



KVL in loop ①:  $\sum V_{\text{active}} = \sum V_{\text{passive}}$

$$12V = 12i_1 + 10(i_1 - i_2) + 6i_1$$

$$\Rightarrow 28i_1 - 10i_2 = 12$$

$$\Rightarrow 14i_1 - 5i_2 = 6 \quad \text{--- (1)}$$

KVL in loop ②:  $\sum V_{\text{active}} = \sum V_{\text{passive}}$

$$-10(i_2 - i_1) = 30(i_2 - i_3)$$

$$\Rightarrow 10i_1 - 40i_2 + 30i_3 = 0$$

$$\Rightarrow i_1 - 4i_2 + 3i_3 = 0 \quad \text{--- (2)}$$

KVL in loop ③:  $\sum V_{\text{active}} = \sum V_{\text{passive}}$

$$-30(i_3 - i_2) = 25i_3 + 5i_3$$

$$\Rightarrow 60i_3 - 30i_2 = 0$$

$$\Rightarrow 2i_3 - i_2 = 0 \quad \text{--- (3)}$$

$$\Rightarrow \frac{i_2}{2} = i_3 \quad \text{--- (4)}$$

Substituting  $i_3$  in (2),

$$i_1 - 4i_2 + \frac{3i_2}{2} = 0$$

$$\Rightarrow 2i_1 - 5i_2 = 0 \quad \text{--- (5)}$$

From (1) and (5)

$$14i_1 - 5i_2 = 6$$

$$\Rightarrow 2i_1 - 5i_2 = 0$$

$$\hline 12i_1 = 6$$

$$\Rightarrow \boxed{i_1 = 0.5A} \Rightarrow \boxed{i_2 = 0.2A} \Rightarrow \boxed{i_3 = 0.1A}$$

$$V_1 = 10(i_1 - i_2)$$

$$= 10(0.3)$$

$$\Rightarrow \boxed{V_1 = 3V}$$

$$V_2 = 5(i_3)$$

$$= 5(0.1)$$

$$\Rightarrow \boxed{V_2 = 0.5V}$$