日期: / / 主题: 电分第三章作业

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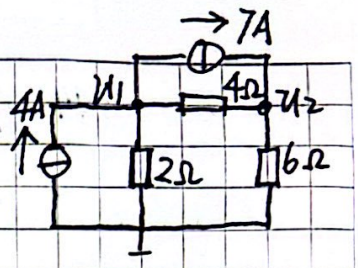
3-4 $\left(\frac{1}{2}+\frac{1}{4}\right)u_{n1}-\frac{1}{4}u_{n2}=4-7$

$-\frac{1}{4}u_{n1}+\left(\frac{1}{4}+\frac{1}{6}\right)u_{n2}=7$

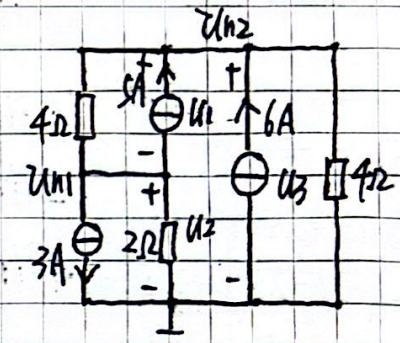
$\begin{cases} u_{n1}=2\,V \\ u_{n2}=18\,V \end{cases}$



3-6 $\left(\frac{1}{2}+\frac{1}{4}\right)u_{n1}-\frac{1}{4}u_{n2}=-3-5$

$-\frac{1}{4}u_{n1}+\left(\frac{1}{4}+\frac{1}{4}\right)u_{n2}=5+6$

$\begin{cases} u_{n1}=-4\,V \\ u_{n2}=20\,V \end{cases}$



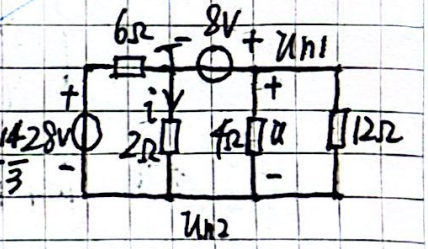
∴ $u_2=-4\,V$ $u_1=24\,V$ $u_3=20\,V$

3-10 $u_{n1}=8\,V$

$-\left(\frac{1}{6}+\frac{1}{2}+\frac{1}{4}+\frac{1}{12}\right)u_{n2}+\left(\frac{1}{4}+\frac{1}{12}\right)u_{n1}=-\frac{14}{3}$

∴ $u_{n2}=2\,V$

$i=\frac{0-(-2V)}{2}=1A$ $u=u_{n1}-u_{n2}=10\,V$



3-11 $u_{n1}=50\,V$

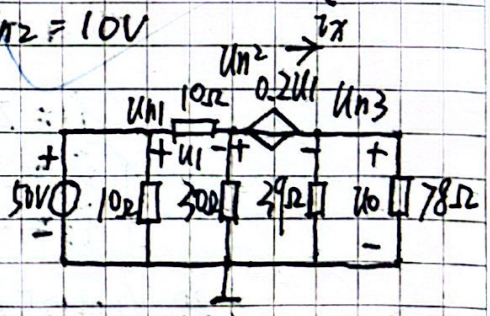
$-\frac{1}{10}u_{n1}+\left(\frac{1}{10}+\frac{1}{30}\right)u_{n2}=-i_x$

$\left(\frac{1}{39}+\frac{1}{78}\right)u_{n3}=i_x$

$u_{n2}-u_{n3}=0.2u_1$

$u_{n1}-u_{n2}=u_1$

∴ $\begin{cases} u_{n2}=30\,V \\ u_{n3}=26\,V \end{cases}$



∴ $u_0=u_{n3}=26\,V$

总结:

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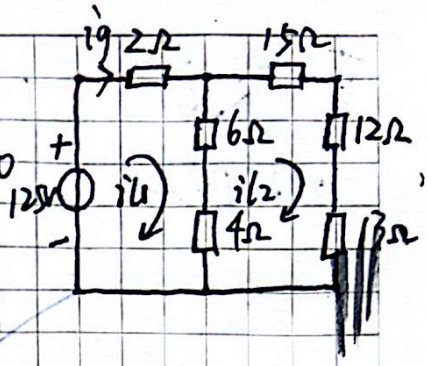
3-14 $(2+6+4)i_{l1} - (6+4)i_{l2} = 125$

$-(6+4)i_{l1} + (6+4+15+12+13)i_{l2} = 0$

$\begin{cases} i_{l1} = 12.5\,A \\ i_{l2} = \frac{25}{6}\,A \end{cases}$ $\therefore i_g = 12.5A$



3-15 $4i_{l1} - 4i_{l3} = \frac{u_1}{8}$ $i_{l1} = \frac{u_1}{8}$

$2i_{l2} - 2i_{l3} = 7$ $i_{l2} = 8$ ×

$-4i_{l1} - 2i_{l2} + (4+2+20)i_{l3} = 0$

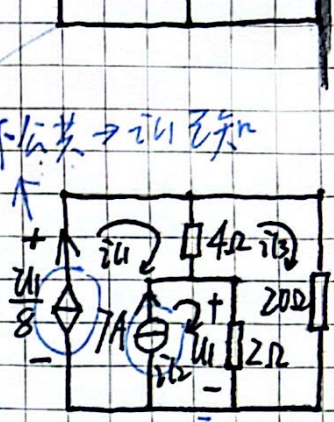
$u_1 = (i_{l2} - i_{l3})2$

$\begin{cases} i_{l1} = \frac{14}{9}A \\ i_{l2} = 7A \\ i_{l3} = \frac{7}{9}A \end{cases}$

$I = i_{l1} - i_{l3} = \frac{5}{9}A$

$P = I^2R = (\frac{5}{9})^2 \times 4 = \frac{100}{81}$ ×

$P = R(i_{l1} - i_{l2}) = 4W$



(电流源→公共→保留ul+辅助方程)

①$i_{l1} = \frac{u_1}{8}$

②$2i_{l2} - 2i_{l3} + u_x = 0$

③$-4i_{l1} - 2i_{l2} + 26i_{l3} = 0$

④$u_1 = (i_{l2} - i_{l3})2$

⑤$7 = i_{l2} - i_{l1}$

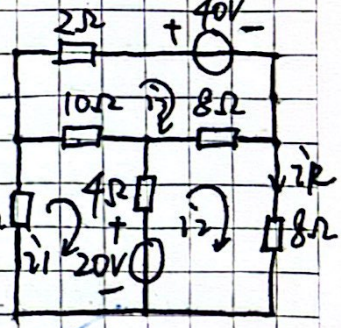
解出: $i_{l1} = 2$, $i_{l2} = 4$, $i_{l3} = 1$, $i_x = 16$, $u_x = 2$

3-16 $(10+10+4)i_1 - 4i_2 - 10i_3 = -20$

$-4i_1 + (4+8+8)i_2 - 8i_3 = 20$

$-10i_1 - 8i_2 + (10+8+2)i_3 = -40$

$\begin{cases} i_1 = 2.50784 \\ i_2 = -0.95611 \\ i_3 = -3.63636 \end{cases}$ $\therefore i_R = -0.956\,A$



3-20 $(2+3+25)i_1 - 25i_2 - 2i_3 = 15$

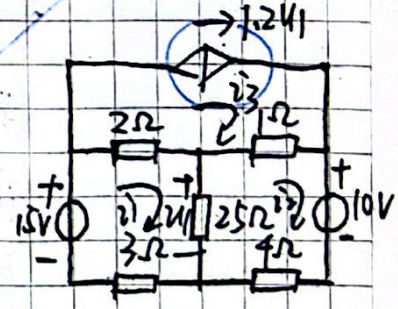
$-25i_1 + (25+4+1)i_2 - i_3 = -10$

$i_3 = 1.2u_1$

$u_1 = \frac{i_1 - i_2}{25}(i_1 - i_2)25$

$\begin{cases} i_1 = \frac{22}{5}A \\ i_2 = \frac{21}{5}A \\ i_3 = 6A \end{cases}$

$I = i_1 - i_3 = -\frac{8}{5}A$ -20



总结: $\begin{cases} i_{l1} = 10 \\ i_{l2} = 9 \\ i_{l3} = 30 \\ u_1 = 25 \end{cases}$

解方程出错

$P = I^2R = 5.12W$ ×

$P = i^2R = 800W$

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3-22 $i_1=6A$

$-6i_1+(2+6+6+4)i_2-4i_3-6i_4=0$

~~$-4i_2+$~~ $i_3=-3$

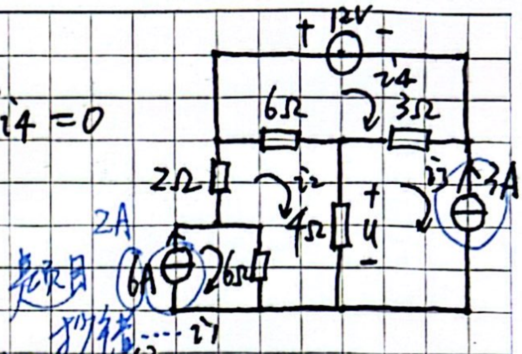
$-6i_2-3i_3+(3+6)i_4=-12$

$\begin{cases} i_1=6A \\ i_2=\frac{13}{6}A \\ i_3=-3A \\ i_4=\frac{16}{9}A \end{cases}$

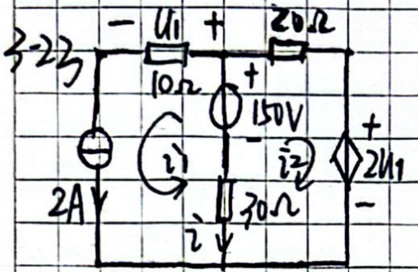
$\therefore u=i_2\cdot R=\frac{13}{6}\times4=\frac{52}{6}V$

$2\times4=8V$

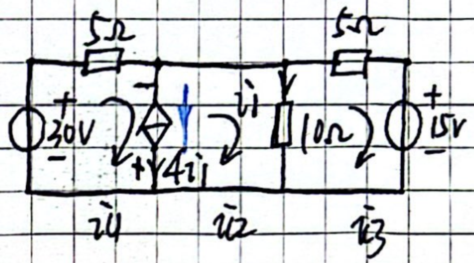
$\begin{cases} i_1=6\ 2 \\ i_2=-1 \\ i_3=-3 \\ i_4=-3 \end{cases}$



3-23



(a)



(b)

(a) $i_1=2$

$30i_1+(20+30)i_2=150-2u_1$

$\frac{u_1}{10}=i_1$

$\therefore \begin{cases} u_1=20V \\ i_1=2A \\ i_2=1A \end{cases}$

$\therefore i=-(i_1+i_2)=-3A$

(b) ~~$i_4=4i_1$~~ $5i_{l1}=u_x+30$

~~$i_2=-4i_1$~~ $10i_{l2}-10i_{l3}=-u_x$

$-10i_{l2}+(10+5)i_{l3}=-15$

$i_1=-i_{l3}+i_{l2}$

$4i_1=i_{l1}-i_{l2}$

$\therefore \begin{cases} i_{l1}=4A \\ i_{l2}=0A \\ i_{l3}=-1A \\ i_1=1A \end{cases}$

总结：