PROBLEM SOLVING

Using nodal analysis, find current i_o in the circuit of Fig. 3.66.

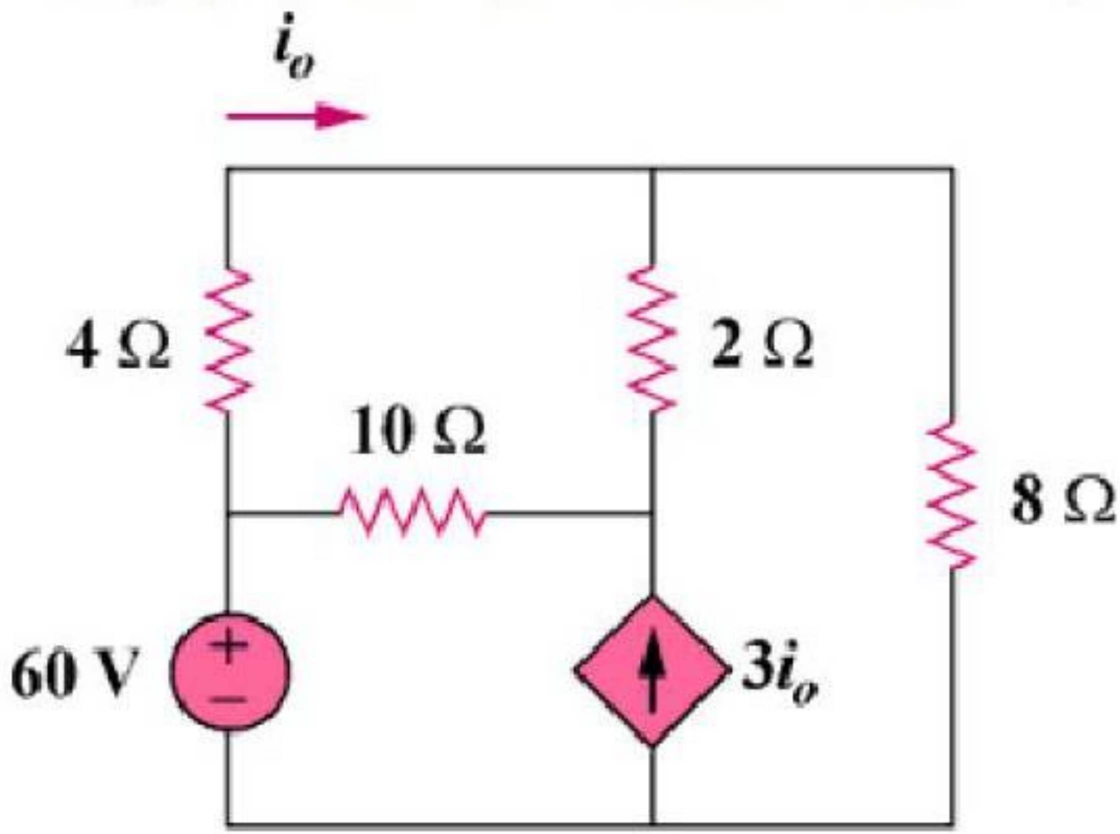
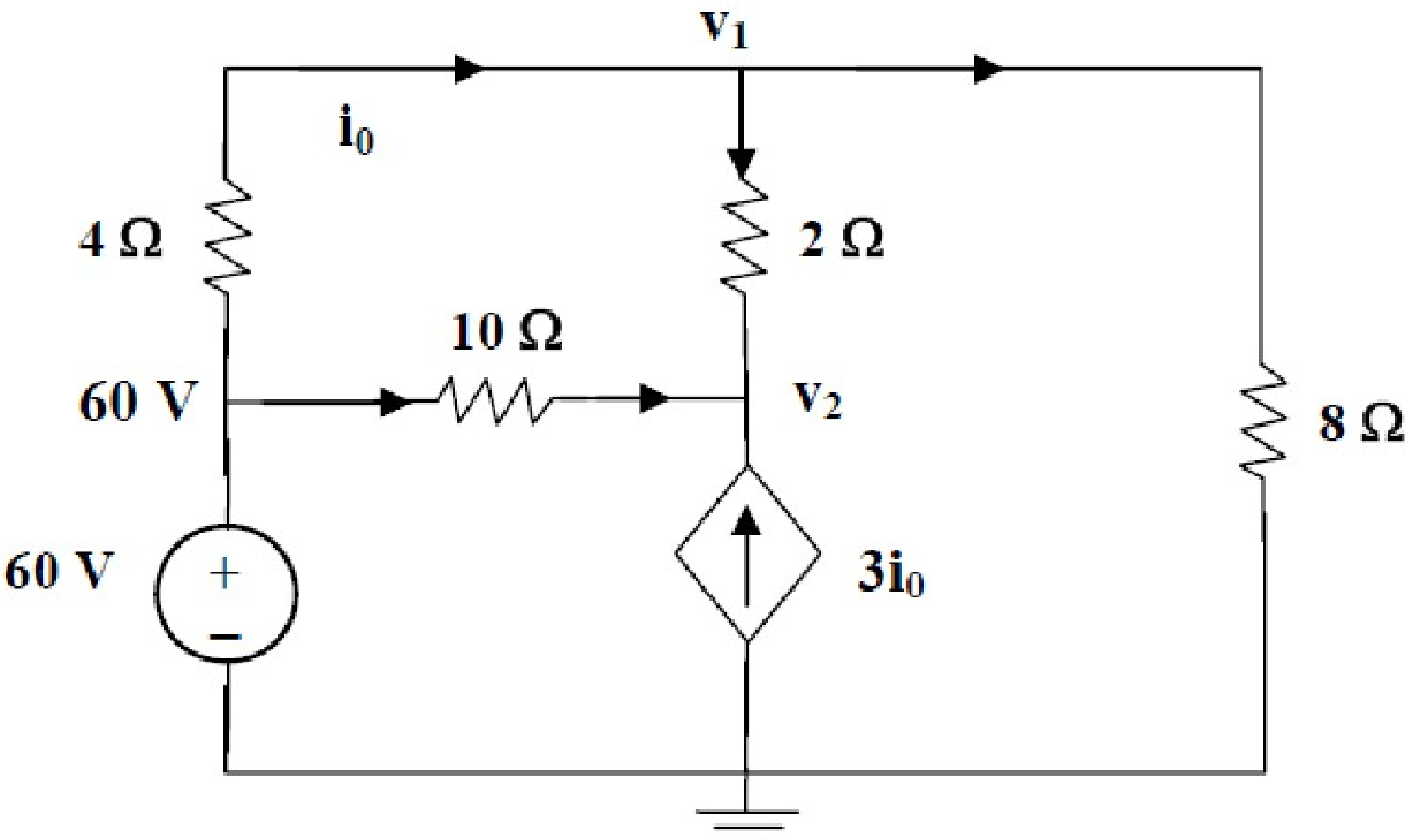


