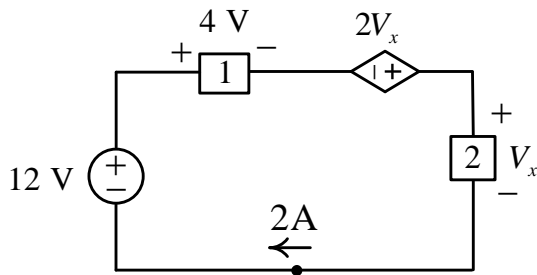


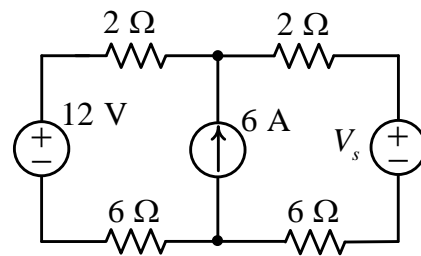
電路學 (一) 第一次測驗 四電機二 A 2015 年 10 月 29 日 (星期四)

- 1) 滿分 100 分，考試時間 2 小時。
- 2) 答案應有正確之數值與單位。
- 3) 可使用計算器，但不得使用電腦、行動電話等通訊器材。不得參閱任何書本及筆記。
- 4) 請確實遵守考試規則，違反考試規則者依本校校規處置。

1. The charge entering the positive terminal of an element is given by  $q(t) = -10e^{-t}$  mC. The power delivered to the element is  $p(t) = 2e^{-2t}$  mW. Calculate (a) the current flowing in the element, (b) the voltage across the element, and (c) the energy delivered to the element in the interval  $0 < t < 100$  ms. (15%)
2. In the circuit of **Fig. 1**, (a) find the value of  $V_x$ , (b) find the electric power that is absorbed by element 2. (c) Is element 2 an active or passive element? (15%)
3. Find the value of  $V_s$  in the circuit of **Fig. 2** such that the power supplied by the 6-A current source is zero. (15%)

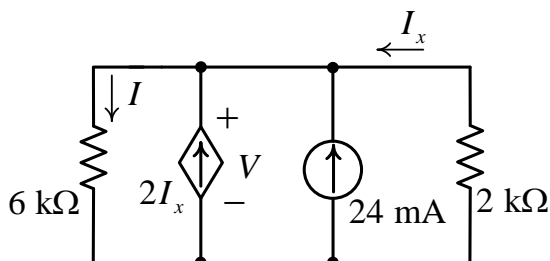


**Fig. 1**

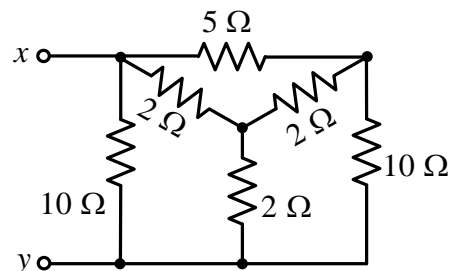


**Fig. 2**

4. Determine the value of  $V$  and the power supplied by the independent current source shown in **Fig. 3**. (10%)
5. Find the equivalent resistance between terminals  $x$ - $y$  in the network of **Fig. 4**. (10%)

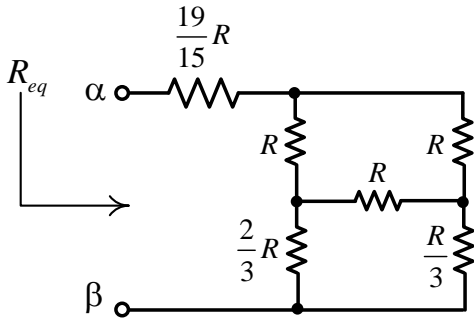


**Fig. 3**

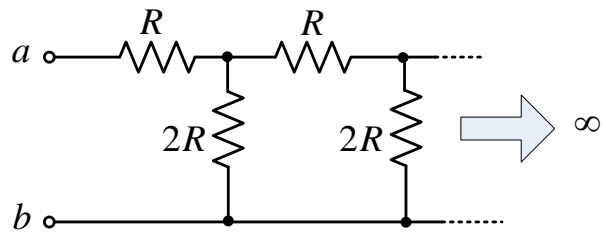


**Fig. 4**

6. Find the equivalent resistance  $R_{eq}$  looking into terminals  $\alpha$  and  $\beta$  of the *bridge circuit* shown in **Fig. 5**. (10%)
7. A network is composed of resistors of  $R$  and  $2R$  connected in series and parallel to construct a *semi-infinite ladder circuit* as shown in **Fig. 6**. Find the resistance looking into terminals  $a$  and  $b$ . (15%)

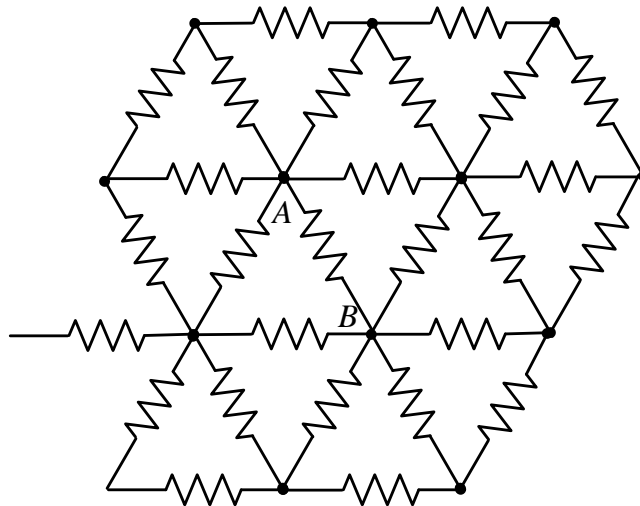


**Fig. 5**



**Fig. 6**

8. An *infinitely extending* resistor grid of triangles is shown in **Fig. 7** in which all the resistors have the same resistance of  $1 \Omega$ . Compute the resistance between two arbitrary adjacent nodes  $A$  and  $B$ . (10%)



**Fig. 7**