• $G_2 = 0.875 - 0.25 - 0.5 = 0.125$.

$R_2 = \frac{1}{G_2} = \frac{1}{0.125} = 8\,\Omega$.

$G_3 = 0.4 - 0.35 - 0.05 = 0.1$.

$R_3 = \frac{1}{G_3} = \frac{1}{0.1} = 10\,\Omega$

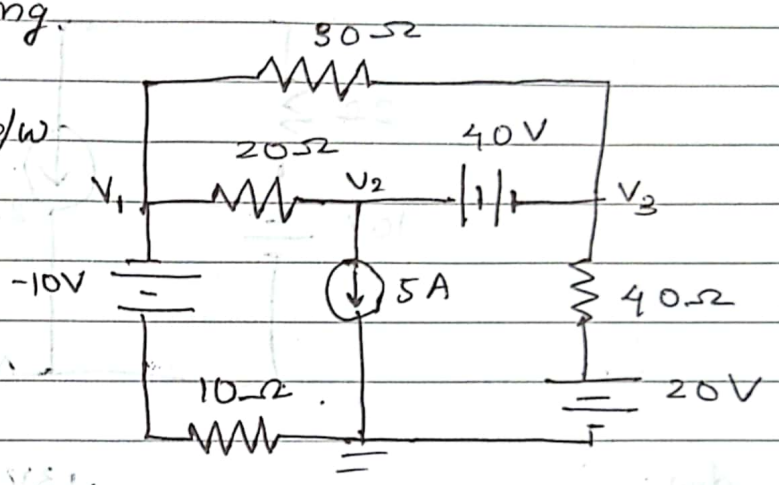
G_1

• $R_{23} = \frac{1}{0.25} = 4$

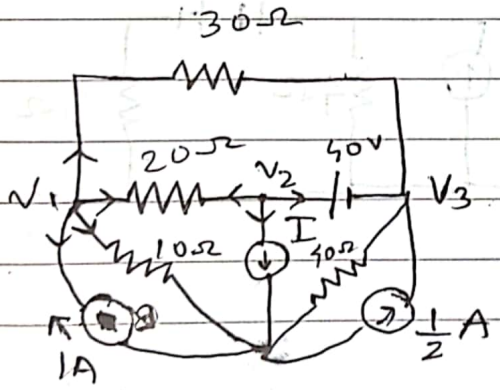
13/11

Q. Find current through 40V battery. Is it is charging / discharging.

Ideal voltage source b/w two nodes is called supernode.



Ans.



For V_1,

$$\frac{V_1 - V_2}{20} + \frac{V_1 - 0}{10} + \frac{V_1 - V_3}{30} - 1 = 0 \quad \text{— (1)}$$

$V_2 - V_3 = 40$ — (2)

For (3) by more the branch containing 40V

$$\frac{V_2 - V_3}{20} + 5 + \frac{V_3 - V_1}{30} + \frac{V_3 - 0}{40} - \frac{I}{2} = 0 \quad (3)$$

$$\frac{V_2 - V_1}{20} + 5 + I = 0 \quad (1)$$

(1) + (2)