Figure 3.66

SOLUTION



At node 1, $\frac{60 - v_1}{4} = \frac{v_1}{8} + \frac{v_1 - v_2}{2}$ $\qquad 120 = 7v_1 - 4v_2 \qquad$ **(1)**

At node 2, $3i_0 + \frac{60 - v_2}{10} + \frac{v_1 - v_2}{2} = 0$

But $i_0 = \frac{60 - v_1}{4}$.

Hence

$$\frac{3(60 - v_1)}{4} + \frac{60 - v_2}{10} + \frac{v_1 - v_2}{2} = 0 \longrightarrow 1020 = 5v_1 + 12v_2 \qquad (2)$$

Solving (1) and (2) gives $v_1 = 53.08$ V. Hence $i_0 = \frac{60 - v_1}{4} =$ **<u>1.73 A</u>**

PROBLEM SOLVING

Determine the node voltages in the circuit in Fig. 3.67 using nodal analysis.

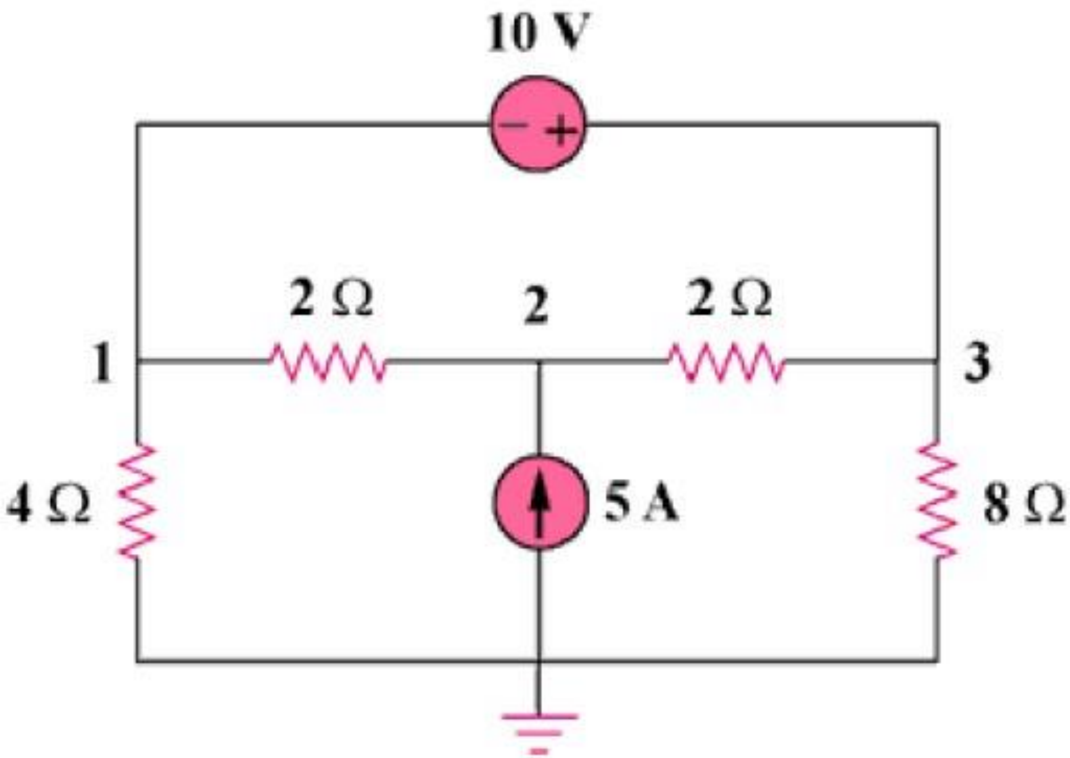
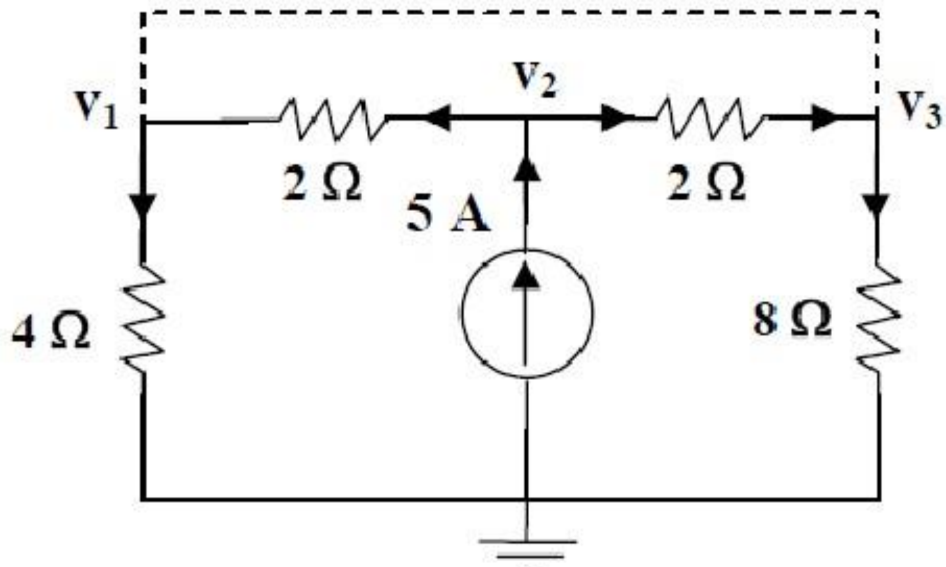
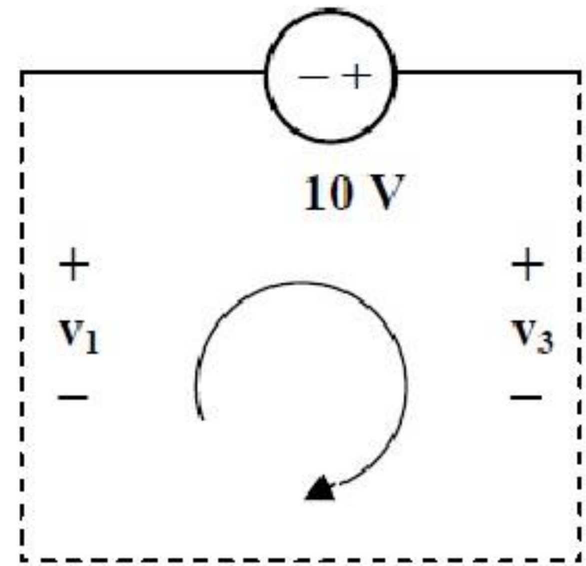


Figure 3.67

SOLUTION



(a)



(b)

At node 2, in Fig. (a), $5 = \frac{v_2 - v_1}{2} + \frac{v_2 - v_3}{2} \longrightarrow 10 = -v_1 + 2v_2 - v_3$ (1)

At the supernode, $\frac{v_2 - v_1}{2} + \frac{v_2 - v_3}{2} = \frac{v_1}{4} + \frac{v_3}{8} \longrightarrow 40 = 2v_1 + v_3$ (2)

From Fig. (b), $-v_1 - 10 + v_3 = 0 \longrightarrow v_3 = v_1 + 10$ (3)

Solving (1) to (3), we obtain $v_1 =$ **10 V**, $v_2 =$ **20 V** $= v_3$