3-2.

(a): n=5, b=10

∴ 有4个KCL方程，6个KVL方程

(b). n=5, b=10

∴ 有4个独立KCL方程，6个独立KVL方程.

3-7.

$$\begin{cases} i_1R_1+i_2R_2+i_3R_3+U_{S3}=0 \\ i_6R_6+i_2R_2+i_4R_4-U_{S6}=0 \\ i_4R_4+i_5R_5-i_3R_3-U_{S3}=0 \\ i_1+i_6=i_2 \\ i_2=i_3+i_4 \\ i_4=i_5+i_6 \end{cases} \Rightarrow \cancel{i_5=-0.0453A} \quad i_5=-0.956A$$

3-8.

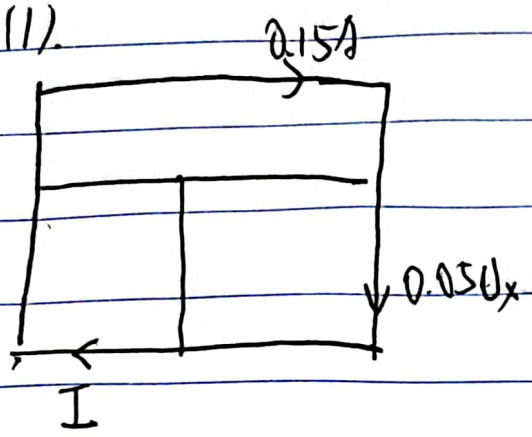
$$\begin{cases} i_1'(R_1+R_6+R_4)+U_{S6}-i_2'R_2-i_3'R_4=0 \\ i_2'(R_1+R_2+R_3)+U_{S3}-i_1'R_2-i_3'R_3=0 \\ \cancel{i_3'(R_3+R_5)-U_{S3}} \\ i_3'(R_3+R_4+R_5)-U_{S3}-i_1'R_4-i_2'R_3=0 \end{cases} \Rightarrow i_5=i_3'=-0.956A$$

~~3-11: $\begin{cases} i_4=i_1+I \\ i_1=I+i_2 \\ i_2+I=i_3 \end{cases}$ $\begin{cases} -20i_2-5i_1=0 \\ -30+5i_4+5i_1+30I=0 \\ -30I+20i_2+5=0 \end{cases}$ 联立解得: $I=0.5A$~~

(3-11在最后)

3-13.

(1).

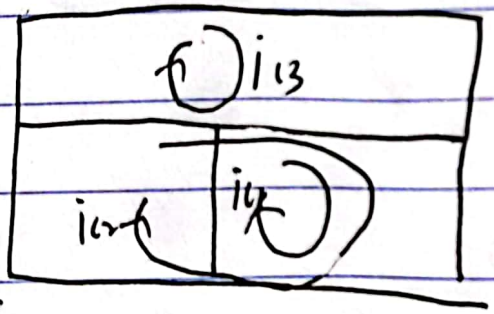


易知 $-20+(I-0.15)\cdot 24+U_x=0$

$U_x+(I-0.05U_x)\cdot 32$

解得 $U_x=8V$.

(2).



$\begin{cases} i_{L1}=3.5A \\ \text{~~$i_{L1}(35+2+4+20)+0.5U_x+35i_{L1}-20i_{L3}=0$~~} \\ i_{L1}(35+2+4+20)+0.5U_x+35i_{L1}-20i_{L3}=0 \\ -U_x-0.5U_x+20i_{L3}-20i_{L2}=0 \end{cases}$

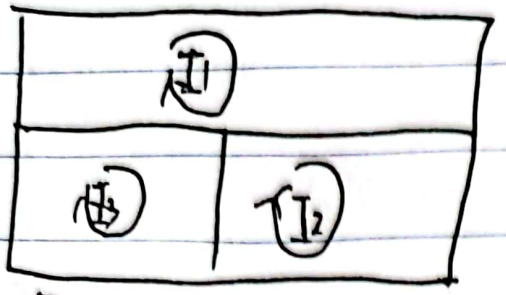
$U_x=20i_{L3}$

解得: $i_{L2}=-2.5A$

$i_{L3}=-1A$

$I=I_{L1}+I_{L2}=3.5-2.5A=1A$

3-14



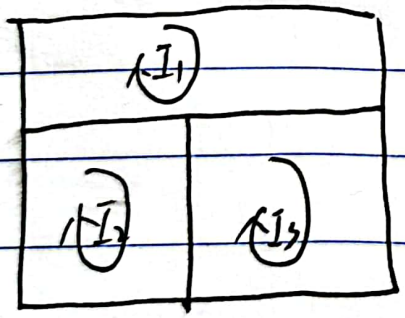
$$\begin{cases} I_1 = 5A \\ 30 + 40I_2 - 20I_1 - 10I_3 = 0 \\ -50 + 40I_x + 10I_3 - 10I_2 = 0 \\ I_x = I_2 \end{cases}$$

联立解得 $\begin{cases} I_3 = 5A \\ I_x = I_2 = 3A \end{cases}$

CCVS电流 $I_{CS} = I_3 - I_1 = 0$

∴ 功率为零

3-11.

