

## 國立台灣科技大學九十九學年度碩士班招生試題

系所組別：電機工程系碩士班乙組

科目：電路學

(總分為100分)

1. The circuit in Fig. 1 has  $v_c = 14k\Omega \times i_1$  and  $i_c = v_x / (25k\Omega)$ . Find the values of  $i_1$ ,  $i_2$ ,  $v_1$ , and  $v_2$ . (16分)

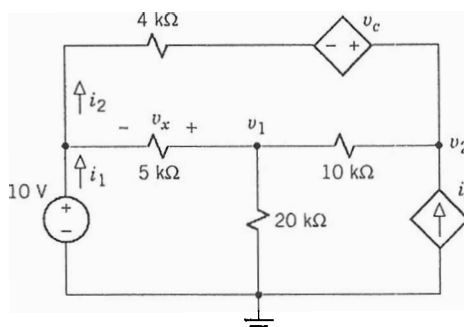


Fig. 1

2. The switch S in the network of Fig. 2 is closed at  $t = 0$ .
- Find  $i(0^-)$ ,  $i(0^+)$ ,  $v(0^-)$ , and  $v(0^+)$ . (8分)
  - Write the differential equation for  $v(t)$  when  $t > 0$ . (6分)
  - Find and sketch  $v(t)$  for  $t > 0$ . (10分)

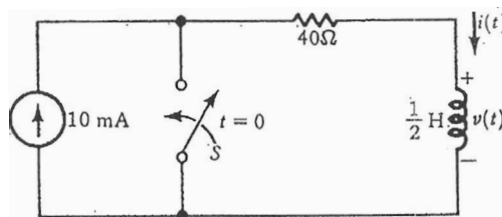


Fig. 2

3. Figure 3 shows an op-amp circuit used as an  $I$ - $V$  converter. Derive the relationship between  $i_i$  and  $v_o$  in the form  $v_o = -kRi_i$ . Assume the op-amp is ideal. (10分)

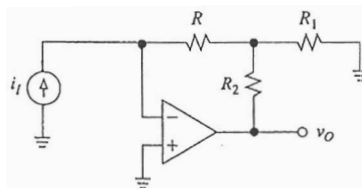


Fig. 3



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4. Find  $v_o(t)$  in the circuit shown in Fig. 4. (15 分)

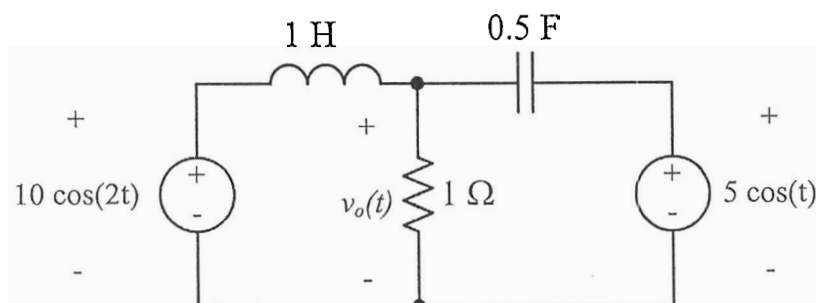


Fig. 4

5. Find  $V_o$  in the circuit shown in Fig. 5. (15 分)

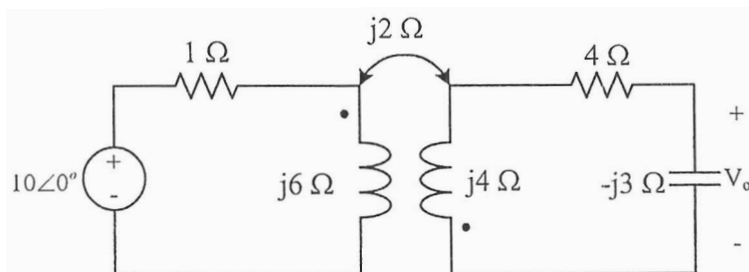


Fig. 5

6. Obtain the transfer function  $H(s)=V_o(s)/V_i(s)$  of the active filter in Fig. 6. What kind of filter is it? Assume the op-amp is ideal. (20 分)

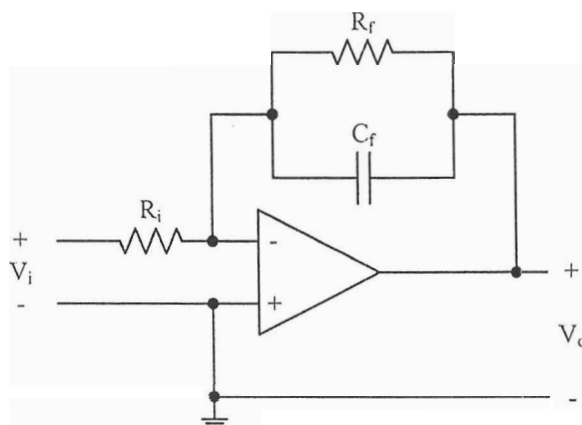


Fig. 6

