

$$0 = \frac{V_1 - 10}{30} + \frac{V_1 - 20}{10} + \frac{V_1}{20} \quad \text{--- (i)}$$

$$\textcircled{1} \Rightarrow V_1 = -10V \quad \text{--- (i)}$$

$$\textcircled{2} \Rightarrow \frac{V_2 - V_1}{10} + \frac{V_2 - 20}{20} = 0$$

$$\Rightarrow \frac{2V_2 - 2V_1 + V_2 - 20}{20} = 0$$

$$\Rightarrow 3V_2 - 2V_1 = 20 \quad \text{--- (ii)}$$

Analyses between (i) and (ii)

$$V_1 = -10V$$

$$V_2 = -25V$$

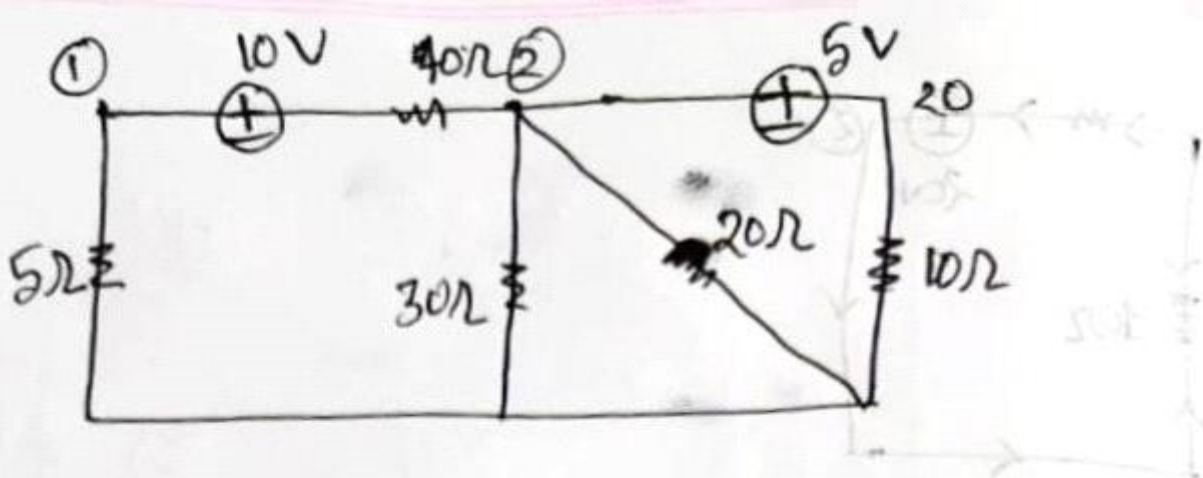
$$0 = \frac{V_1}{10} + \frac{V_1}{20} + \frac{V_1 - 10}{15}$$

$$0 = \frac{2V_1 - 2V_1 + 15V_1 + 10V_1}{30}$$

$$33V_1 - 2V_1 = 0$$

$$-2V_1 + 33V_1 = 0$$

Analyses (i) and (ii)  $V_1 = 5.0336V$



$$\textcircled{1} \Rightarrow \frac{V_1}{50} + \frac{V_1 - 20}{40} + \frac{V_1 - V_2}{30} = 0$$

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

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

$$\textcircled{2} \Rightarrow 30 \parallel 20 \Rightarrow \frac{30 \times 20}{30 + 20}$$

$$\Rightarrow 12$$

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

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

$$23V_2 - 5V_1 = 0$$

$$-5V_1 + 23V_2 = 0$$

Analysis (i) and (ii)  $V_1 = 7.0336 \text{ V}$

$$V_2 = 1.52 \text{ V}$$