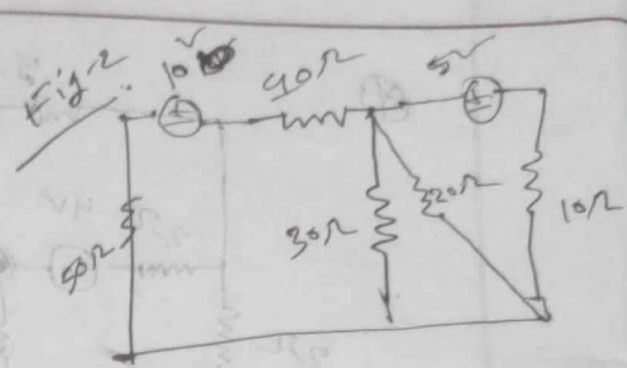
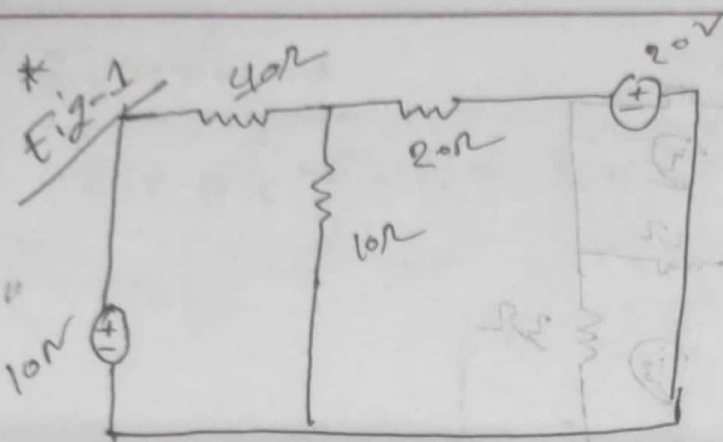


18.2.2023



Nodal Analysis.

| | |
|---------------------------------|----------------------|
| $V_1 - V_2$ | $V_2 - V_1$ |
| $\frac{40}{40}$ | $\frac{20}{20}$ |
| $\frac{10 - 20}{40}$ | $\frac{20 - 10}{20}$ |
| $-\frac{1}{4}$ | $\frac{1}{2}$ |
| $\frac{1}{2} + \frac{1}{4} = 0$ | |
| $\frac{1 + 2}{2}$ | |
| $\frac{3}{4} = 20$ | |

Ans

Fig-1

$\Rightarrow V_1 = 10V$

Using KCL in 2

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

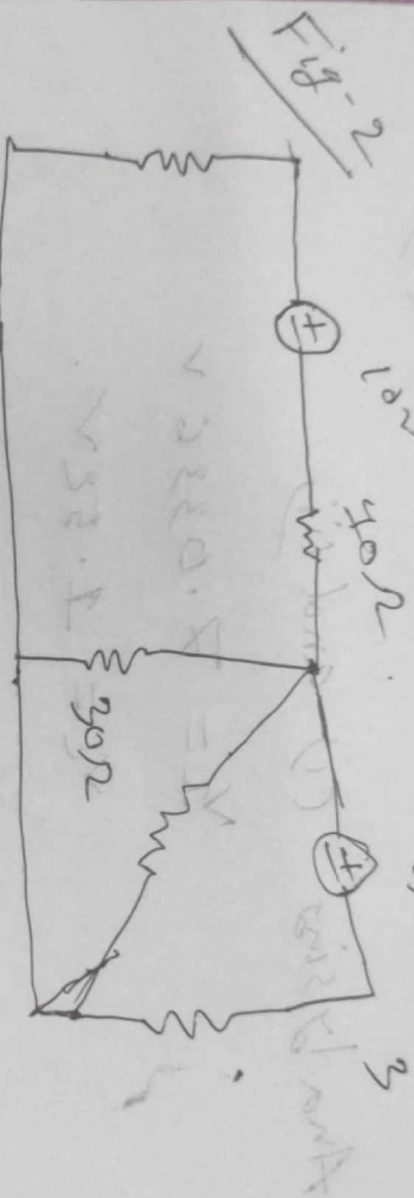
$\Rightarrow \frac{2V_2 - 2V_1 + V_2 - 20}{20} = 0$

$\Rightarrow 3V_2 - 2V_1 - 20 = 0 \rightarrow (ii)$

Analysis between (i) and (ii)

$$V_1 = -20 \text{ V}$$

$$V_2 = -25 \text{ V}$$



$$(ii) \Rightarrow 0 = 5V_3 + V_3 - 5V$$

$$(i) \Rightarrow \frac{V_1}{50} + \frac{V_1 - 20}{40} + \frac{V_1 - V_2}{30} = 0$$

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

$$\Rightarrow 47V_1 - 20V_2 = 300 \rightarrow (i)$$

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

$$\Rightarrow 12$$

$$\therefore \frac{V_2 - V_1}{12} + \frac{V_2}{5} + \frac{V_2}{20} = 0$$

$$\Rightarrow 5V_2 + 5V_1 + 12V_2 + 6V_2 \geq 0$$

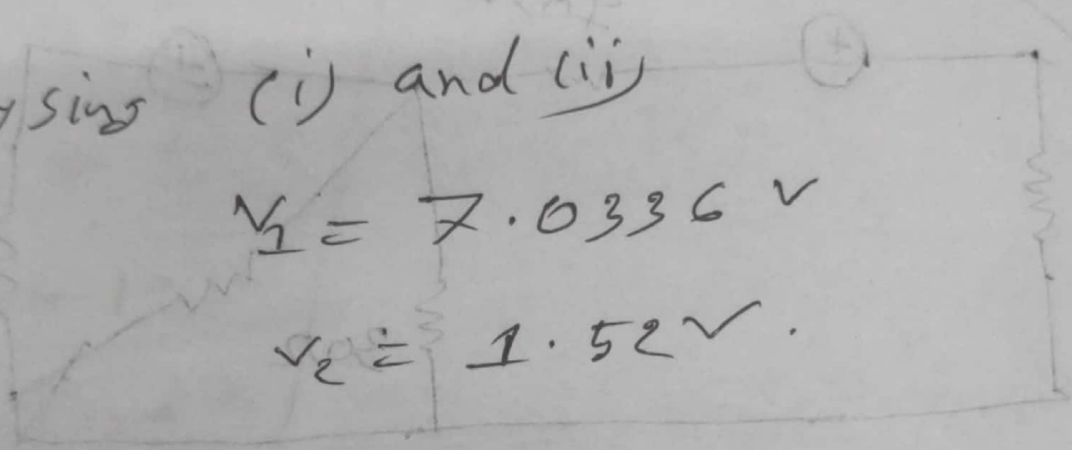
$$\Rightarrow 23V_2 + 5V_1 = 0$$

$$\Rightarrow -5V_1 + 23V_2 \geq 0 \rightarrow (ii)$$

Analyzing (i) and (ii)

$$V_1 = 7.0336 \text{ V}$$

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



$$0 = \frac{V_1 - V_2}{30} + \frac{0.5 - V_1}{50} + \frac{V_2}{20}$$

$$0 = \frac{15V_1 + 12V_2 - 300 + 50V_1 - 50V_2 - 300}{200}$$

$$(i) \rightarrow 0.05 = \frac{50V_1 - 50V_2}{300} \rightarrow (i)$$

$$\frac{0.05 \times 300}{50 + 50}$$

15

V - V