

# 國立臺北科技大學 109 學年度碩士班招生考試

系所組別：2120 電機工程系碩士班乙組

## 第一節 電路學 試題

第 1 頁 共 2 頁

### 注意事項：

1. 本試題共 10 題，每題 10 分，共 100 分。
2. 不必抄題，作答時請將試題題號及答案依照順序寫在答案卷上。
3. 全部答案均須在答案卷之答案欄內作答，否則不予計分。

1. In Fig. 1, calculate the values of powers,  $P_1$ ,  $P_2$ ,  $P_3$ , and  $P_4$ , and give a comment on each power, delivering or absorbing. (10%)

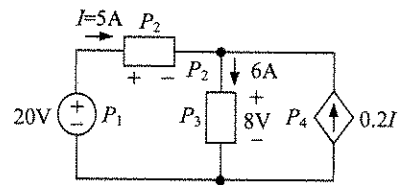


Fig. 1.

2. In Fig. 2, find the value of  $I$ . (10%)

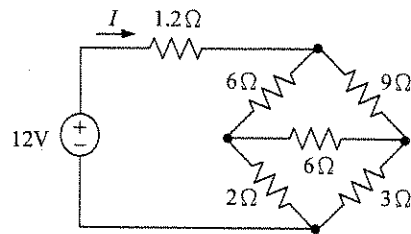


Fig. 2.

3. In Fig. 3, (a) find the voltage  $V_o$  which is contributed from the 20V voltage source; (b) find the voltage  $V_o$  which is contributed from the 5A current source. (10%)

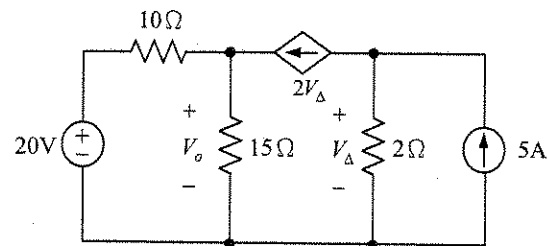


Fig. 3.

4. In Fig. 4, use the mesh-current method to find the value of  $V_o$ . (10%)

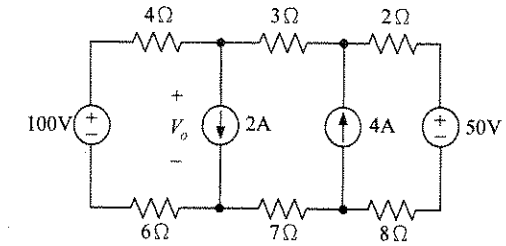


Fig. 4.

5. In Fig. 5, find the efficiency under the maximum power transfer. It is noted that the efficiency is defined as  $P_o \div P_i \times 100\%$ , where  $P_i$  is the input power coming from the 360V voltage source and  $P_o$  is the output power coming from the  $R_L$  load. (10%)

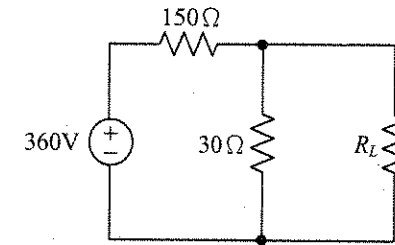


Fig. 5.

6. In Fig. 6, use the source transformation to find the value of the voltage  $V_o$ . (10%)

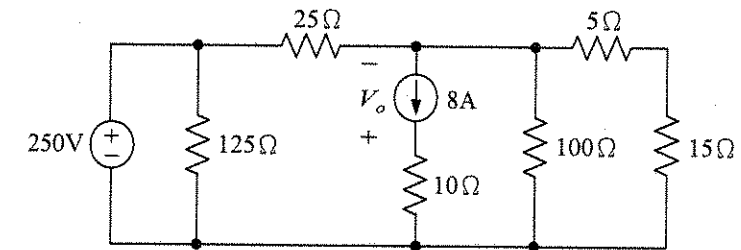


Fig. 6.

7. In Fig. 7, If  $[Z] = \begin{bmatrix} 3 & 2 \\ 2 & 3 \end{bmatrix}$ , then find the value of  $I_o$ . (10%)

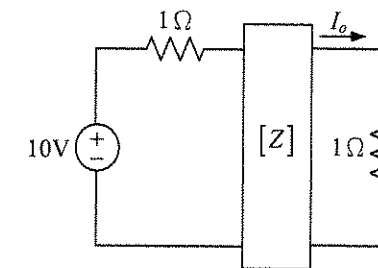


Fig. 7.

注意：背面尚有試題

8. In Fig. 8, if  $V_g(t) = 5 \sin(2t + 30^\circ) + 5 \cos(t + 10^\circ)$  V, then find  $V_o(t)$  in the steady state.

(10%)

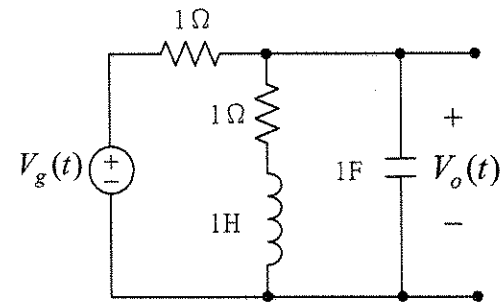


Fig. 8.

9. (a) In Fig. 9(a), at  $t = 0^+$ , find the voltage across the 6H inductor, namely,  $V(0^+)$ .

(b) In Fig. 9(b), find  $I(t)$  for  $t \geq 0$ , where  $V_0 = 4$ V,  $C_1 = 4$ F and  $C_2 = 4$ F. (10%)

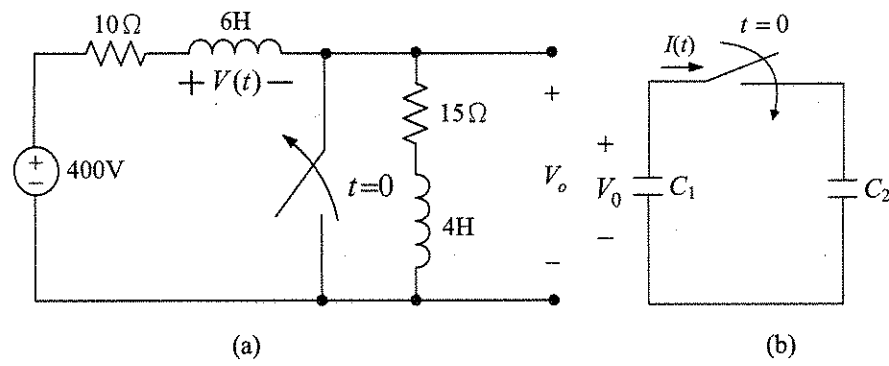


Fig. 9.

10. In Fig. 10, find the current  $I$  out of the ideal operational amplifier. (10%)

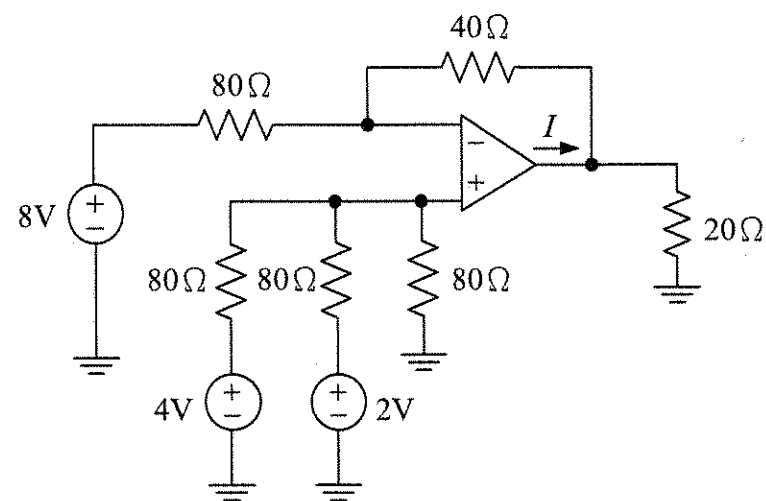


Fig. 10.