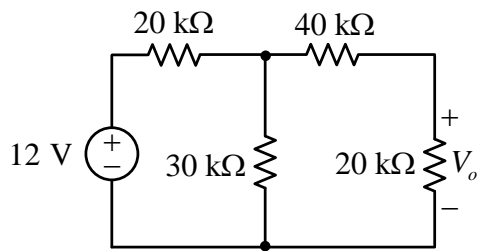
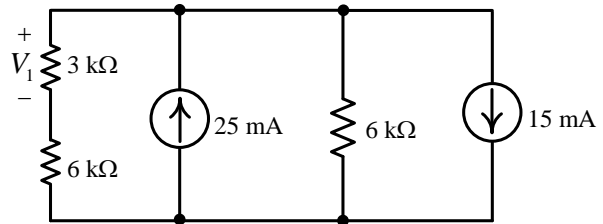


1. Find  $V_o$  in the circuit of **Fig. 1**. (15%)
2. Find  $V_1$  in the circuit of **Fig. 2**. (15%)

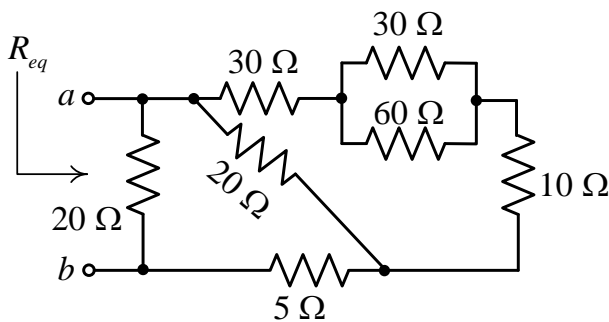


**Fig. 1**

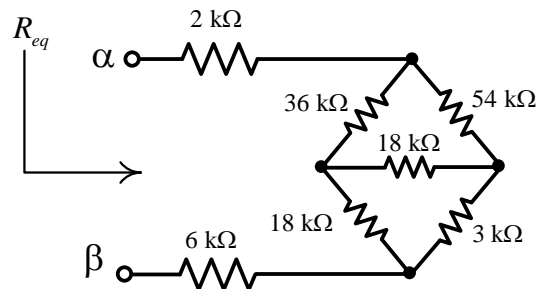


**Fig. 2**

3. Find the resistance  $R_{eq}$  looking into terminals  $a$  and  $b$  of the circuit shown in **Fig. 3**. (15%)
4. Find the resistance  $R_{eq}$  looking into terminals  $\alpha$  and  $\beta$  of the circuit shown in **Fig. 4**. (15%)

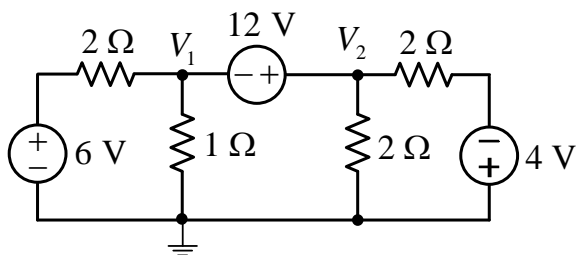


**Fig. 3**

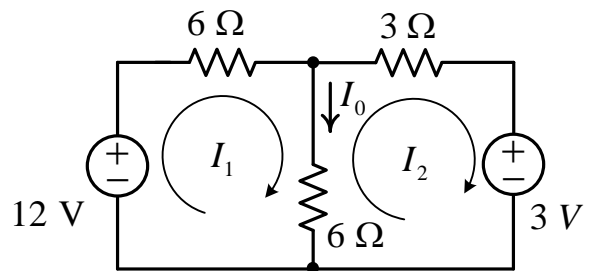


**Fig. 4**

5. Find the node voltages  $V_1$  and  $V_2$  in the circuit of **Fig. 5**. (20%)
6. Find the branch current  $I_0$  in the circuit of **Fig. 6** using the mesh current method. (20%)



**Fig. 5**



**Fig. 6**

電路學(一) 第一次測驗 四電機二A 參考解法

1. Find  $V_o$  in the circuit of Fig. 1.

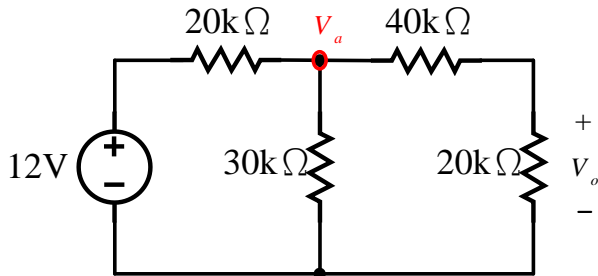


Fig. 1

根據電壓分配定則得到  $V_a$  後再對  $40\text{ k}\Omega$  與  $20\text{ k}\Omega$  做分壓即可得到  $20\text{ k}\Omega$  上的電壓  $V_o$

$$\begin{aligned} V_o &= 12 \times \frac{30\text{k}\Omega // 60\text{k}\Omega}{20\text{k}\Omega + (30\text{k}\Omega // 60\text{k}\Omega)} \times \frac{20\text{k}\Omega}{40\text{k}\Omega + 20\text{k}\Omega} \\ &= 12 \times \frac{20}{40} \times \frac{20}{60} \\ &= 2 \end{aligned}$$

答案:  $V_o = 2\text{ V}$

2. Find  $V_1$  in the circuit of Fig. 2.

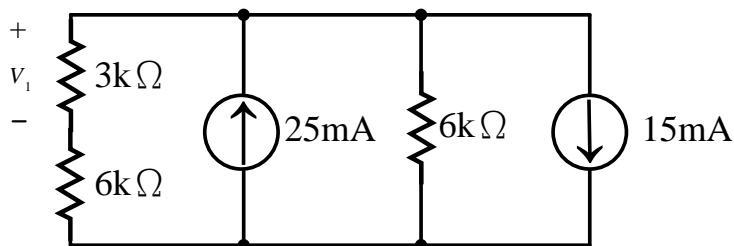


Fig. 2

根據分流定則流經  $3\text{ k}\Omega$  的電流:

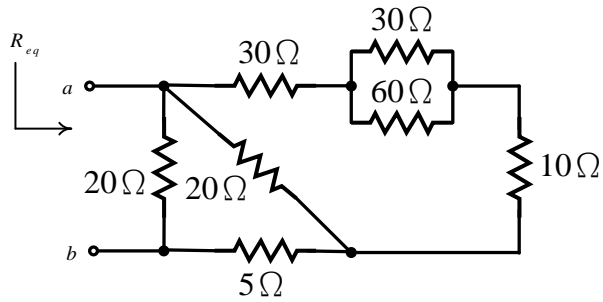
$$25 \times \frac{6\text{k}\Omega}{9\text{k}\Omega + 6\text{k}\Omega} - 15 \times \frac{6\text{k}\Omega}{9\text{k}\Omega + 6\text{k}\Omega} = 4\text{ (mA)}$$

$$V_1 = 4\text{ mA} \cdot 3\text{ k}\Omega = 12\text{ (V)}$$

答案:  $V_1 = 12 \text{ V}$

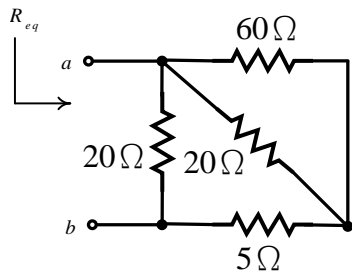
3. Find the resistance  $R_{eq}$  looking into terminals  $a$  and  $b$  of the circuit shown in

**Fig. 3.**



**Fig. 3**

先將右上部分計算後得到  $30 + (30 // 60) + 10 = 60\ \Omega$



$$R_{eq} = 20 // [(60 // 20) + 5] = 10\ \Omega$$

答案:  $R_{eq} = 10\ \Omega$

4. Find the resistance  $R_{eq}$  looking into terminals  $\alpha$  and  $\beta$  of the circuit shown

in **Fig. 4.**

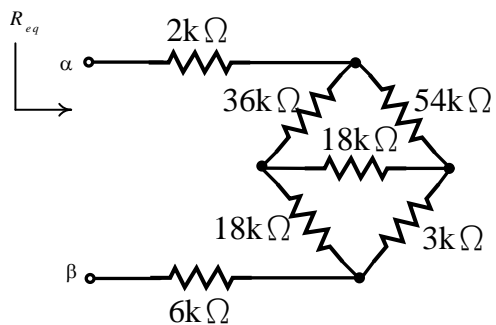
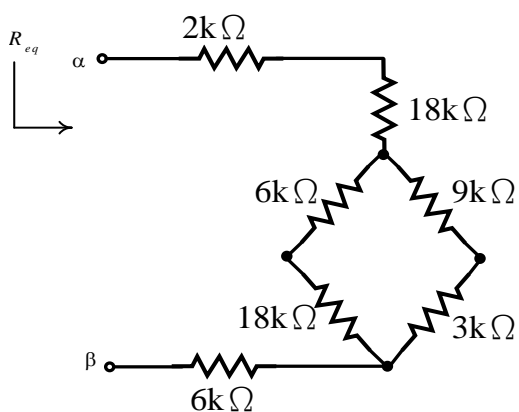


Fig. 4

對  $36k\Omega$ 、 $18k\Omega$ 、 $54k\Omega$   $\Delta$ 化 Y 後



$$R_{eq} = 2 + 18 + (6 + 18 // 9 + 3) + 6 = 34 \text{ k}\Omega$$

答案:  $R_{eq} = 34 \text{ k}\Omega$

5. Find the node voltage  $V_1$  and  $V_2$  in the circuit of Fig. 5.

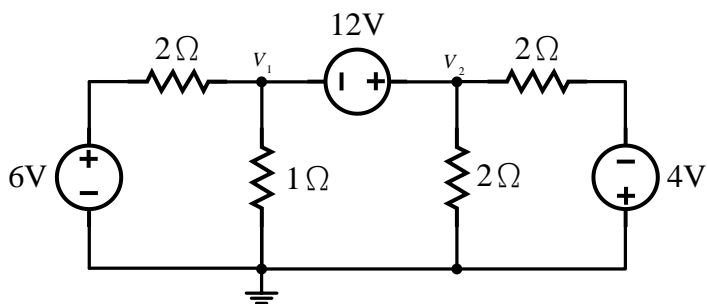


Fig. 5

根據克希荷夫電流定律，流進等於流出，利用節點電壓法假設  $V_1$ 、 $V_2$  點的電

流為流出:

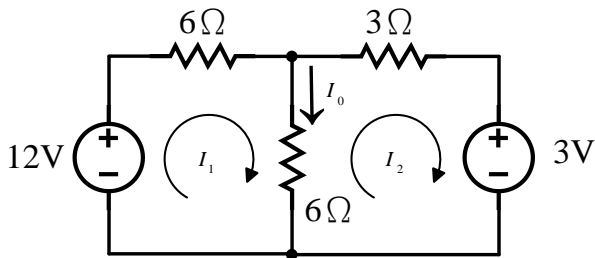
$$\frac{V_1 - 6}{2} + \frac{V_1}{1} + \frac{V_2}{2} + \frac{V_2 + 4}{2} = 0$$

而  $V_2 = V_1 + 12$  代入後

$$\frac{V_1 - 6}{2} + \frac{V_1}{1} + \frac{V_1 + 12}{2} + \frac{V_1 + 12 + 4}{2} = 0 \text{ 即可得到 } V_1 = -4.4, V_2 = 7.6$$

答案:  $V_1 = -4.4$  (V),  $V_2 = 7.6$  (V)

6. Find the branch current  $I_0$  in the circuit of **Fig. 6** using the mesh current method



**Fig. 6**

在所欲求出之網路的迴路中，應用克希荷夫電壓定律寫出兩組迴路方程式以

求出各迴路之電流

$$-12 + 6I_1 + 6(I_1 - I_2) = 0 \quad (1)$$

$$6(I_2 - I_1) + 3I_2 + 3 = 0 \quad (2)$$

$$\text{而 } I_0 = I_1 - I_2 \quad (3)$$

將(1)、(2)式解聯立後便可得到  $I_1$ 、 $I_2$

再帶代回(3)式即可得到  $I_0 = 0.75$

答案:  $I_0 = 0.75(A)$