 = 60 \frac{2(0.5)}{1-0.25^2} = \underline{80 \Omega}$$

Sketch



$$[S] = \begin{bmatrix} 0 & 0.5 \\ 0.5 & 0 \end{bmatrix}$$