$$\frac{V_3 - V_1}{30} + \frac{V_3 - 0}{40} - \frac{I}{2} - I = 0 \quad (2)$$

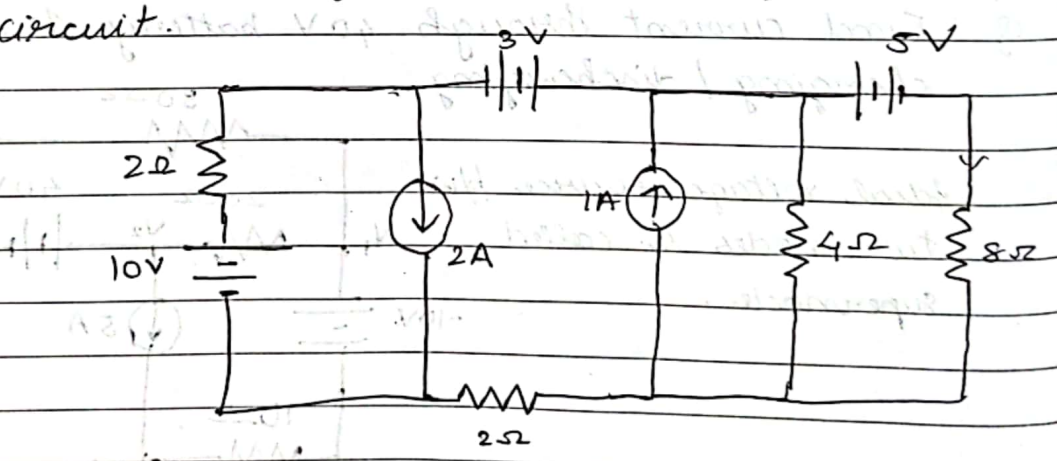
$V_1 = -16.77$ V

$V_2 = -32.90$ V

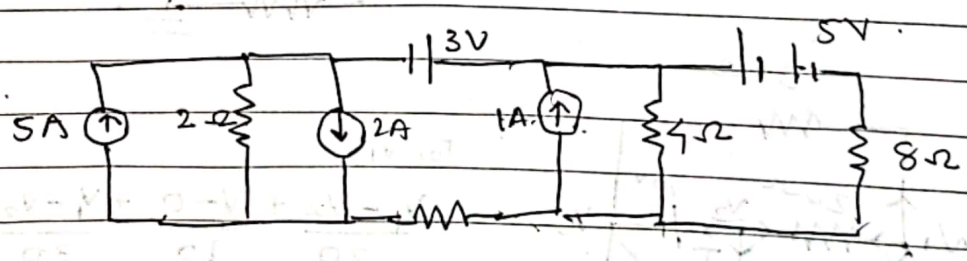
$V_3 = -72.9$ V

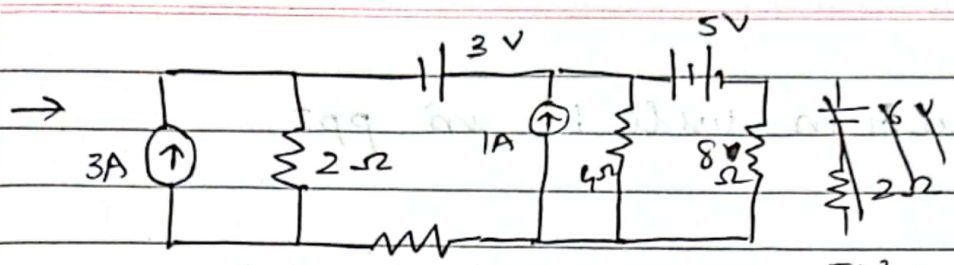
$I = \bar{+} 4.19$ A

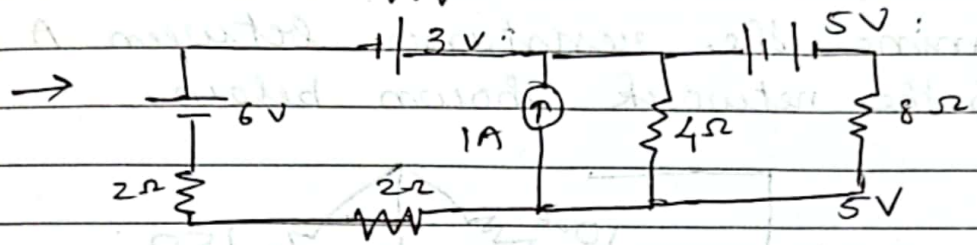
Q. Find the current through 8Ω resistor by source transformation method, in the circuit.

