

Problem 1 Using nodal analysis evaluate v_o in the circuit of Fig. 1.

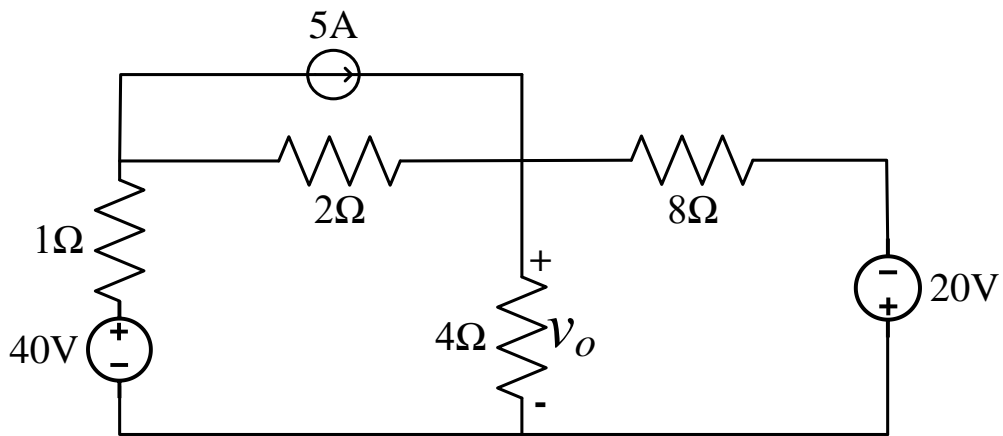


Fig. 1

Problem 2 Using mesh analysis method find out the current through $30\ \Omega$, $40\ \Omega$ and $60\ \Omega$ resistors in Fig. 2.

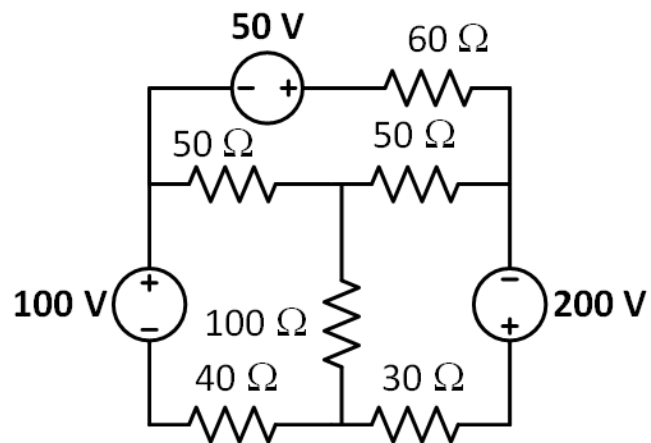
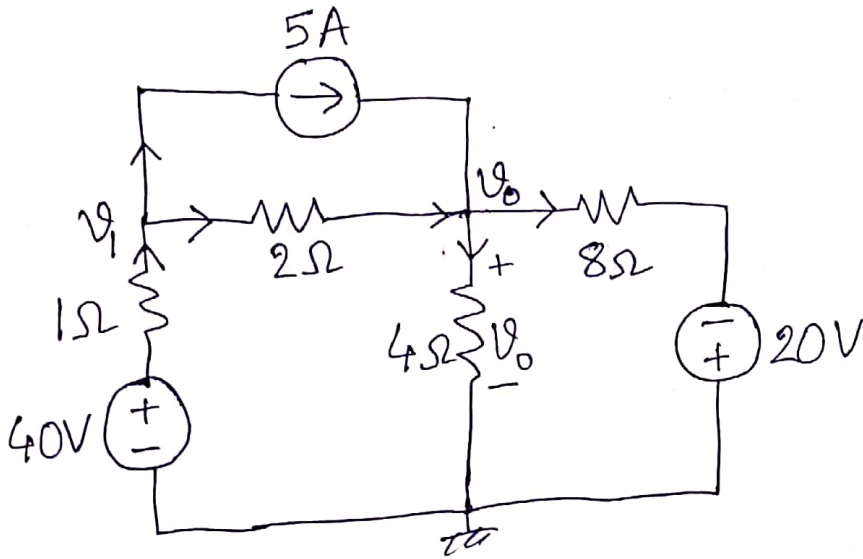


Fig. 2

2)

At node v_1 :

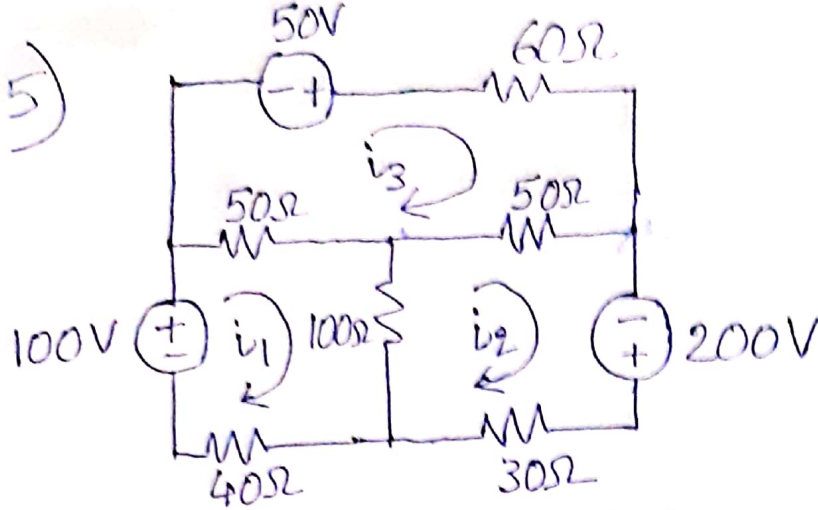
$$\frac{v_1 - v_0}{2} + 5 = \frac{40 - v_1}{1}$$

$$\Rightarrow 3v_1 - v_0 = 70 \quad \text{--- (1)}$$

$$\text{At node } v_2: \frac{v_1 - v_0}{2} + 5 = \frac{v_0}{4} + \frac{v_0 + 20}{8}$$

$$\Rightarrow 4v_1 - 7v_0 = -20 \quad \text{--- (2)}$$

Solving (1) & (2) $v_0 = 20V$



$$\text{Loop 1: } -100 + 50(i_1 - i_3) + 100(i_1 - i_2) + 40i_1 = 0$$

$$190i_1 - 100i_2 - 50i_3 = 100 \quad \text{--- (1)}$$

$$\text{Loop 2: } -200 + 30i_2 - 100(i_1 - i_2) + 50(i_2 - i_3) = 200$$

$$-100i_1 + 180i_2 - 50i_3 = 200 \quad \text{--- (2)}$$

$$\text{Loop 3: } -50 + 60i_3 - 50(i_2 - i_3) - 50(i_1 - i_3) = 0.$$

$$-50i_1 - 50i_2 + 160i_3 = 50 \quad \text{--- (3)}$$

$$i_1 = i_{40\Omega} = 2.873 \text{ A},$$

$$i_2 = i_{30\Omega} = 3.33 \text{ A},$$

$$i_3 = i_{60\Omega} = 2.252 \text{ A}.$$