ASSIGNMENT PRESENTATION

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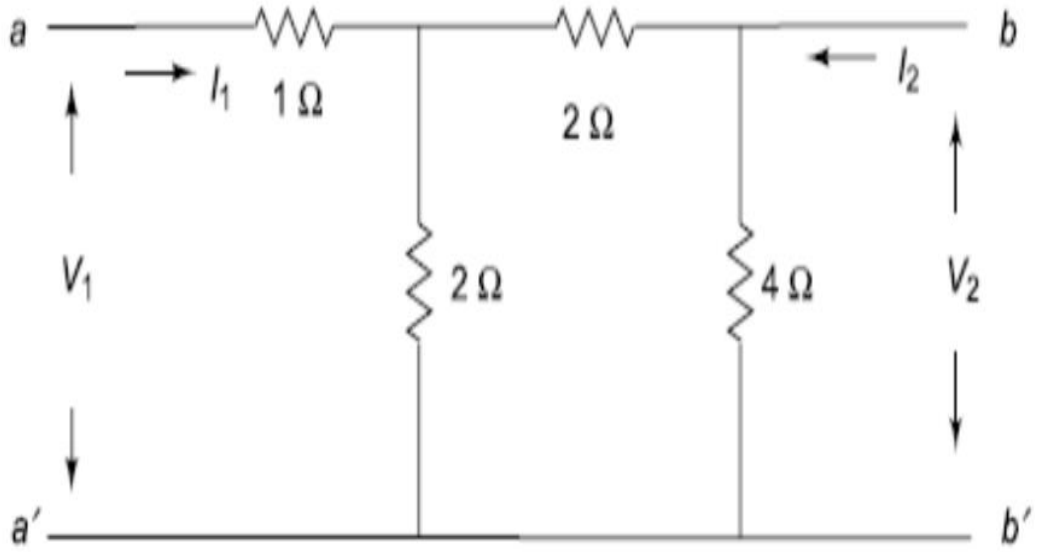
201141

Determine the Z parameter for the given network



- $v_1 = z_{11} I_1 + z_{12} I_2$
- $v_2 = z_{21} I_1 + z_{22} I_2$

  - $z_{11} = \left.\frac{v_1}{I_1}\right|_{I_2=0}$ open circuit input impedence
  - $z_{21} = \left.\frac{v_2}{I_1}\right|_{I_2=0}$ open circuit forward transfer impedence
  - $z_{12} = \left.\frac{v_1}{I_2}\right|_{I_1=0}$ open circuit reverse transfer impedence
  - $z_{22} = \left.\frac{v_2}{I_2}\right|_{I_1=0}$ open circuit output impedence

- When $I_2 = 0$(open circuiting bb')

