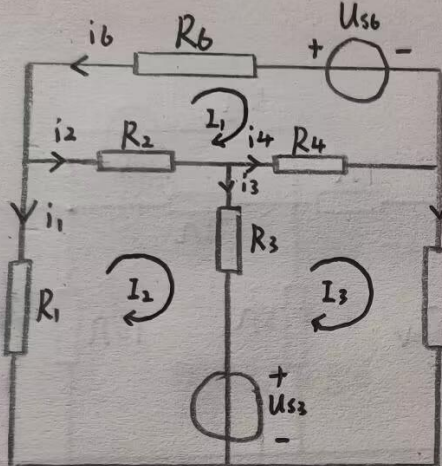


电路作业 (三)

3—7

3—8



网孔电流法:

$$\begin{aligned} (8+10+2)I_1 + 40 &= 10I_2 + 8I_3 \\ (10+10+4)I_2 + 20 &= 10I_1 + 4I_3 \\ (4+8+8)I_3 - 20 &= 4I_2 + 8I_1 \end{aligned}$$

解得: $i_5 = I_3 = -0.956A$

支路电流法: 由KCL得:

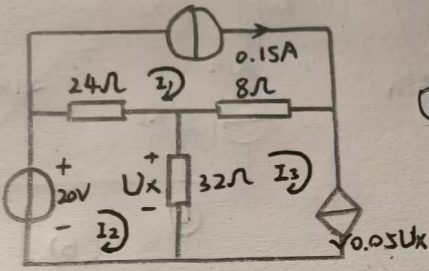
$$\begin{aligned} i_1 + i_2 &= i_6 \\ i_3 + i_4 &= i_2 \\ i_5 + i_6 &= i_4 \end{aligned}$$

由KVL得: $2i_6 + 10i_2 + 8i_4 = 40$

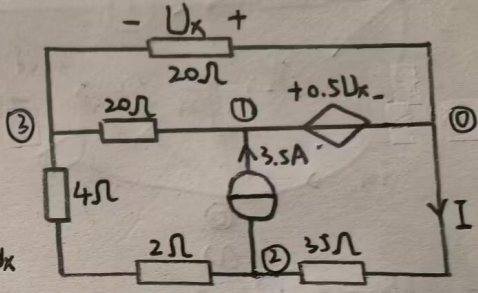
$$\begin{aligned} 10i_1 &= 10i_2 + 4i_3 + 20 \\ 4i_3 + 20 &= 8i_4 + 8i_5 \end{aligned}$$

联立解得: $i_5 = -0.956A$

3—13



(a)



(b)

网孔电流法:

$$32I_2 + 24I_2 - 20 = 32I_3 + 24I_1$$

$$I_3 = 0.05U_x = 1.6(I_2 - 0.05U_x)$$

$$I_1 = 0.15A$$

解得: $U_x = 8V$

结点电压法

$$\textcircled{2}: \frac{U_{n2}}{35} + \frac{U_{n2} - U_{n3}}{4 + 2} + 3.5 = 0$$

$$\textcircled{3}: \frac{U_{n3}}{20} + \frac{U_{n3} - U_{n2}}{4 + 2} + \frac{U_{n3} - U_{n1}}{20} = 0$$

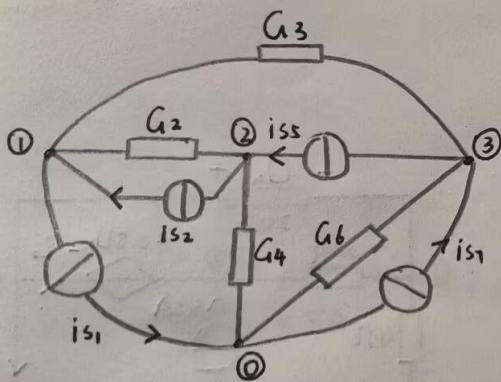
$$U_{n1} = 0.5U_x$$

$$U_{n3} = -U_x$$

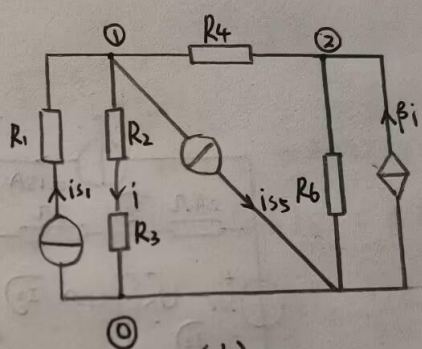
解得: $U_{n2} = -3.5V$

$$\therefore I = \frac{-U_{n2}}{35} = 1A$$

3—15



(a)



(b)

$$\textcircled{1}: (G_2 + G_3)U_{n1} - G_2U_{n2} - G_3U_{n3} + i_{s1} - i_{s2} = 0$$

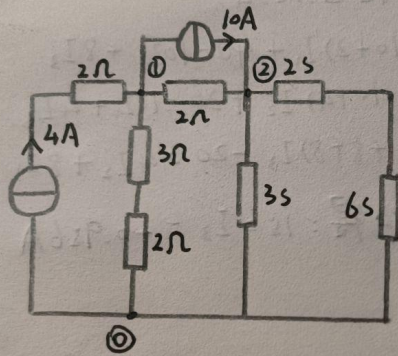
$$\textcircled{2}: (G_2 + G_4)U_{n2} - G_2U_{n1} + i_{s2} - i_{s5} = 0$$

$$\textcircled{3}: (G_3 + G_6)U_{n3} - U_{n1}G_3 + i_{s5} - i_{s7} = 0$$

$$\textcircled{1}: \frac{U_{n1}}{R_2 + R_3} + \frac{U_{n1} - U_{n2}}{R_4} + i_{s5} - i_{s1} = 0$$

$$\textcircled{2}: \frac{U_{n2} - U_{n1}}{R_4} + \frac{U_{n2}}{R_6} - \beta i = 0$$

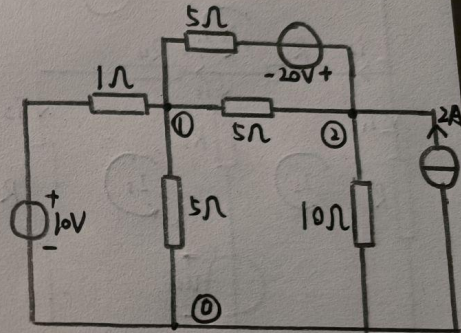
$$i = \frac{U_{n1}}{R_2 + R_3}$$



(a)

$$\textcircled{1} : \frac{U_{n1}}{3+2} + \frac{U_{n1}-U_{n2}}{2} + 10 - 4 = 0$$

$$\textcircled{2} : 3U_{n2} + \frac{U_{n2}-U_{n1}}{2} + \frac{2 \times 6}{2+6} U_{n2} - 10 = 0$$



(b)

$$\textcircled{1} : \frac{U_{n1}}{5} + \frac{U_{n1}-U_{n2}}{5} + \frac{U_{n1}-U_{n2}+20}{5} + \frac{U_{n1}-10}{1} = 0$$

$$\textcircled{2} : \frac{U_{n2}}{10} + \frac{U_{n2}-U_{n1}}{5} + \frac{U_{n2}-U_{n1}-20}{5} - 2 = 0$$