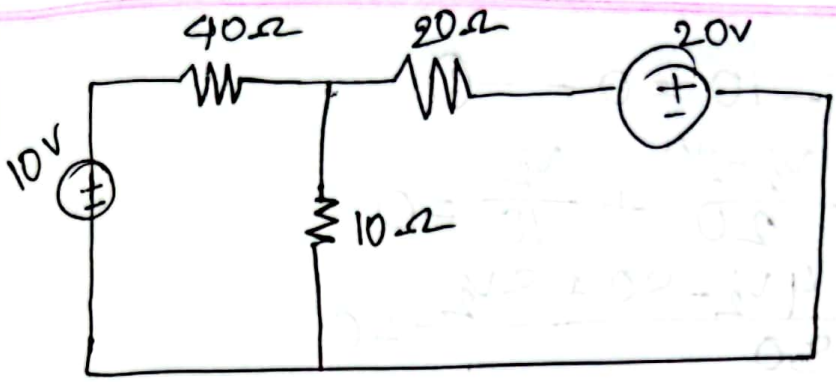
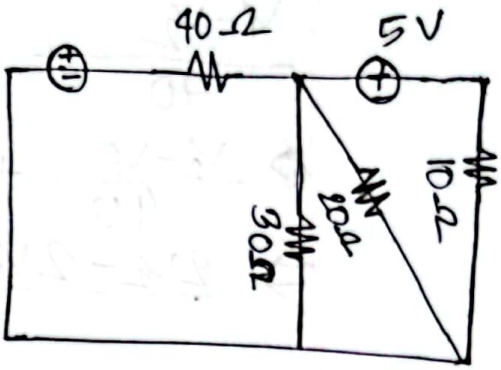
Nodal Analysis





$$\frac{V_1 - V_2}{40} + V_1 - 10 = 0 \quad \text{——} (1)$$

$$\frac{V_2 - V_1}{10} + \frac{V_1 - 20}{20} + \frac{V_2 - V_1}{40} = 0 \quad \text{——} (11)$$

$$\Rightarrow \frac{V_2}{10} + \frac{V_2 - 20}{20} + \frac{V_2 - V_1}{40} = 0$$

from equation (1)

$$\frac{V_1 - V_2}{40} + V_1 - 10 = 0$$

$$\Rightarrow \frac{V_1 - V_2 + 40V_1 - 400}{40} = 0$$

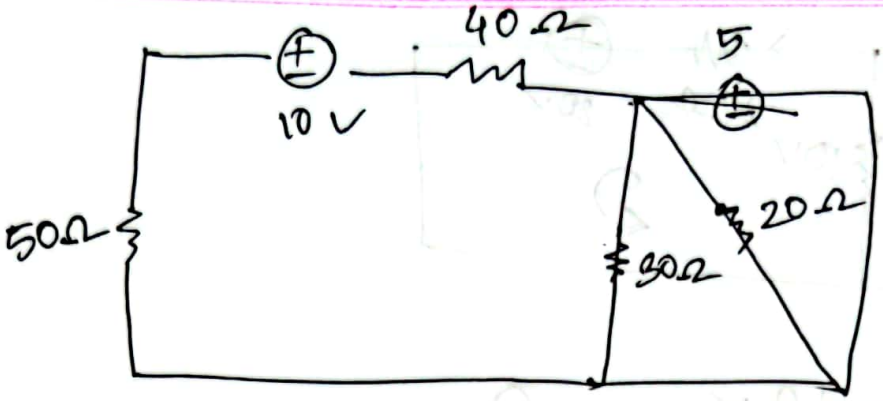
$$\Rightarrow V_1 - V_2 + 40V_1 - 400 = 0$$

$$\Rightarrow 41V_1 - V_2 - 400 = 0$$

$$V_1 = -\frac{1420}{143} \qquad V_2 = \frac{-1020}{143}$$

$$= -9.930 \qquad = -57.132$$

Nodal Analysis formula



$$\frac{V_1}{50} + \frac{V_1 - 20}{40} + \frac{V_1 - V_2}{30} = 0$$

$$\Rightarrow \frac{12V_1 + 15V_1 - 300 + 20V_1 - 20V_2}{600} = 0$$

$$\Rightarrow 47V_1 - 20V_2 = 300 \quad \text{---} \quad (1)$$

$30 \parallel 20$

$$\Rightarrow \frac{30 \times 20}{30 + 20}$$

$$\Rightarrow 12$$

$$\therefore \frac{V_2 - V_1}{12} + \frac{V_2}{5} + \frac{V_2}{10} = 0$$

$$\Rightarrow \frac{5V_2 - 5V_1 + 12V_2 + 6V_2}{60} = 0$$

$$\Rightarrow 23V_2 - 5V_1 = 0$$

$$\Rightarrow -5V_1 + 23V_2 = 0 \quad \text{---} \quad (2)$$

$\therefore V_1 = 7.0336V$

$\therefore V_2 = 1.52\ V$ Ans