

國立臺灣科技大學 103 年度電力電子產業碩士專班招生(秋)試題  
 系所組別：電力電子領域  
 科目：電路學

(總分為 100 分)

不得使用計算器

1. The potentiometer (adjustable resistor)  $R_x$  in Fig. P1 is to be designed to adjust current  $i_x$  from 1 A to 10 A. Calculate the values of  $R$  and  $R_x$  to achieve this. (10 分)

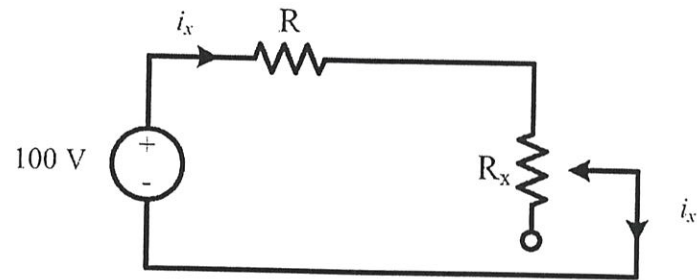


Fig. P1

2. Find the current  $i_o$  in the circuit in Fig. P2. (20 分)

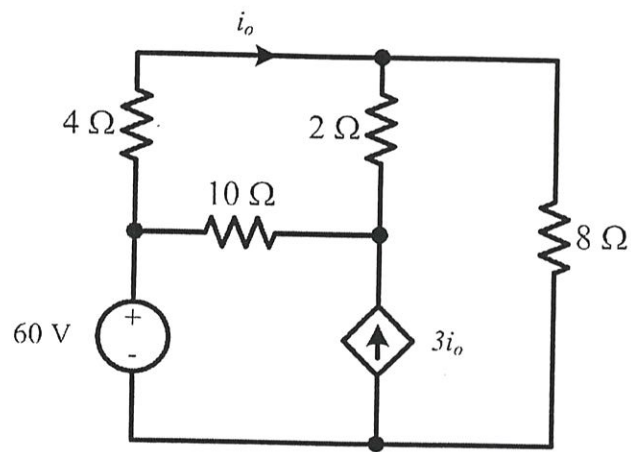


Fig. P2

3. Determine the maximum power that can be delivered to the variable resistor  $R$  in the circuit of Fig. P3. (20 分)

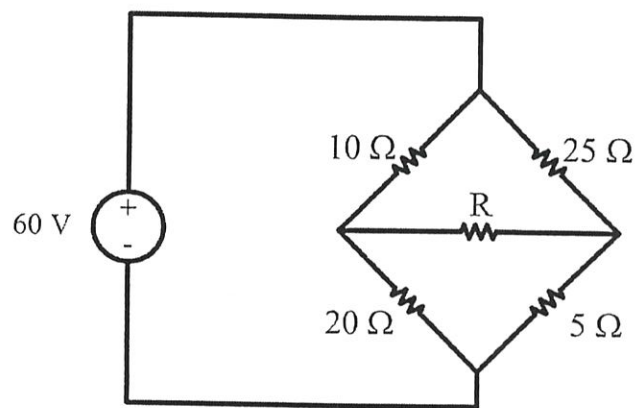


Fig. P3



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4. For the circuit shown in Fig. P4,  $v_s(t) = 10 \cos(3t)$  V,  $i_s(t) = 1 \cos(4t - 45^\circ)$  A, given that  $\tan^{-1}\left(\frac{3}{4}\right) = 37^\circ$ :
- Find the average power supplied by  $v_s(t)$  alone, that is, when  $i_s(t) = 0$ . (10 分)
  - Find the average power supplied by  $i_s(t)$  alone, that is, when  $v_s(t) = 0$ . (10 分)
  - Can the superposition theorem be applied to the average power consumed by the  $8\text{-}\Omega$  resistor in this case? Why? (10 分)
  - Calculate the total average power consumed by the  $8\text{-}\Omega$  resistor. (10 分)

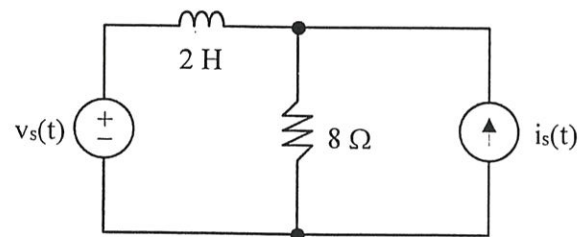


Fig. P4

5. Assuming that there is no initial energy stored in the circuit shown in Fig. P5 at  $t = 0$ , determine  $v_o(t)$ . (10 分)

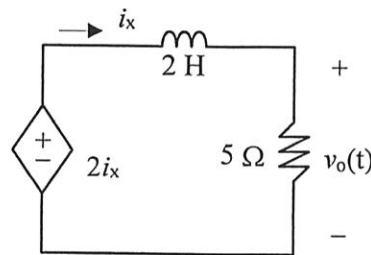


Fig. P5