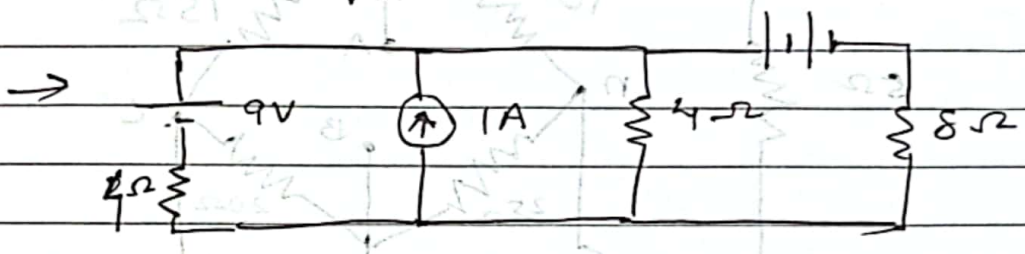


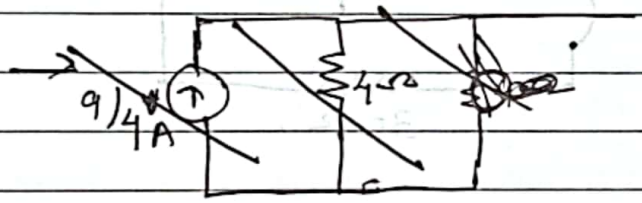
Ans. →

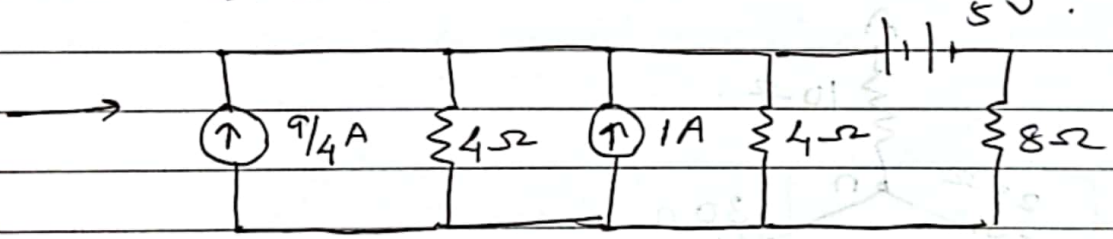


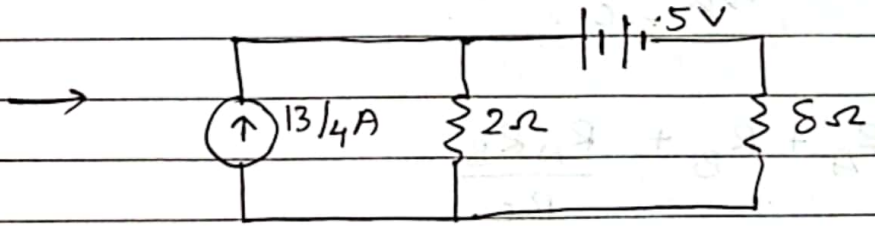


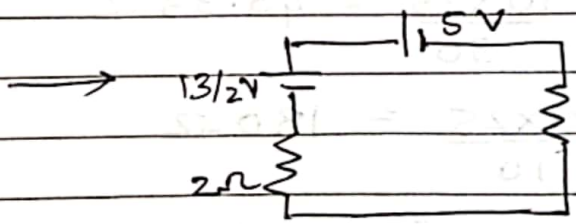


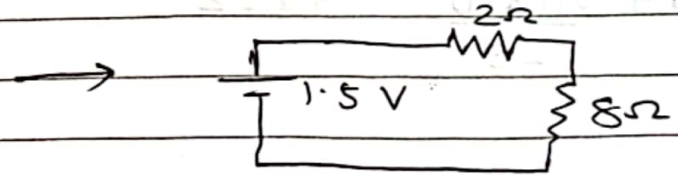








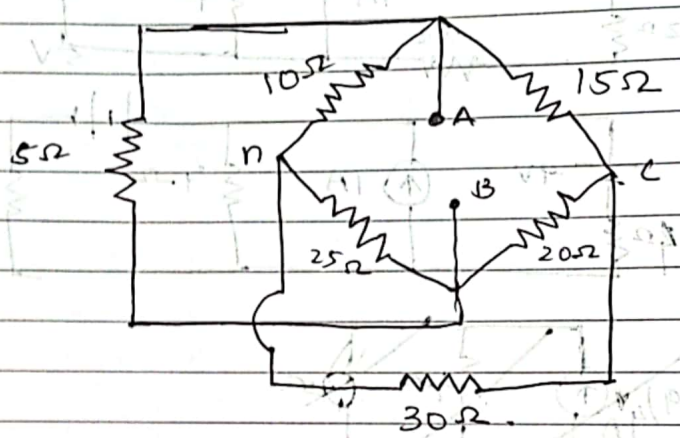




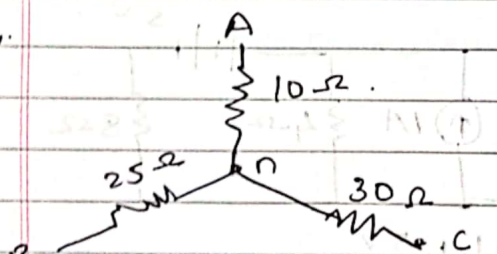
$\therefore I = \frac{1.5}{10} = 0.15A$

H.W questions will be in ppt

Q. Determine the resistance between A and B in the network shown below.



Ans.