$z_{11} = \frac{v_1}{I_1}$ to find v_1,

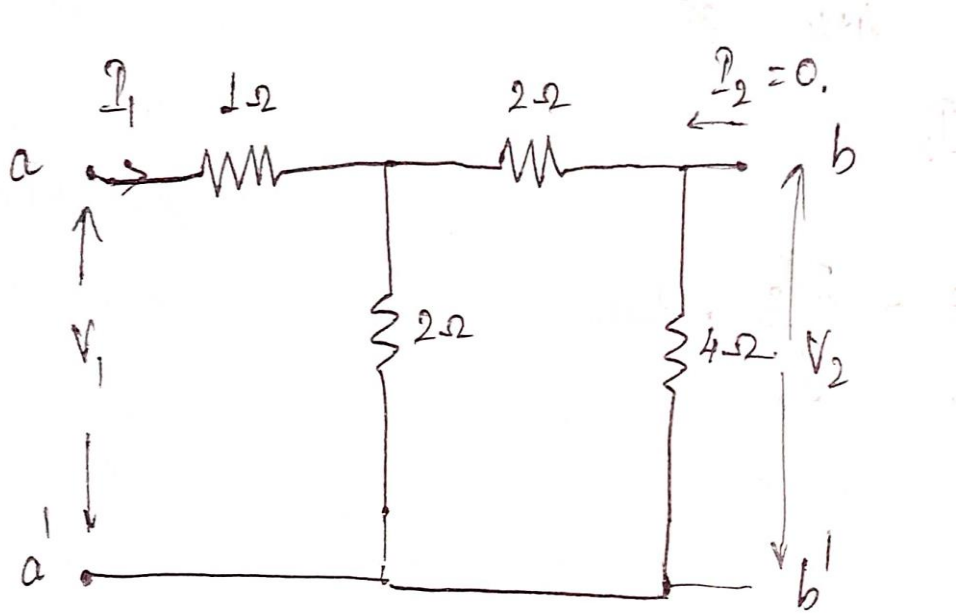
$$v_1 = R_{eq} \times I_1$$

R_{eq}=1+[2||(2+4)]

$$=1+\frac{2\times6}{2+6}$$

$$=\frac{5}{2}$$

$$v_1 = \frac{5}{2} I_1$$



$$z_{11} = \frac{v_1}{I_1} = \frac{\frac{5}{2} I_1}{I_1} = 2.5\Omega$$

- $Z_{21} = \frac{v_2}{I_1}$
- To find v_2 :

v_2 is the voltage across 4Ω

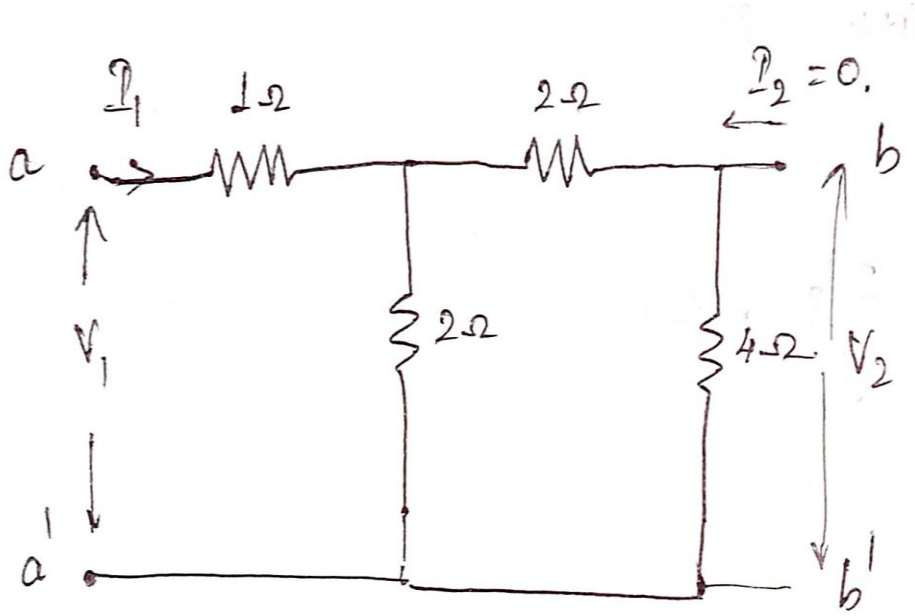
by current division method

$v_2 = 4\text{x } I_{2\Omega,4\Omega}$ $\qquad$ $I_{2\Omega,4\Omega} = \frac{2}{8} I_1$

