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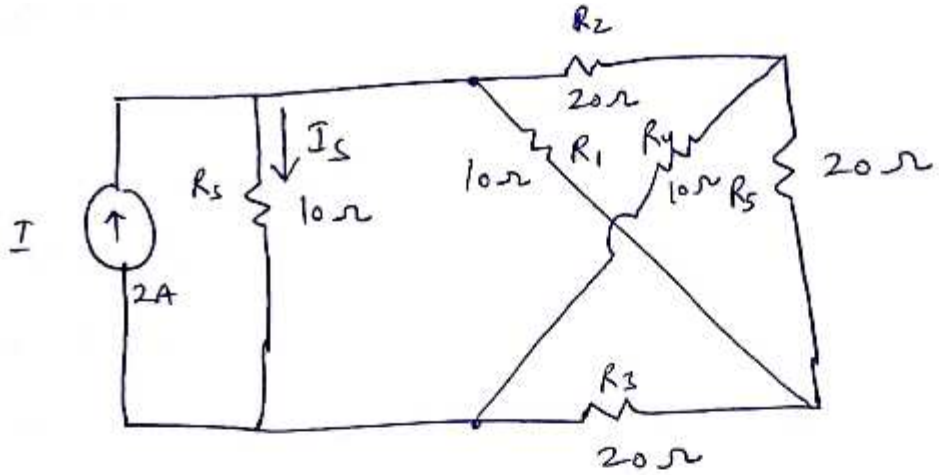
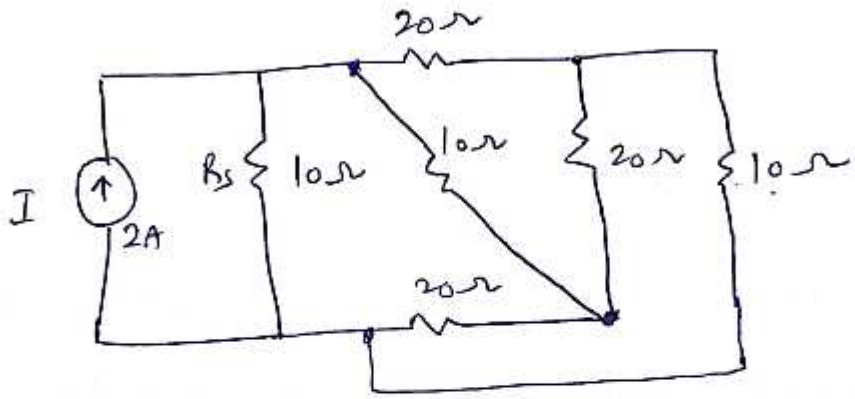
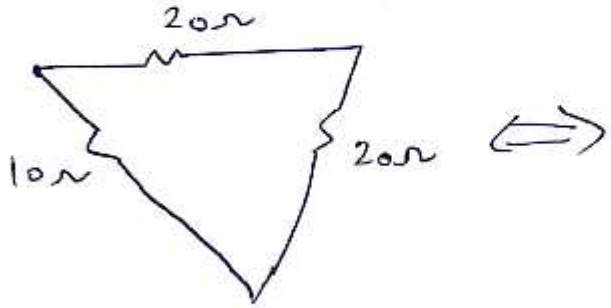
Answer



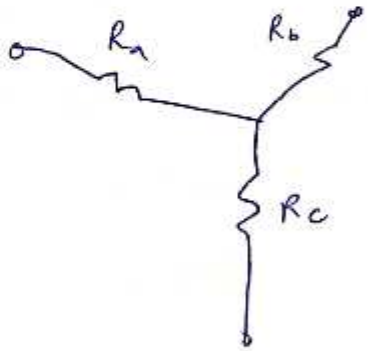
$\Rightarrow$



Using Star to Delta Transformation —



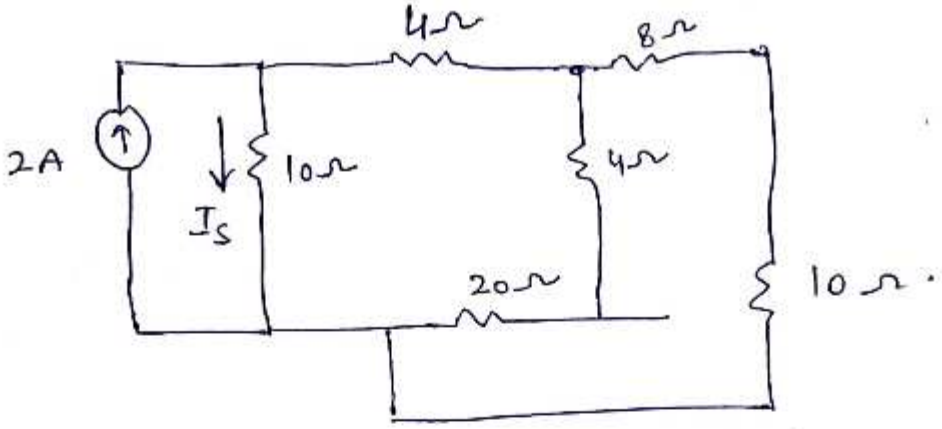
$\Longleftrightarrow$



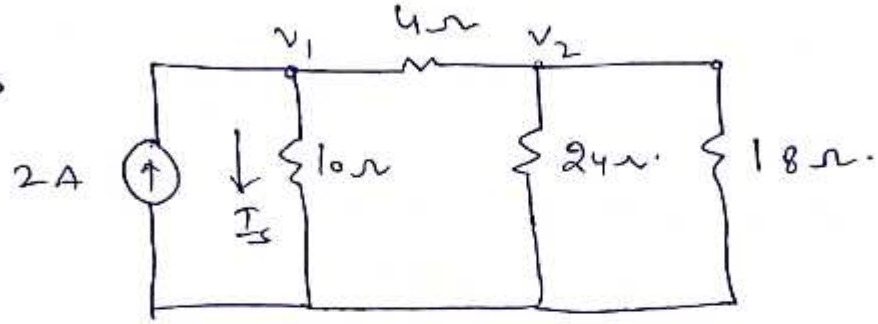
$$R_a = \frac{20 \times 10}{50} = 4\Omega$$

$$R_b = \frac{20 \times 20}{50} = 8\Omega$$

$$R_c = \frac{20 \times 10}{50} = 4\Omega .$$



$\Rightarrow$



Now using Nodal Analysis — at V_1 —

$$\frac{V_1}{10} + \frac{V_1 - V_2}{4} = 2$$

$$2V_1 + 5V_1 - 5V_2 = 40$$

$$7V_1 - 5V_2 = 40 \quad \text{——} (1)$$

$\rightarrow$ Similarly at V_2 —

$$\frac{V_2}{24} + \frac{V_2}{18} + \frac{V_2 - V_1}{4} = 0$$

$$3V_2 + 4V_2 + 18V_2 - 18V_1 = 0$$

$$18V_1 = 25V_2 \quad \text{——} (2)$$

On solving Equation (1) & (2) —

$$V_1 = \frac{200}{17} \text{ Volt}$$

$$V_2 = \underline{144} \text{ Volt.}$$

Now Current through R_x

$$I_s = \frac{V_1}{10} = \frac{20}{17}$$

$$\boxed{I_s = 1.176 \text{ Amp}}$$

$\Rightarrow$ I use nodal Analysis over Mesh. because in Mesh 3 equation required but in Nodal Analysis only two equation required

Likes: 0 **Dislikes: 0**