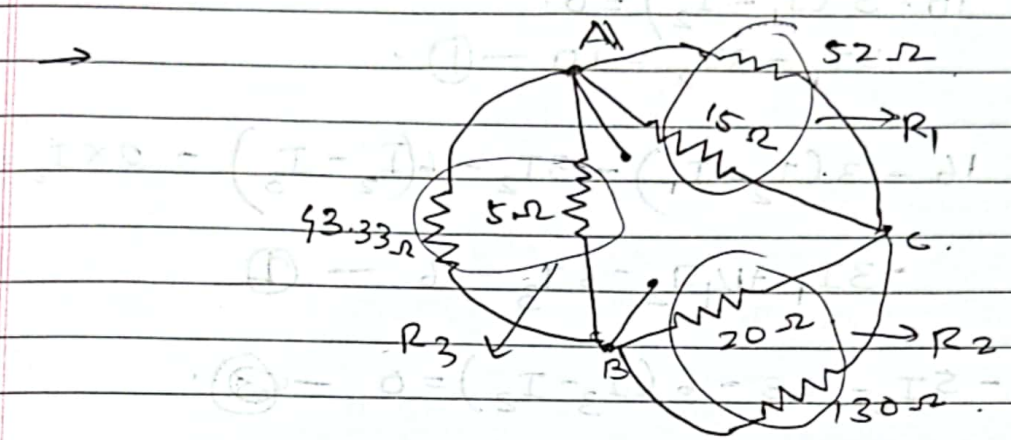


$$R_{AB} = R_A + R_B + \frac{R_A R_B}{R_C}$$

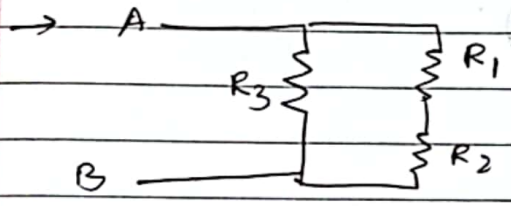
$$= 10 + 25 + \frac{10 \times 25}{30} = 43.33\,\Omega$$

$$R_{BC} = 25 + 30 + \frac{30 \times 25}{10} = 130\,\Omega$$

$$R_{CA} = 30 + 10 + \frac{30 \times 10}{25} = 52\,\Omega$$



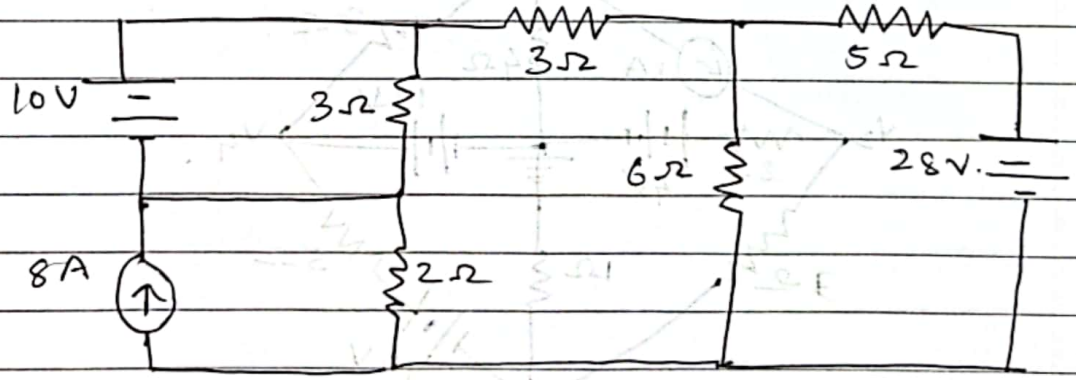
and



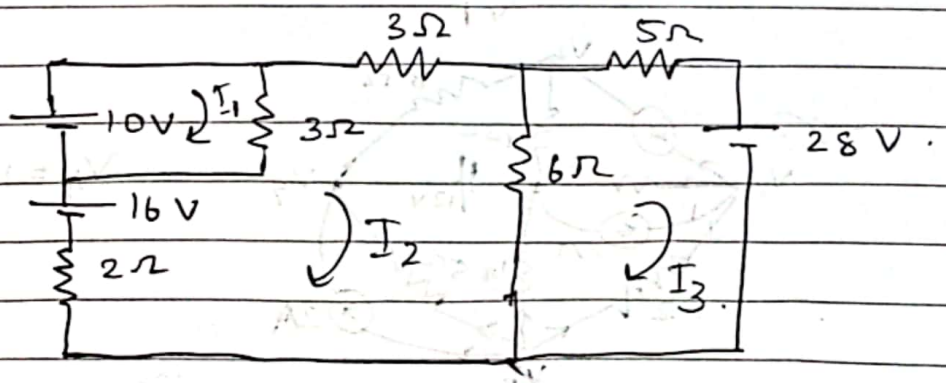
and calculate answer.

$$R_{AB} = \frac{(R_1 + R_2) R_3}{R_1 + R_2 + R_3} =$$

Q. Find voltage across the current source using mesh current analysis.



Ans.



$10 - 3(I_1 - I_2) = 0$

$3I_1 - 3I_2 = 10$ — (1)

$16 - 3(I_2 - I_1) - 3I_2 - 6(I_2 - I_3) - 2 \times I_2 = 0$

$-3I_1 + 14I_2 - 6I_3 = 16$ — (2)

$-5I_3 - 28 - 6(I_3 - I_2) = 0$ — (3)

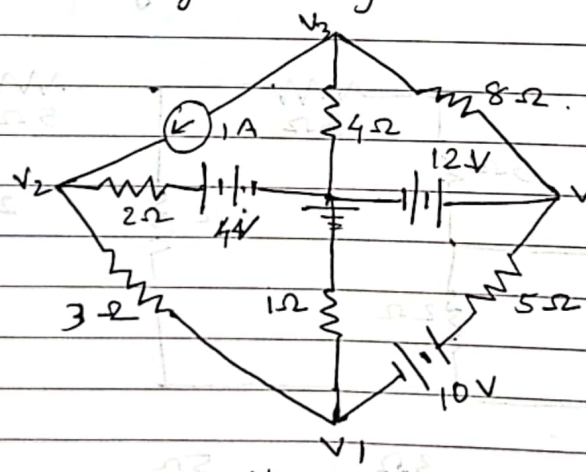
$-6I_2 + 11I_3 = -28$ — (3)

$I_1 = 4.72$ A

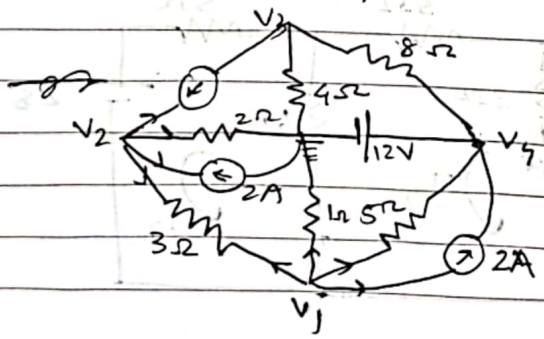
$I_2 = 1.38$ A

$I_3 = -1.78$ A

Q. Find the voltage of all nodes using node voltage analysis.



Ans.



$V_4 = 12$ V

$\frac{V_1 - V_2}{3} + 1$

$\frac{V_2 - V_1}{3} +$

$\frac{V_2 -}{3}$

$\frac{V_3 - 12}{8} +$

$V_1 =$

$V_2 = 4.$

$V_3 = 4/3$

V_4

$$\frac{V_1 - V_2}{3} + \frac{V_1 - 0}{1} + \frac{V_1 - 12}{5} + 2 = 0 \quad \text{— (1)}.$$

$$\frac{V_2 - V_1}{3} + \frac{V_2 - 0}{2} - 2 - 1 = 0.$$

$$\frac{V_2 - V_1}{3} + \frac{V_2}{2} = 3 \quad \text{— (2)}.$$

$$\frac{V_3 - 12}{8} + \frac{V_3 - 0}{4} + 1 = 0 \quad \text{— (3)}.$$

$V_1 = 1.14\ V$

$V_2 = 4.05\ V$

$V_3 = 4/3 = 1.33\ V.$