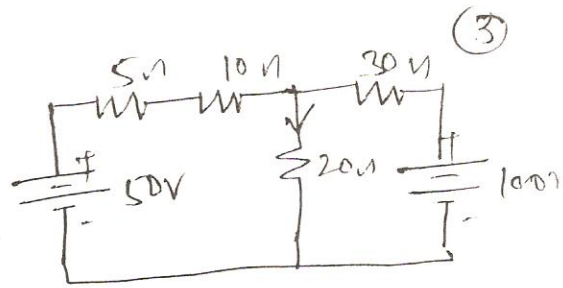
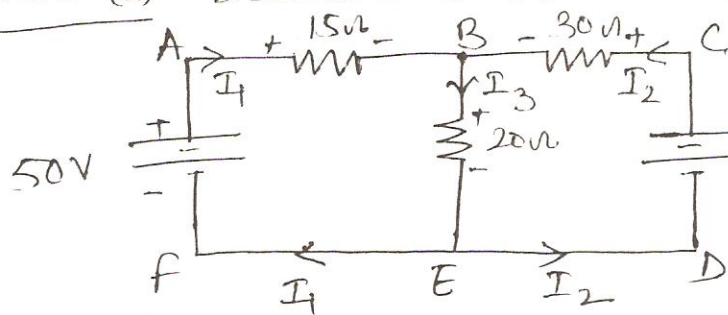


Ans 3. (a) Branch Current Method



In loop ABEFA —
KVL ~~gives~~ gives —

$$+50 - 15I_1 - 20(I_1 + I_2) = 0 \quad \text{--- (1)}$$

In loop BCDEB —
KVL gives —

$$+100 - 30I_2 - 20(I_1 + I_2) = 0 \quad \text{--- (2)}$$

We can rewrite equation ① as

$$50 = 35I_1 + 20I_2 \quad \text{--- (3)}$$

Equation ② as

$$100 = 50I_2 + 20I_1 \quad \text{--- (4)}$$

Divide Equation ③ & ④ by 5

$$7I_1 + 4I_2 = 10 \quad \text{--- (5)}$$

$$4I_1 + 10I_2 = 20 \quad \text{--- (6)}$$

By solving these equations by determinant method we get

$$\Delta = \begin{vmatrix} 7 & 4 \\ 4 & 10 \end{vmatrix} = 70 - 16 = 54$$

$$\Delta_1 = \begin{vmatrix} 10 & 4 \\ 20 & 10 \end{vmatrix} = 100 - 80 = 20$$

$$\Delta_2 = \begin{vmatrix} 7 & 10 \\ 4 & 20 \end{vmatrix} = 140 - 40 = 100$$

$$I_1 = \frac{\Delta_1}{\Delta} = \frac{20}{54} = 0.370 \text{ amp} \quad I_3 = I_1 + I_2 = 0.370 + 1.852 = 2.22 \text{ amp}$$

$$I_2 = \frac{\Delta_2}{\Delta} = \frac{100}{54} = 1.852 \text{ amp}$$