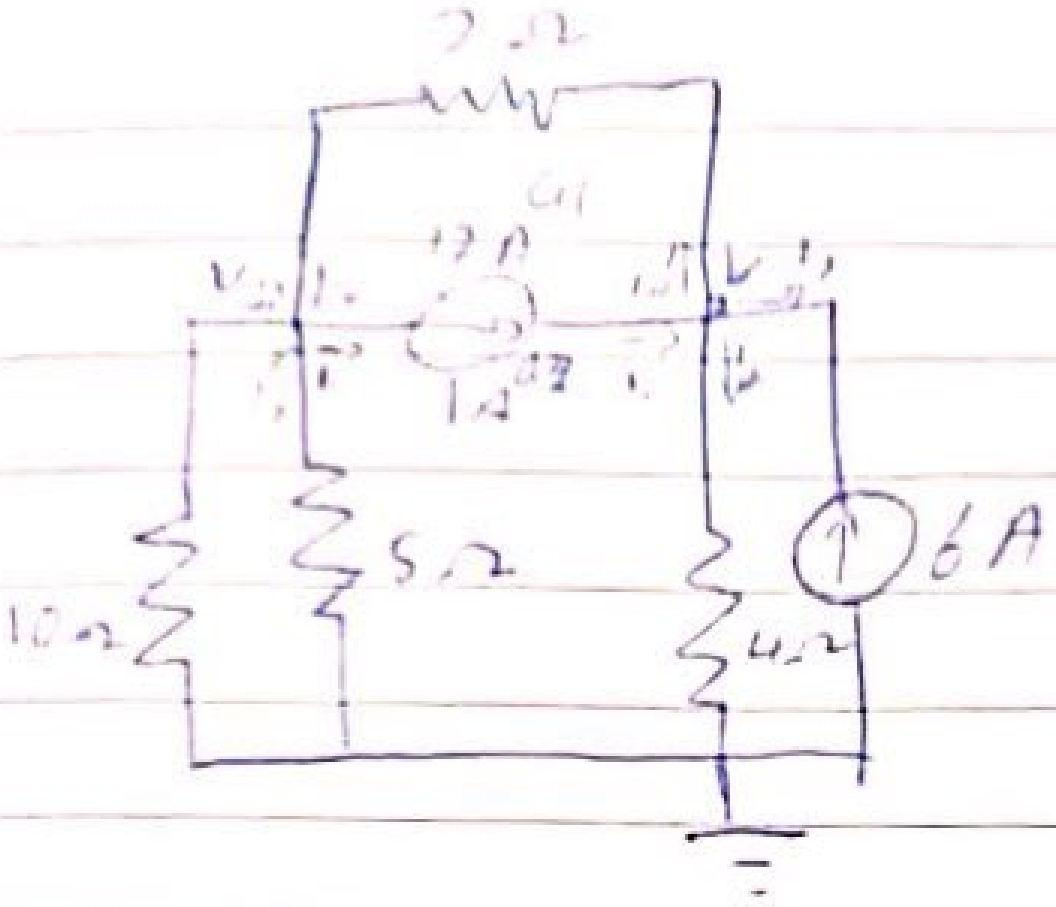

Q. For node 1

$$i_1 = i_2 + i_3 + i_4$$

$$12A = \frac{v_1 - 0}{5} + \frac{v_1 - 0}{10} + \frac{v_1 - v_2}{2}$$

$$120A = 2v_1 + v_1 + 5(v_1 - v_2)$$

$$120 = 8v_1 - 5v_2 \quad \text{--- (1)}$$

For node 2

$$i_1 = i_2 + i_3 + i_4$$

$$12A = \frac{v_2 - 0}{4} + -6A + \frac{v_2 - v_1}{2}$$

$$18A = \frac{v_2}{4} + \frac{v_2 - v_1}{2}$$

INSPIRA

$7_2 = V_2 + 2V_2 - 2V_1$

$7_2 = 3V_2 - 2V_1 \quad \cdots (i)$

$7_2 = 3V_2 - 2V_1$ 1

$100 = -5V_2 + 8V_1$

$V_1 = \frac{360}{7} = 51.43\ V$

$V_2 = \frac{403}{7} = 58.29\ V$

∴ For Node 1

$i_1 = 12A \quad i_2 = \frac{51.43}{5} = 10.29\ A$

$i_3 = \frac{51.43}{10} = 5.143\ A$

$i_4 = \frac{5.43 - 58.29}{2}$

$= \frac{-6.86}{2} = -3.43A$

INSPIRA

For Node 2

$i_1 = 10A$

$i_2 = \frac{58.28}{4} = 14.57A$

$i_3 = -6A$

$i_4 = \frac{V_2 - V_1}{2}$

$= \underline{3.43A}$

Q2 For Node 1

$i_1 = i_2 + i_3 + i_4$

$1A = \frac{V_1}{5} + \frac{V_1}{10} + \frac{V_1 - V_2}{2}$

$10A = 2V_1 + V_1 + 5V_1 - 5V_2$

$10A = 8V_1 - 5V_2 \quad \text{---(1)}$

For Node 2

$i_2 = i_3 + i_4$

$1A = \frac{V_2}{4} - 6A + \frac{V_2 - V_1}{2}$

Solutions

$V_1 = 12.14\ V$

$V_2 = 17.43\ V$

For Node 1

$i_1 = 1A \quad i_2 = \frac{12.14}{5} = 2.43A$

$i_3 = \frac{12.14}{10} = 1.21A$

$i_4 = \frac{12.14 - 17.43}{2} = \frac{-5.29}{2} = -2.65A$

For Node 2

$i_1 = 1A, \quad i_2 = \frac{17.43}{4} = 4.36A$

$i_3 = -6A \quad i_4$

$i_4 = \frac{V_2 - V_1}{2} = \frac{5.29}{2} = 2.65A$