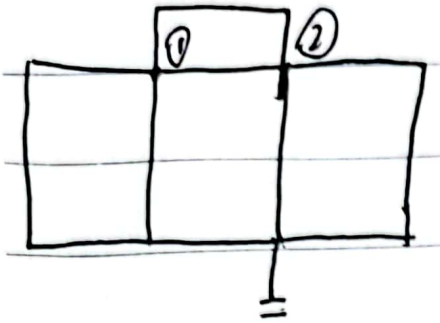


$$\begin{cases} I_1 = 1A \\ -30 + 40I_2 - 5I_1 - 30I_3 = 0 \\ 5 + 50I_3 - 30I_2 - 20I_1 = 0 \end{cases} \Rightarrow \begin{cases} I_1 = 1A \\ I_2 = 2A \\ I_3 = \frac{3}{2}A \end{cases}$$

$$I = I_2 - I_3 = 0.5A$$

3-16. (a).

取参考节点如图所示.



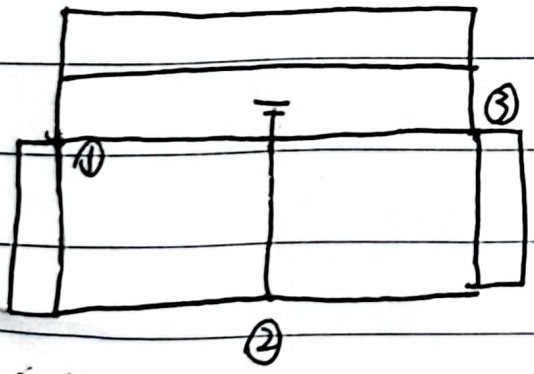
$$\begin{cases} U_{n1}\left(\frac{1}{2}+\frac{1}{5}+\frac{1}{3+\frac{2\times6}{2+6}}\right)-U_{n2}\cdot\frac{1}{2}=4+10 \\ -\frac{1}{2}U_{n1}+U_{n2}\left(\frac{1}{2}+\frac{1}{3+\frac{2\times6}{2+6}}\right)=10 \end{cases}$$

整理后得:

$$\begin{cases} 0.7U_{n1}-0.5U_{n2}=-6 \\ 0.5U_{n1}+5U_{n2}=10. \end{cases}$$

3-18 (b).

取参考节点如图所示.



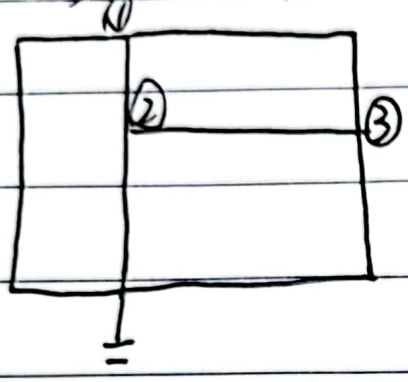
$$\begin{cases} U_{n1}=+1V \\ -\left(\frac{1}{0.2}+1\right)U_{n1}+\left(\frac{1}{0.5}+1+\frac{1}{0.2}+1\right)U_{n2}-U_{n3}=-3-\frac{2}{1} \\ -\frac{1}{0.5}U_{n1}-U_{n2}+\left(1+1+\frac{1}{0.5}\right)U_{n3}=3U_2+3 \\ U_2=U_{n1}-U_{n2} \end{cases}$$

整理得：

$$\begin{cases} U_{n1} = -1V \\ -6U_{n1} + 9U_{n2} - U_{n3} = -5 \\ -5U_{n1} + 2U_{n2} + 4U_{n3} = 3 \end{cases}$$

3-20

取参考节点如图所示



$$\begin{cases} U_{n1} = 48V \\ -\frac{1}{5}U_{n1} + (\frac{1}{5} + \frac{1}{6} + \frac{1}{2})U_{n2} - \frac{1}{2}U_{n3} = 0 \\ -\frac{1}{12}U_{n1} - \frac{1}{2}U_{n2} + (\frac{1}{2} + \frac{1}{2} + \frac{1}{12})U_{n3} = 0 \end{cases}$$

解得：$\begin{cases} U_{n1} = 48V \\ U_{n2} = 18V \\ U_{n3} = 12V \end{cases}$

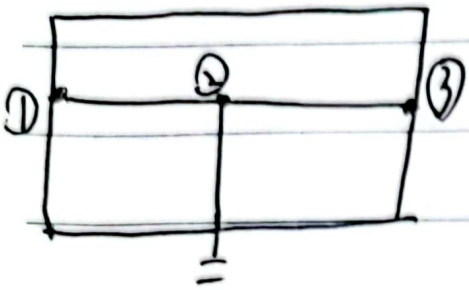
$$\therefore I_0 = \frac{U_{n3} - U_{n2}}{2\Omega} = -3A$$

$$I_{st} \quad \frac{U_{n2} - U_{n1}}{5\Omega} + \frac{U_{n3} - U_{n1}}{3+9} = 0$$

$$I_S = 9A.$$

3-21.

取参考点如下图所示.



$$\begin{cases} U_{n1}=50V \\ -\frac{1}{5}U_{n1}+(\frac{1}{4}+\frac{1}{5}+\frac{1}{20})U_{n2}-\frac{1}{4}U_{n3}=0 \\ U_{n3}=15I \\ U_{n2}=20I \end{cases}$$

解得

$$\begin{cases} U_{n1}=50V \\ U_{n2}=80V \\ U_{n3}=60V \\ I=4A \end{cases}$$

$U=U_{n2}=80V$.