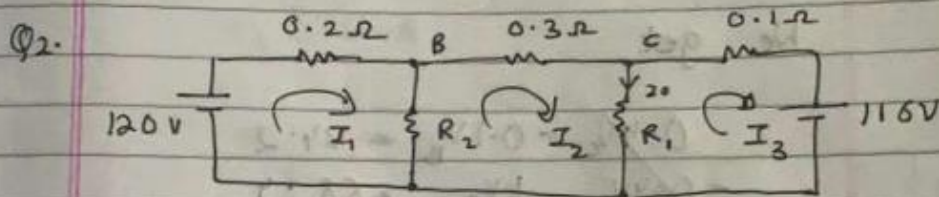


Current - division  $i_5 = 2A$ ,  $i_3 = 1.5A$



Mesh Rule

Loop 1  $120 = 0.2I_1 + R_2(I_1 - I_2)$  ( $V = IR$ )

Loop 2

OR

Nodal Analysis

$$\frac{V_B - V_A}{0.2} + \frac{V_B - V_C}{0.3} + 30 = 0$$

$$\Rightarrow \frac{V_B - 120}{0.2} + \frac{V_B - V_C}{0.3} = -30$$

$$0.5V_B - 36 + (-0.2V_C) = -1.8$$

$$0.5V_B - 0.2V_C = 36 - 1.8 = 34.2$$

$$\frac{V_c - V_B}{0.3} + \frac{V_c + 116}{0.1} + 20 = 0$$

$$0.4 V_c - 0.1 V_B - 116(0.3) = -20(0.03)$$

$$0.4 V_c - 0.1 V_B - 34.8 = -0.6$$

$$0.4 V_c - 0.1 V_B = 34.8 - 0.6 = 34.2$$

$$2 \times (-0.2 V_c + 0.5 V_B = 34.2) \quad \text{--- ①}$$

We get

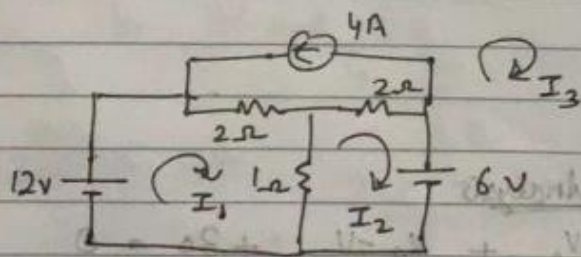
$$\begin{aligned} 0.4 V_c - 0.1 V_B &= 34.2 \\ -0.4 V_c + 1 V_B &= 68.4 \end{aligned}$$

$$(I - I) + 0.9 V_B = 102.6$$

$$V_B = \frac{102.6}{0.9} = 114V, \quad V_c = 114V$$

$$\underline{V_B = 114V} \quad \text{and} \quad \underline{V_c = 114V}$$

Q3.



$$12 = [(I_3 - I_2) + I_1] \cdot 2 - 2(I_3 - I_1)$$

$$= 2[I_1 + I_2 - I_3] + (I_1 - I_2)$$

$$12 = (3I_1 - 2I_3 - I_2) \quad \text{--- ①}$$

$$2(I_3 - I_1) + 2(I_3 - I_1) = 0$$

$$2I_3 - 8 - 2I_2 - 8 + 2I_3 + 2I_1 = 0$$

$$4I_3 - 16 - 2I_2 + 2I_1 = 0$$

$$I_3 = -4A$$

$$-6 = 2(I_2 - I_3) + (I_2 - I_1) \quad \text{--- (2)}$$

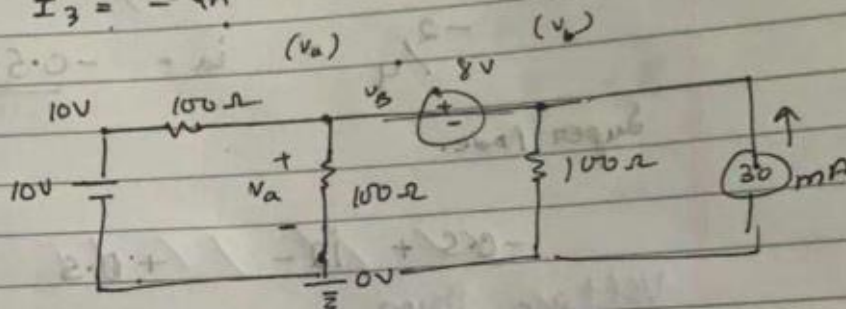
$$-6 = 3I_2 - 2I_3 - I_1 \quad \text{--- (3)}$$

From eq (1), (2), (3)

$$I_1 = -1/4 (0.25A), I_2 = (-19/4) \rightarrow -4.75A$$

$$I_3 = -4A$$

Q4.



