

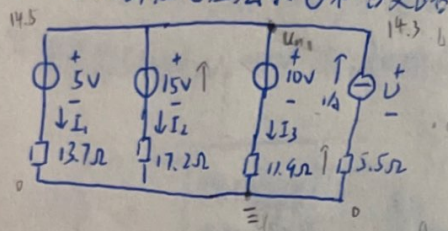


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班级: 能源25

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3-21 用节点电压法求 U 和各支路电流

$$\left(\frac{1}{13.7} + \frac{1}{17.2} + \frac{1}{11.9}\right) U_{n1} = \frac{5}{13.7} + \frac{15}{17.2} + \frac{10}{11.9} + 1$$

$$U_{n1} = 14.3V$$

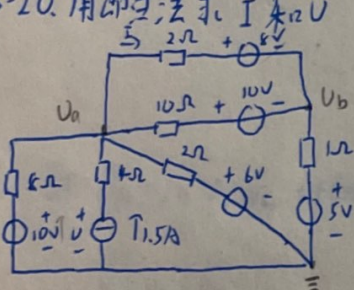
$$U_{n1} = U - 1 \times 5.5$$

$$U = 14.3 + 5.5$$

$$U = 19.8V$$

$$I_1 = \frac{14.3 - 5}{13.7} \quad I_2 = \frac{14.3 - 15}{17.2} \quad I_3 = \frac{14.3 - 10}{11.9}$$

$$I_1 = 0.68A \quad I_2 = -0.04A \quad I_3 = 0.36A$$

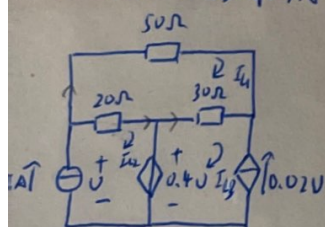
3-20 用节点法求 I 和 U 

$$\begin{cases} \left(\frac{1}{8} + \frac{1}{2} + \frac{1}{10} + \frac{1}{2}\right) U_a - \left(\frac{1}{10} + \frac{1}{2}\right) U_b = \frac{10}{8} + 1.5 + \frac{10}{10} + \frac{8}{2} + \frac{6}{2} \\ -\left(\frac{1}{10} + \frac{1}{2}\right) U_a + \left(\frac{1}{2} + \frac{1}{10} + \frac{1}{1}\right) U_b = -\frac{8}{2} + \frac{10}{10} + \frac{5}{1} \end{cases}$$

$$\Rightarrow \begin{cases} U_a = 10.75V \\ U_b = 4.03V \end{cases} \quad I = \frac{10.75 - 8 - 4.03}{2} = -0.64A$$

$$U = 10.75 + 4 \times 1.5 = 16.75V$$

3-15 用回路法求 1A 电源发出的功率



$$(50 + 30 + 20) I_1 - (20) I_2 - (30) I_3 = 0$$

$$I_2 = 1A$$

$$I_3 = -0.02A$$

$$U = 20(I_2 - I_1) + 0.4V$$

$$\Rightarrow \begin{cases} 100 I_1 + 0.6U = 20 \\ -20 I_1 - 0.6U = -20 \end{cases}$$

$$\Rightarrow U = 33.33V$$

$$P_{\text{发}} = IU = 1 \times 33.33 = 33.33W$$

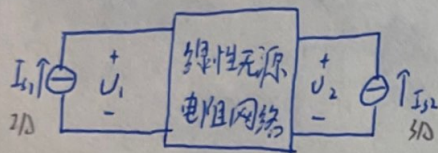
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4-10 $I_{s1}=2A$, $I_{s2}=3A$, 当 $3A$ 电流源断开时, $2A$ 输出功率为 $28W$, $U_2=8V$; 当 $2A$ 电流源断开时, $3A$ 输出功率为 $54W$, $U_1=12V$, 求同时作用时, 每个电流源的输出功率

① $3A$ 断开时.② $2A$ 断开时.

$$U_1 = \frac{28}{2} = 14V$$

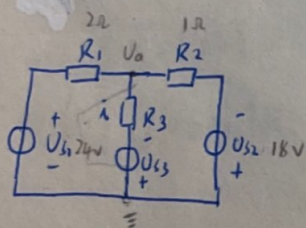
$$U_2 = \frac{54}{3} = 18V$$

共同作用:

$$P_{s1} = 2 \times (14 + 12) = 52W$$

$$P_{s2} = 3 \times (18 + 8) = 78W$$

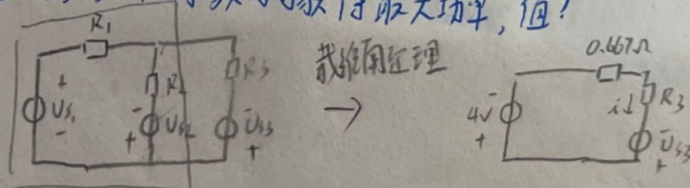
5. 已知 $U_{s1}=24V$, $U_{s2}=18V$, $R_1=2\Omega$, $R_2=1\Omega$

① $U_{s3}=15V$, $R_3=3\Omega$ 时 R_3 中的电流

$$\left(\frac{1}{2} + \frac{1}{1} + \frac{1}{3}\right) U_a = \frac{24}{2} - \frac{15}{3} - \frac{18}{1}$$

$$-6 = -15 + U_{R3} \quad U_a = -6V$$

$$i = \frac{-6 + 15}{3} = 3A$$

② $U_{s3}=15V$ R_3 为多大时可获得最大功率, 值?当 $R_3=0.667\Omega$ 时功率最大

$$P_{max} = \frac{(4+5)^2}{4 \times 0.667} = 45.375W$$

③ 使 R_3 中电流为零, U_{s3} 应为多少?

$$U_{s3} = 4V$$



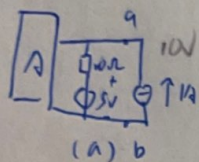
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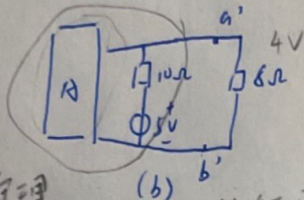
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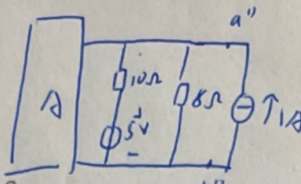
4-36. (a) 中 $U_{ab}=10V$, (b) 中 $U_{a'b'}=4V$, 求 (c) 中 $U_{a''b''}$



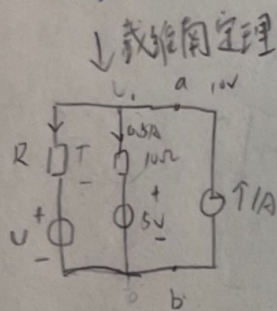
(a) b



(b)

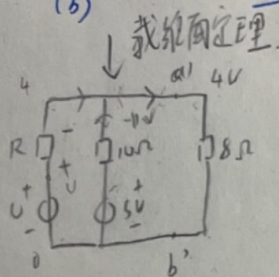


(c)

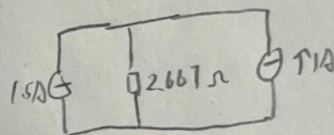
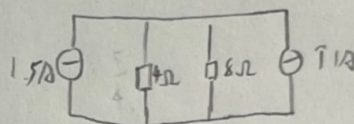
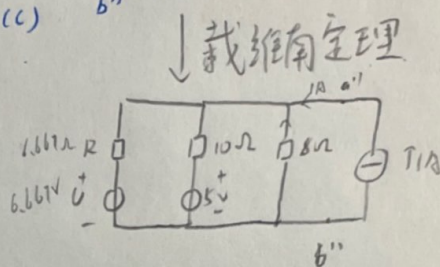


$$10 = 0.5R + U$$

$$\Rightarrow \begin{cases} R = 6.667 \Omega \\ U = 6.667 V \end{cases}$$



$$4 = -0.4R + U$$



$$\begin{aligned} U_{a''b''} &= (1.5 + 1) \times 2.667 \\ &= 6.67 V \end{aligned}$$