

Solⁿ 4 (a) $Z = \begin{bmatrix} 2 & 3 \\ 5 & 1 \end{bmatrix} \Omega$ Find Y parameters.

$$\Delta Z = 2 \times 1 - 5 \times 3 = -13$$

$$Y_{11} = \frac{Z_{22}}{\Delta Z} = \frac{1}{-13} = -76.92 \text{ mS}$$

$$Y_{12} = \frac{-Z_{12}}{\Delta Z} = \frac{-3}{-13} = 230.7 \text{ mS}$$

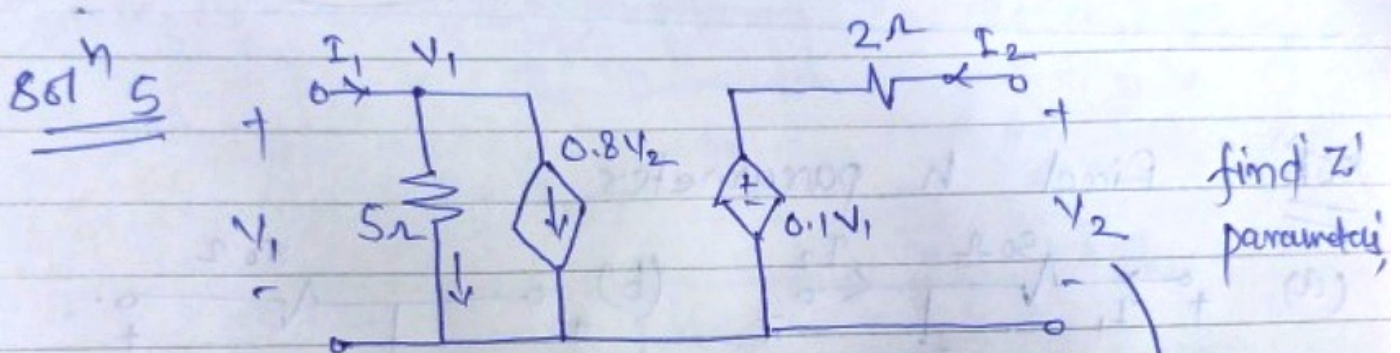
$$Y_{21} = \frac{-Z_{21}}{\Delta Z} = \frac{-5}{-13} = 384.6 \text{ mS}$$

$$Y_{22} = \frac{Z_{11}}{\Delta Z} = \frac{2}{-13} = -153.85 \text{ mS}$$

(a) $Y = \begin{bmatrix} 0.001 & 0.005 \\ 0.006 & 0.003 \end{bmatrix} \text{ S}$ find Z parameter

$$\Delta Y = (0.001)(0.003) - (0.005)(0.006) = 0$$

As $\Delta Y = 0 \Rightarrow Z_{11}, Z_{12}, Z_{21}, Z_{22} \neq \infty$



$$V_1 = Z_{11} I_1 + Z_{12} I_2$$

$$V_2 = Z_{21} I_1 + Z_{22} I_2$$

Nodal at V_1 :

$$\frac{V_1}{5} = I_1 - 0.8V_2 \quad \text{--- (1)}$$

applying KVL

$$V_2 = 2I_2 + 0.1V_1 \quad \text{--- (2)}$$

on Rearranging

$$0.28V_1 = I_1 - 1.6I_2$$

$$\text{(OR)} \quad V_1 = 3.5I_1 - 5.7I_2 \quad \text{--- (3)}$$

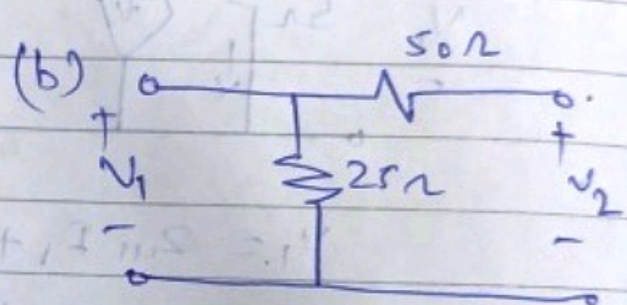
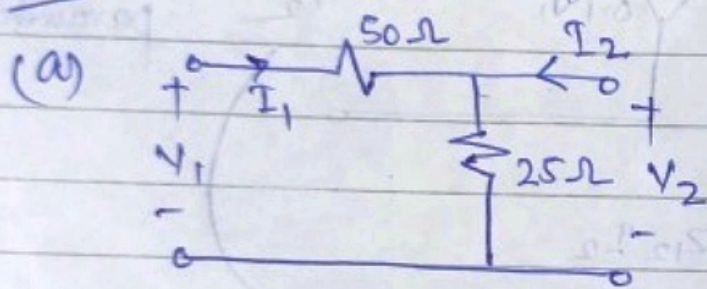
By (2) & (3):

$$V_2 = 0.35I_1 + 1.42I_2$$

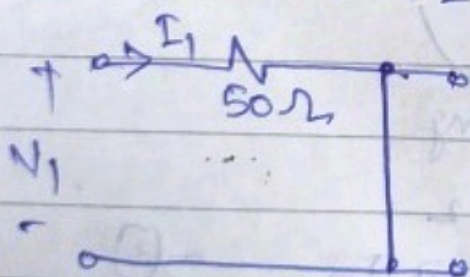
$$Z = \begin{bmatrix} 3.5 & -5.7 \\ 0.35 & 1.42 \end{bmatrix}$$

801^m

Find h parameters



(a) $h_{11} = \frac{V_1}{I_1} \Big|_{V_2=0}$



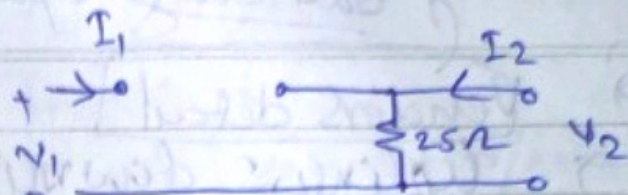
$\Rightarrow V_1 = 50 I_1 \Rightarrow h_{11} = \frac{50 I_1}{I_1} = 50 \Omega$

$h_{21} = \frac{I_2}{I_1} \Big|_{V_2=0} \Rightarrow \text{as } I_1 = -I_2$

$h_{21} = -1$

$\begin{bmatrix} 1 & 0 \\ 0 & -1 \end{bmatrix}$

$$h_{12} = \left. \frac{V_1}{V_2} \right|_{I_1=0}$$



$$h_{12} = 1$$

$$h_{22} = \left. \frac{I_2}{V_2} \right|_{I_1=0}$$

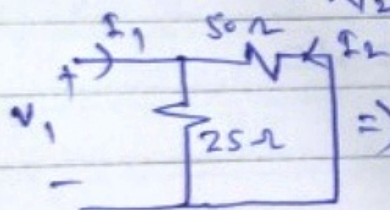
$$V_1 = V_2$$

$$V_2 = 25 I_2$$

$$\frac{I_2}{V_2} = \frac{1}{25}$$

$$h_{22} = 0.04 \text{ S}$$

$$(b) h_{11} = \left. \frac{V_1}{I_1} \right|_{V_2=0}$$



$$\Rightarrow (50 \parallel 25) I_1 \Rightarrow h_{11} = 16.67 \Omega$$

negative as I_1 & I_2 are opposite flowing current.

$$h_{21} = \left. \frac{I_2}{I_1} \right|_{V_2=0} = \left(\frac{-25}{25+50} \right) I_1 \Rightarrow h_{21} = -0.33$$

$$h_{12} = \left. \frac{V_1}{V_2} \right|_{I_1=0} \Rightarrow V_1 = \frac{25}{25+50} V_2 \Rightarrow h_{12} = 0.33$$

$$h_{22} = \left. \frac{I_2}{V_2} \right|_{I_1=0} \Rightarrow \frac{I_2}{(25+50) I_2} \Rightarrow h_{22} = 0.03 \text{ S}$$