Node Analysis

$$V = IR$$

$$8 \times 10^3 \cdot R$$

$$\frac{V_a - 10}{100} + \frac{V_a - 8}{100} + \frac{V_a}{100} = 30 \text{ mA}$$

$$\frac{V_a - 10}{100} + \frac{V_a - 8}{100} + \frac{V_a}{100} = 30 \times 10^{-3}$$

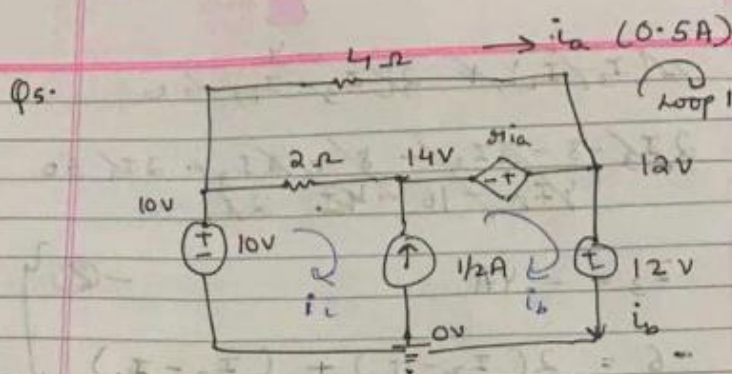
$$3V_a - 18 = 3$$

$$V_a = \frac{21}{3} = 7V$$

Ans

7V





In Loop 1

$$V = IR$$

$$V - V_1 = -i_a(4)$$

$$12 - 10 = -i_a(4)$$

$$-2/4 = i_a = -0.5A$$

Super Node

$$-0.5 + 1/2 - 1/2 = 0$$

Voltage Drop

$$(14 - 12) = 2$$

$$\therefore 2/0.5 = 4$$

$$V = IR$$

$$(V_R = I)$$

$$(V/I = R)$$

In loop

$$-4i_a - 4 - 2(i_i - i_a) = 0$$

$$-6i_a - 2i_i = 4$$

$$i_i = \frac{4 + 8(-1/2)}{-2} = \frac{4 - 4}{-2} = 0$$

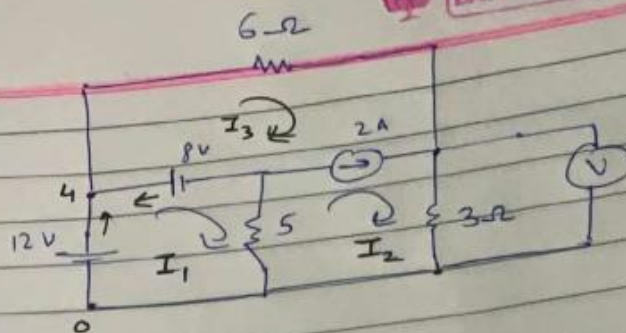
$$i_i + i_b = 1/2$$

$$\Rightarrow -5/2 \Rightarrow -2.5$$

$$i_b = 1/2 - 2.5$$

$$= -2A$$

Q6.



$$I_2 \rightarrow 2/3 \text{ A}$$

$$4\text{V} = 5(I_1 - I_2) \quad ; \quad 8I_3 = 6$$

$$I_3 = 3/4 \quad ; \quad (4/5 + 2 = I_1 = \frac{14}{5})$$

$$\rightarrow I_2 \rightarrow 2/3 \text{ A}$$

$$V = (I_2 + 2)3 = IR$$

$$= \left(\frac{2}{3} + 2\right)3 = \frac{8}{3} \times 3$$

$$\underline{8\text{V}}$$