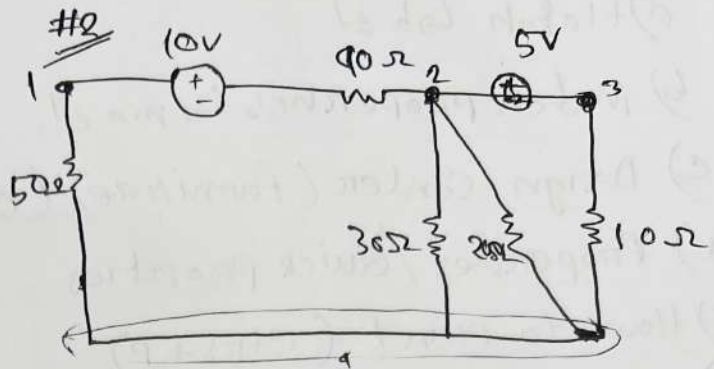
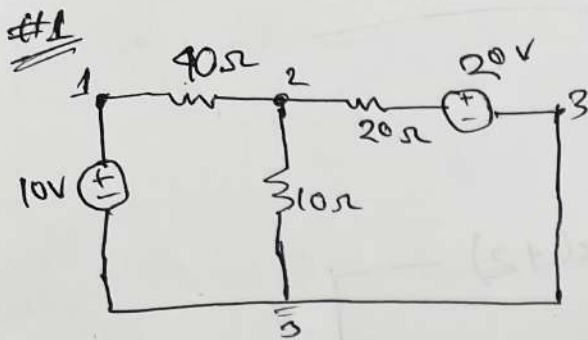


Nodal Analysis

EEE



#1

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

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

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

$$\Rightarrow \frac{8V_2 + 4V_2 - 80 + 2V_2 - 2V_1}{80} = 0$$

$$\Rightarrow 8V_2 + 4V_2 - 80 + 2V_2 - 2V_1 = 0$$

$$\Rightarrow 14V_2 - 2V_1 - 80 = 0$$

$$\Rightarrow 2V_1 - 14V_2 + 80 = 0$$

$$\Rightarrow 2V_1 - 14V_2 = -80 \quad \text{--- (10)}$$

from equation. 1

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

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

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

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

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

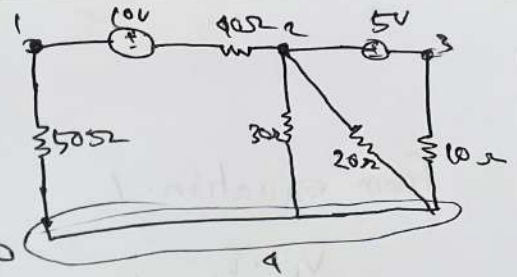
$$V_1 = -\frac{1420}{143}$$

$$V_2 = -\frac{1020}{143}$$

$$= 9.930V$$

$$= 7.1328V$$

#2



$$\frac{V_2 - 10}{40} + \frac{V_2 - V_4}{30} + \frac{V_2 - V_4}{20} + V_2 - 5 = 0$$

$$\Rightarrow \frac{6V_2 - 60 + 8V_2 - 12V_4 - 0 - 0 + 240V_2 - 1200}{240} = 0$$

$$\Rightarrow 6V_2 - 60 + 8V_2 + 12V_4 + 240V_2 - 1200 = 0$$

$$\Rightarrow V_2 = 1260/266$$

$$= 4.736$$

$$\therefore V_1 = 4.735 \text{ V}$$

$$V_3 - 5 + \frac{V_3}{40} = 0$$

$$\Rightarrow 10V_3 - 50 + V_3 = 0$$

$$\Rightarrow 11V_3 = 50$$

$$\therefore V_3 = \frac{50}{11}$$

$$= 4.545 \text{ V}$$

Ans: