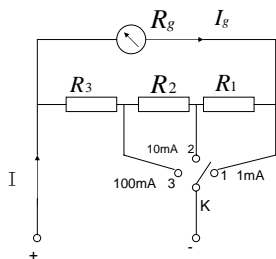


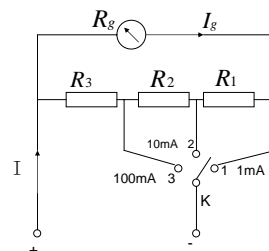
例2-1 电流表分流器原理图如图示



已知 表头内阻 $R_g=1k\Omega$, 表头满刻度电流 $I_g=100\mu A$
要求构成能测量1mA, 10mA, 100mA的电流表, 求分流电阻的阻值。

1

解:



$$\text{设 } R=R_1+R_2+R_3$$

当开关K位于1时:

$$I_g = \frac{R}{R+R_g} I = \frac{R}{R+1000} \times 1 = 0.1 \text{ mA}$$

$$R = 111.11 \Omega$$

2

当开关K位于2时:

$$I_g = \frac{R_2+R_3}{R+R_g} I = \frac{R_2+R_3}{111.11+1000} \times 10 = 0.1 \text{ mA}$$

$$R_2+R_3 = 11.11 \Omega$$

$$R_1 = R - (R_2+R_3) = 111.11 - 11.11 = 100 \Omega$$

3

当开关K位于3时:

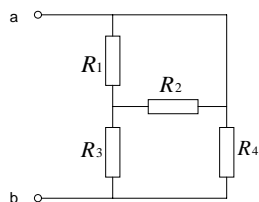
$$I_g = \frac{R_3}{R+R_g} I = \frac{R_3}{111.11+1000} \times 100 = 0.1 \text{ mA}$$

$$R_3 = 1.11 \Omega$$

$$R_2 = 11.11 - 1.11 = 10 \Omega$$

4

例2-2 求 R_{ab}

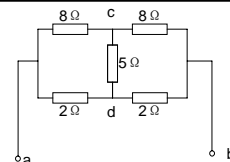


解:

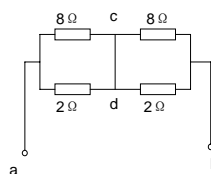
$$R_{ab} = [R_1 // R_2 + R_3] // R_4$$

5

例2-3 求 R_{ab}



解: 法1



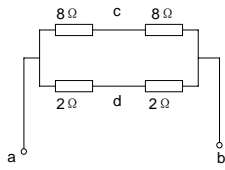
$$R_{ab} = (8//2) + (8//2)$$

$$= 2 \times \frac{8 \times 2}{8 + 2}$$

$$= 3.2 \Omega$$

6

法2



$$R_{ab} = (8 + 8) // (2 + 2)$$

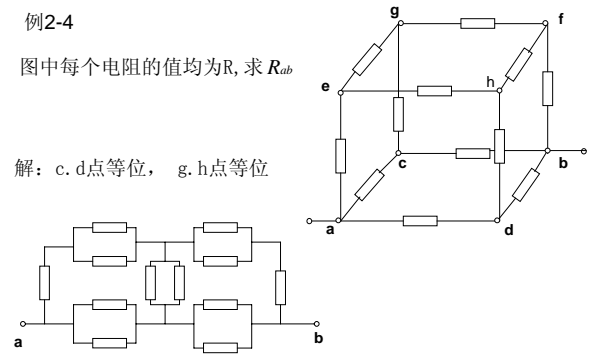
$$= \frac{16 \times 4}{16 + 4} = 3.2 \Omega$$

7

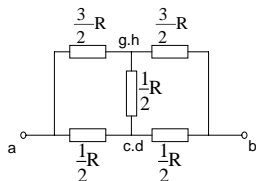
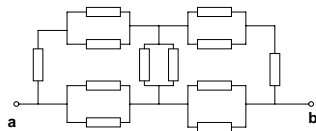
例2-4

图中每个电阻的值均为R, 求 R_{ab}

解: c, d点等位, g, h点等位



8

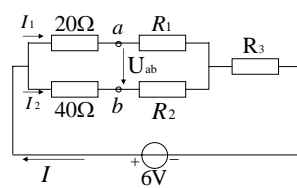
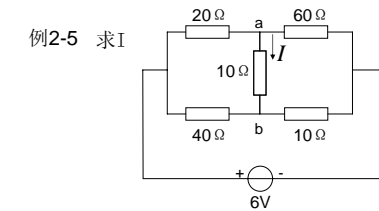


电桥平衡, g, c点等位

$$R_{ab} = 2 \times \frac{\frac{1}{2}R \times \frac{3}{2}R}{\frac{1}{2}R + \frac{3}{2}R} = \frac{3}{4}R$$



例2-5 求I

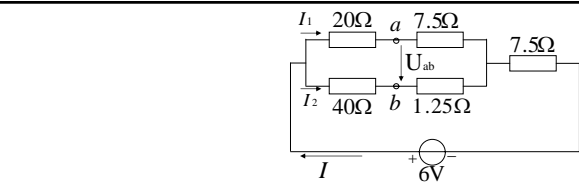


$$R_1 = \frac{10 \times 60}{10 + 10 + 60} = 7.5 \Omega$$

$$R_2 = \frac{10 \times 10}{10 + 10 + 60} = 1.25 \Omega$$

$$R_3 = \frac{10 \times 60}{10 + 10 + 60} = 7.5 \Omega$$

10



$$I = \frac{6}{(20 + 7.5) // (40 + 1.25) + 7.5} = 0.25 A$$

$$I_1 = \frac{40 + 1.25}{20 + 7.5 + 40 + 1.25} \times 0.25 = 0.15 A$$

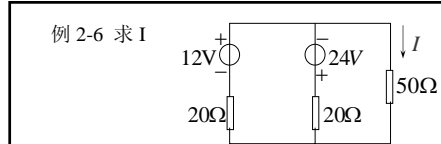
$$I_2 = I - I_1 = 0.25 - 0.15 = 0.1 A$$

$$U_{ab} = -20 \times 0.15 + 40 \times 0.1 = 1 V$$

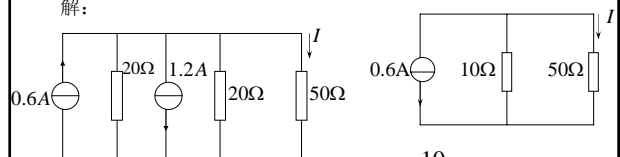
$$I = \frac{1}{10} = 0.1 A$$



例 2-6 求 I



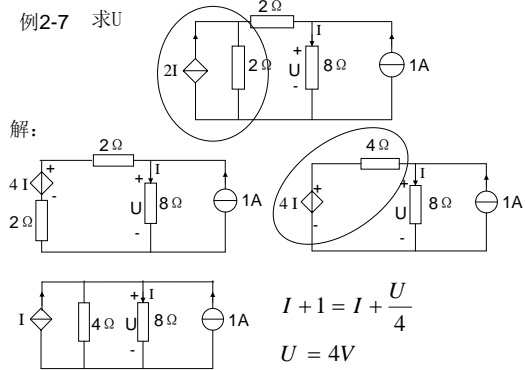
解:



$$I = -\frac{10}{10 + 50} \times 0.6 = -0.1 A$$

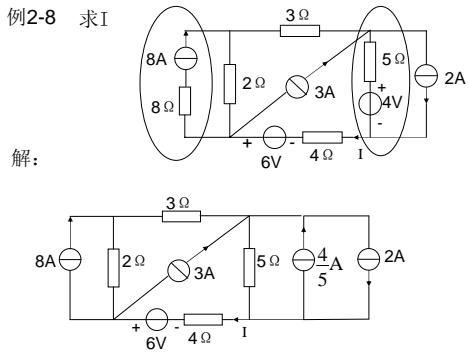
12

例2-7 求U

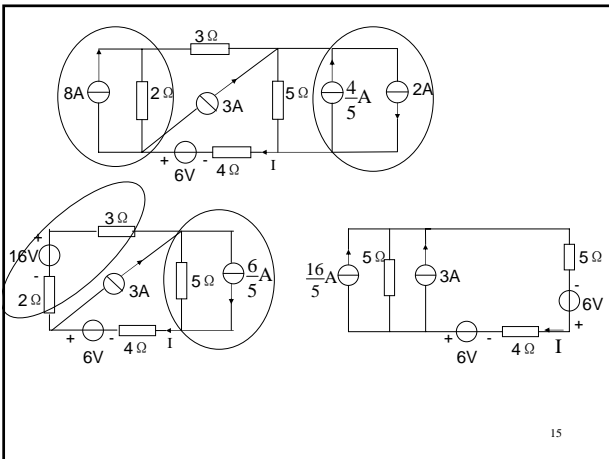


13

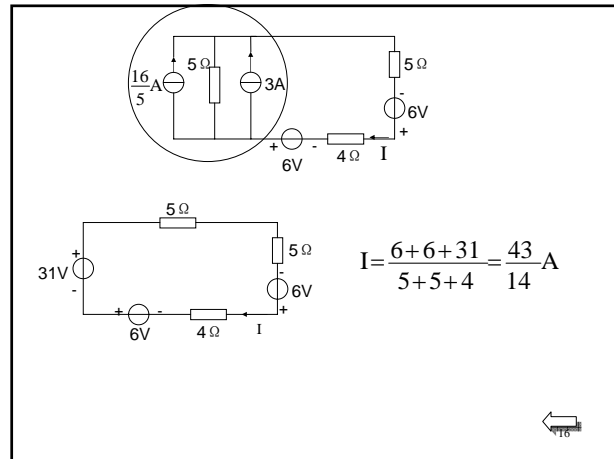
例2-8 求I



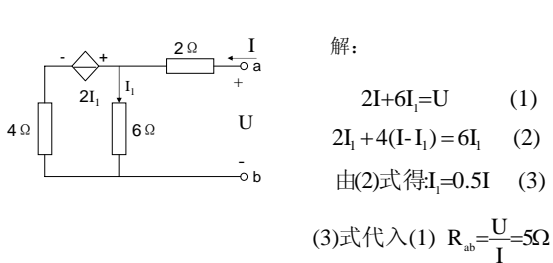
14



15

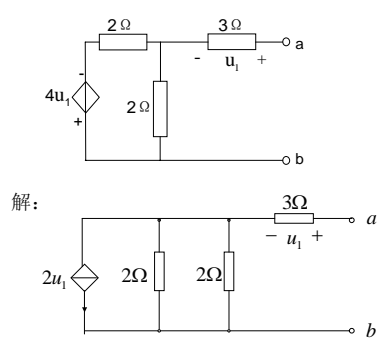


例2-9 求a. b支路的输入电阻

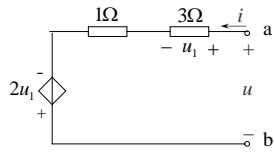
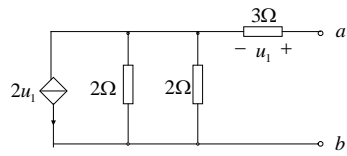


17

例2-10 求a. b支路的输入电阻



18



$$u = u_1 + i - 2u_1$$

$$u_1 = 3i$$

$$R_{ab} = \frac{u}{i} = -2\Omega$$

