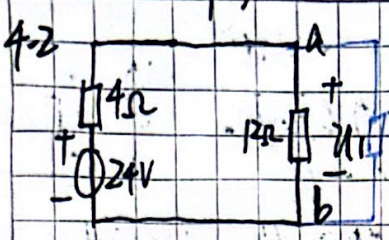
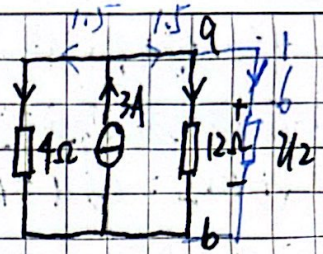
日期：5.9 主题：第4章作业

4-2





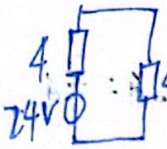
由叠加定理可知 $U_{ab}=U_1+U_2$

$U_1=\frac{12}{4+12}\cdot 24=18V$ $U_2=\frac{4+3}{4+12}\cdot 12=9V$ $\therefore U_{ab}=27V$

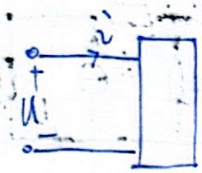
12+6=18V

$R_{总}=\frac{12\times 6}{12+6}+4=8$ 12V

$\frac{4+12}{(4+12)+6}\cdot 6=$ 4 6V



4-5 (1) 将右边看成黑匣子

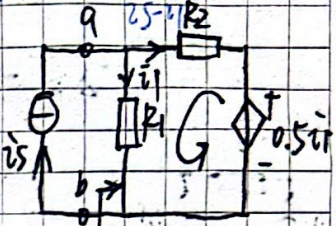


$R=\frac{U}{i}$

$U_{oc}=R_1U_{R1}=i_1R_1=1.5i_1$

$i_{SC}=\frac{0.5i_1}{R_2}=0.25i_1$ ×

$\therefore R_{eq}=\frac{U_{oc}}{i_{SC}}=6\Omega$ × $R=1.5\Omega$



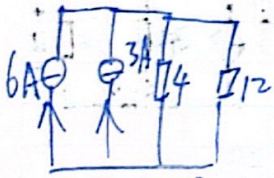
假设U已知

(2) 流过R2电流大小为 i_5-i_1，对回路用KVL

$0.5i_1=-R_2(i_5-i_1)+i_1\cdot R_1$

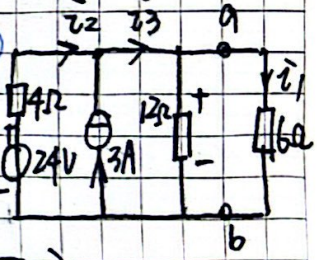
$\therefore i_5=\frac{3}{2}i_1$

4-8 $i_2=\frac{24V}{4\Omega}=6A$ × (有受控电流源影响)

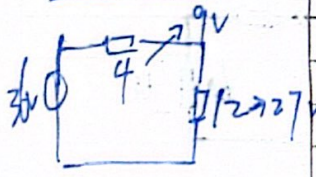


由KCL可知 $i_3=i_2+3A=9A$

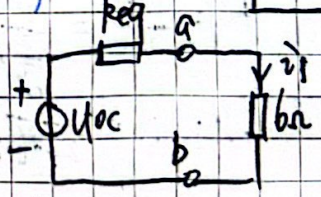
$\therefore U_{ab}=U_{oc}=9A\times 12\Omega=108V$ × 27V



$R_{eq}=\frac{4\times 12}{4+12}=3\Omega$

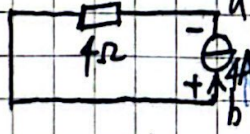


∴等效后电路如图

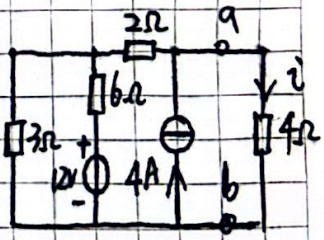


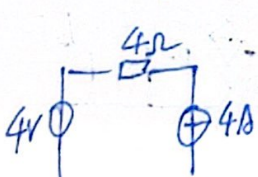
$\therefore i_1=\frac{U_{oc}}{R_{eq}+6\Omega}=12A$ × 3A

4-9 左边可化简为：



$\therefore U_{oc}=U_{ab}=-1V$ 4×5=20V

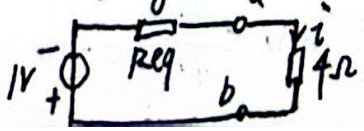




总结：

$R_{eq}=\frac{3\times 6}{3+6}+2=4\Omega$

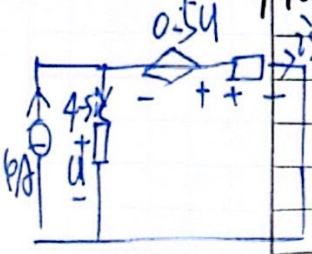
∴电路等效为



$\therefore i=-\frac{1}{4+4}=-\frac{1}{8}A$ ×

$\frac{20}{8}=2.5A$

日期: / / 主题: ①受控量支路不可改变 ②i_{SC}、U_{OC}有方向 ③待电路图独立源



4-10 将ab短路可得$i_{SC}=4-0.5U$

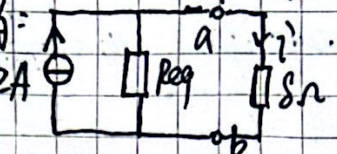
受控电流源可转换为电压源.

由KVL: $0.5U=1.5i_{SC}-U$

$\therefore i_{SC}=0.5U$ $\therefore U=8V=4V$ $i_{SC}=2A$ ×3A

$U_{OC}=4A\times2\Omega=8V$ $\therefore R_{eq}=\frac{U_{OC}}{i_{SC}}=4\Omega$

$\therefore$电路等效为:

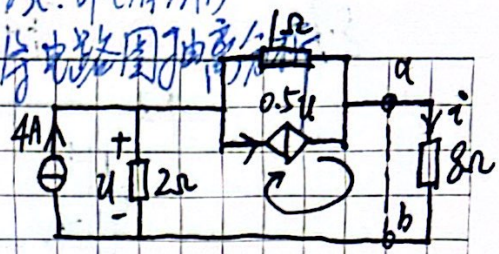


$i=\frac{4}{4+8}\cdot2A=\frac{2}{3}A$ ×1A

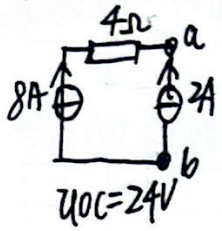
$1.5U=i_{SC}$

而$U=2(4-i_{SC})$

$\therefore i_{SC}=3A$



4-13 设二端口ab



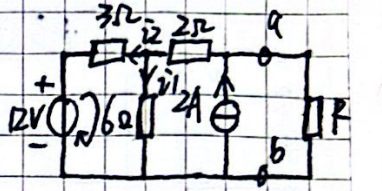
$R_{eq}=\frac{3\times6}{3+6}+2=4\Omega$

由KCL可知$i_1+i_2=2A$, 设$i_2=2-i_1$

由KVL: $12=-3i_2+6i_1=-3(2-i_1)+6i_1$ $\therefore i_1=2A$ $i_2=0A$

$\therefore U_{ab}=U_{OC}=2\times(6+2)=16V$

$\therefore$当$R=R_{eq}=4\Omega$时 $P_{获得}$max. $P_{max}=\frac{U_{OC}^2}{4R_{eq}}=16W$



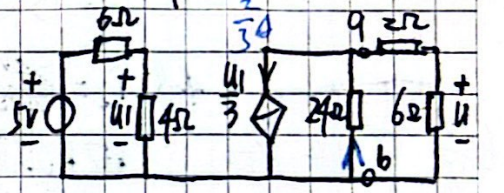
4-14 设二端口ab

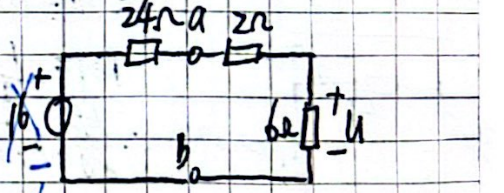
$U_1=\frac{4}{6+4}\cdot5=2V$

$\therefore U_{ab}=U_{OC}=\frac{2}{3}\times24=16V$

$R_{eq}=\frac{U_{OC}}{i_{SC}}=\frac{16V}{\frac{2}{3}A}=24\Omega$

注意U_{OC}的方向 $U=16\times\frac{6}{24+6+2}=3V$





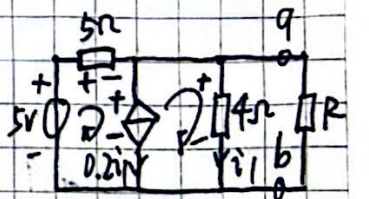
4-17 ~~$U_{ab}=U_{OC}=9-0.8i_1=5V$~~

~~$i_1=$~~ $i_{SC}=\frac{5V}{5\Omega}=1A$

$5V=5\cdot\frac{1.2}{0.4}i_1+U$

$U=4i_1$

$\therefore U=2V$ $i_1=0.5A$



$\therefore U_{OC}=U_{ab}=i_1\cdot4=2V$

$R_{eq}=\frac{U_{OC}}{i_{SC}}=2\Omega$

$\therefore$当$R=R_{eq}=2\Omega$时取得$P_{max}=\frac{U_{OC}^2}{4R_{eq}}=\frac{1}{2}W$

总结: