

電路學 (一) 第四次測驗 四電機二 A 2016 年 1 月 11 日 (星期一)

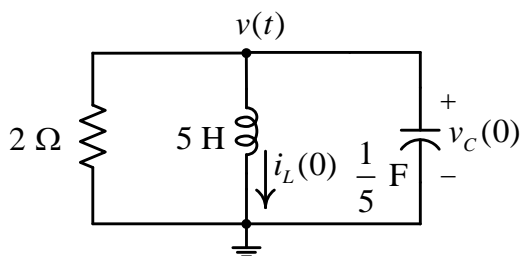
- 1) 滿分 120 分，考試時間 2 小時。
- 2) 答案應有正確之數值與單位。
- 3) 可使用計算器，但不得使用電腦、行動電話等通訊器材。不得參閱任何書本及筆記。
- 4) 請確實遵守考試規則，違反考試規則者，依本校校規處置。

1. A parallel  $R$ - $L$ - $C$  circuit shown in **Fig. 1** has the initial conditions  $i_L(0) = -1$  A and  $v_C(0) = 4$  V. Find the inductor current  $i_L(t)$ , for  $t > 0$ . (20%)

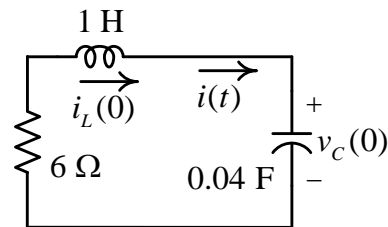
$$-\frac{1}{5}e^{-2t} - \frac{4}{5}e^{-\frac{t}{2}} \text{ A}$$

2. A series  $R$ - $L$ - $C$  circuit shown in **Fig. 2** has the initial conditions  $i_L(0) = 4$  A and  $v_C(0) = -4$  V. Find the inductor current  $i_L(t)$  for  $t > 0$ . (20%)

$$2e^{-3t}(2\cos 4t - \sin 4t) \text{ A}$$



**Fig. 1**



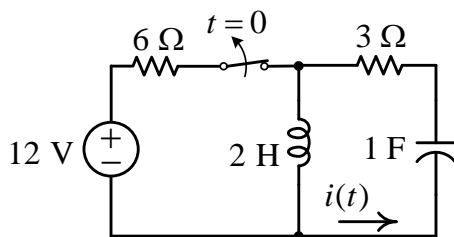
**Fig. 2**

3. The switch in the circuit of **Fig. 3** has been closed for a long time before opening at  $t=0$ . Find the current  $i(t)$  for  $t > 0$ . (20%)

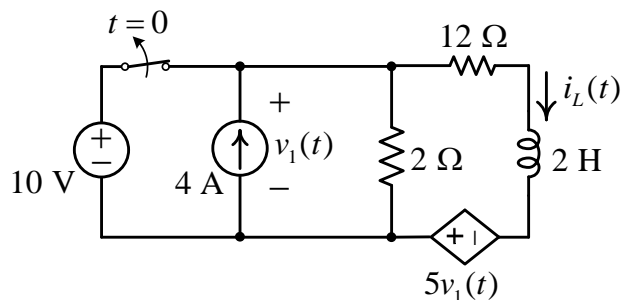
$$-2e^{-\frac{t}{2}} + 4e^{-t} \text{ A}$$

4. Find  $i_L(t)$  for  $t > 0$  in the circuit shown in **Fig. 4** if the switch has been closed for a long time before opening at  $t=0$ . (20%)

$$2 + 3e^{-12t} \text{ A}$$



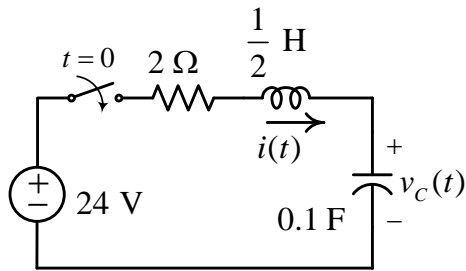
**Fig. 3**



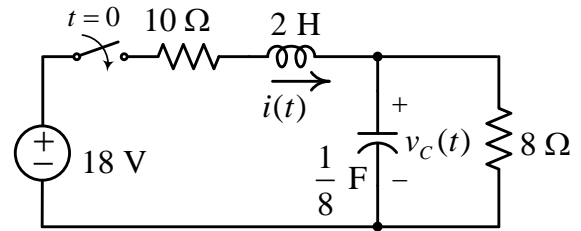
**Fig. 4**

5. The switch in the circuit of **Fig. 5** closes at  $t = 0$ . If all the initial conditions are zero, find  $v_C(t)$  for  $t > 0$ . (20%)  $24 - 12e^{-2t}(\sin 4t + 2\cos 4t)$  V

6. The initial conditions of the circuit shown in **Fig. 6** are all zero. The switch is closed at  $t = 0$ . Find  $v_C(t)$  for  $t > 0$ . (20%)  $8 - 24te^{-3t} - 8e^{-3t}$  V



**Fig. 5**



**Fig. 6**