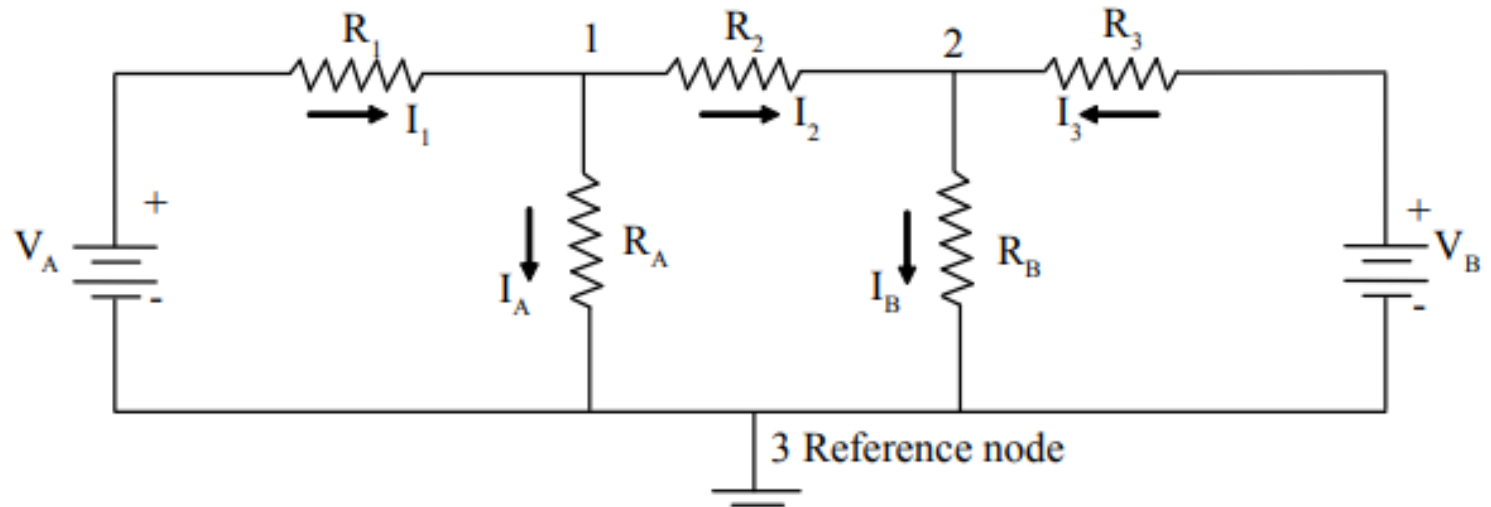


NODAL METHOD



By applying kirchhoff's current law [KCL] equation at node 1,

$$I_1 = I_2 + I_A$$

Substituting, $I_1 = \frac{V_A - V_1}{R_1}$; $I_2 = \frac{V_1 - V_2}{R_2}$; $I_A = \frac{V_1}{R_A}$

i.e., $\frac{V_A - V_1}{R_1} = \frac{V_1 - V_2}{R_2} + \frac{V_1}{R_A}$

$$V_1 \left(\frac{1}{R_A} + \frac{1}{R_1} + \frac{1}{R_2} \right) - V_2 \left(\frac{1}{R_2} \right) = \frac{V_A}{R_1}$$

By applying KCL equation at node 2,

$$I_2 + I_3 = I_B$$

Substituting, $I_2 = \frac{V_1 - V_2}{R_2}$; $I_3 = \frac{V_B - V_2}{R_3}$; $I_B = \frac{V_2}{R_B}$

i.e., $\frac{V_1 - V_2}{R_2} + \frac{V_B - V_2}{R_3} = \frac{V_2}{R_B}$

$$-V_1 \left(\frac{1}{R_2} \right) + V_2 \left(\frac{1}{R_2} + \frac{1}{R_3} + \frac{1}{R_B} \right) = \frac{V_B}{R_3}$$

$$\begin{bmatrix} \left(\frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_A} \right) & -\frac{1}{R_2} \\ -\frac{1}{R_2} & \left(\frac{1}{R_2} + \frac{1}{R_3} + \frac{1}{R_B} \right) \end{bmatrix} \begin{bmatrix} V_1 \\ V_2 \end{bmatrix} = \begin{bmatrix} \frac{V_A}{R_1} \\ \frac{V_B}{R_3} \end{bmatrix}$$

$$V_1 = \frac{\Delta_1}{\Delta}$$

$$V_2 = \frac{\Delta_2}{\Delta}$$