$v_2 = 4\text{x } \frac{I_1}{4}$ $\qquad$ $= \frac{I_1}{4}$

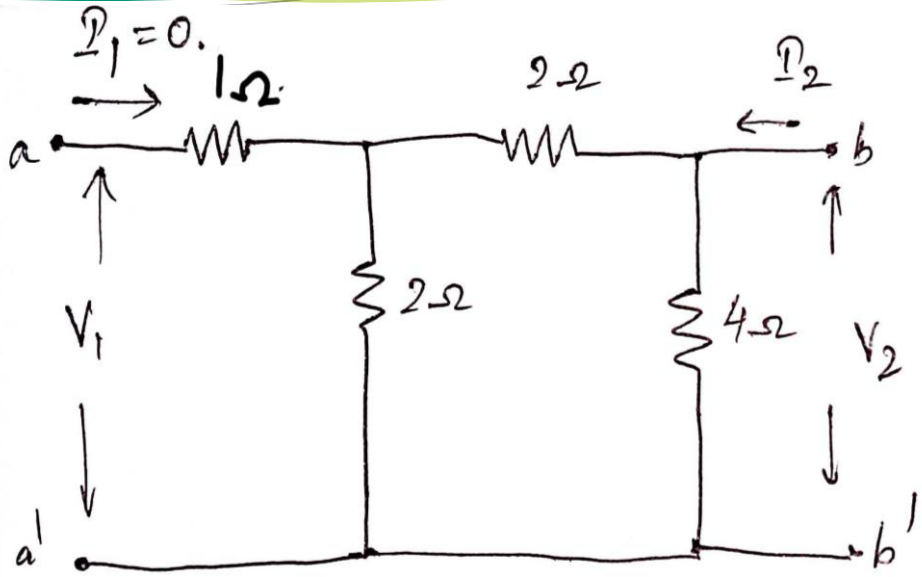
$v_2 = I_1$

$$z_{21} = \frac{v_2}{I_1} = \frac{I_1}{I_1} = 1\Omega$$



- When $I_1 = 0$ (open circuiting aa')
- $z_{12} = \frac{v_1}{I_2}$

v_1 is voltage across 2Ω



by current division :

$$I_{2\Omega,2\Omega} = \frac{4}{8} I_2 = \frac{1}{2} I_2$$

$$v_1 = 2\Omega \times I_{2\Omega,2\Omega}$$

$$v_1 = 2 \times \frac{1}{2} I_2 = I_2$$

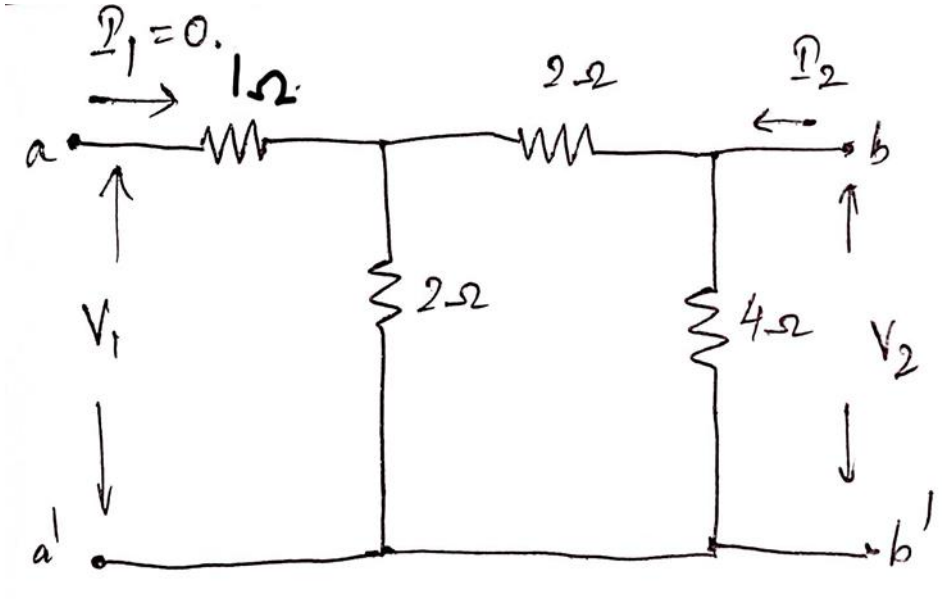
$$z_{12} = \frac{v_1}{I_2} = \frac{I_2}{I_2} = 1\Omega$$

- $z_{22} = \frac{v_2}{I_2}$
- $v_2 = I_2 \times R_{eq}$

$= I_2 \times \left(\frac{4\times4}{4+4}\right) = \frac{16}{8} I_2$

$= 2 \times I_2$

- $z_{22} = \frac{v_2}{I_2} = \frac{2I_2}{I_2} = 2\Omega$



In this circuit, $z_{12} = z_{21} = 1\Omega$, this network is a reciprocal network

Thank you