

國立臺灣科技大學101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. A frequency-domain network with an unknown load  $Z$  is shown in Fig. P1. If  $\underline{I}_s = 2\angle 0^\circ$  A, please find the impedance of  $Z$  so that the amplitude of the terminal voltage  $\underline{V}$  has a maximum value. (15 分)

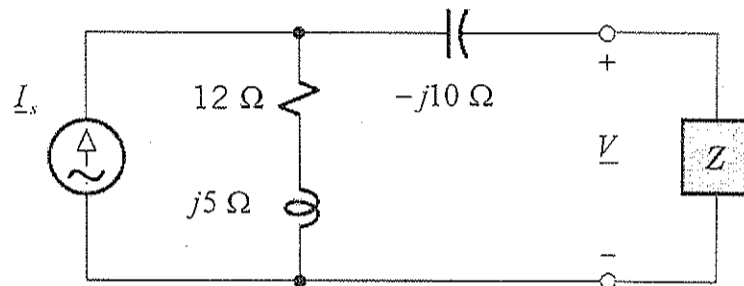


Fig. P1

2. The dc circuit in Fig. P2 has  $v_c = 20\Omega \times i_o$ . Please find  $i_1$  and  $i_2$ . (20 分)

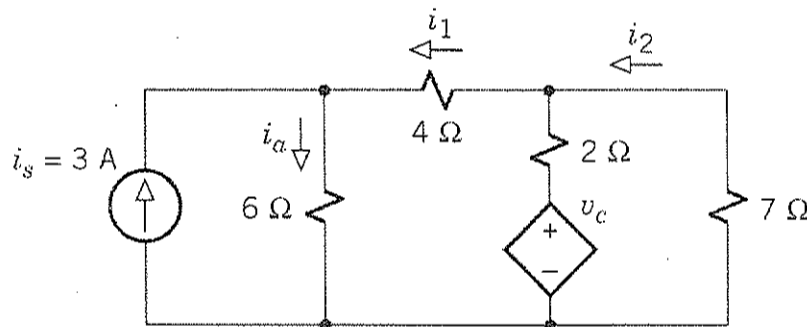


Fig. P2

3. (a) The circuit in Fig. P3 has  $i_m = 1$  A,  $L=1$  H, and  $C=0.5$  F. Please find  $i_1$ ,  $i_2$ , and  $v_m$ , under dc steady-state conditions. (6 分)
- (b) Following part (a), if  $i_m = -1$  A for  $t > t_1$ , (i.e.  $i_m$  changes polarity at  $t_1$ ), please find  $i_1(t_1^+)$ ,  $i_2(t_1^+)$ , and  $v_m(t_1^+)$ . (9 分)

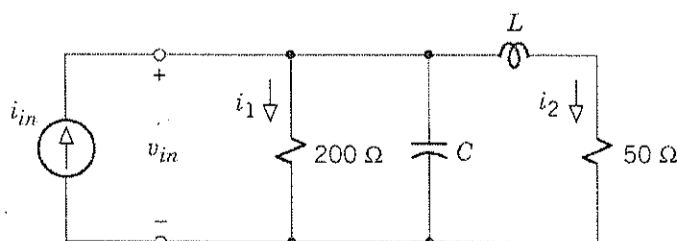


Fig. P3



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4. For the circuit shown in Fig. P4, the switch is originally open before  $t=0$ . At  $t=0$ , the switch is closed. Find  $v(t)$  and  $i(t)$  for  $t>0$  (20 分)

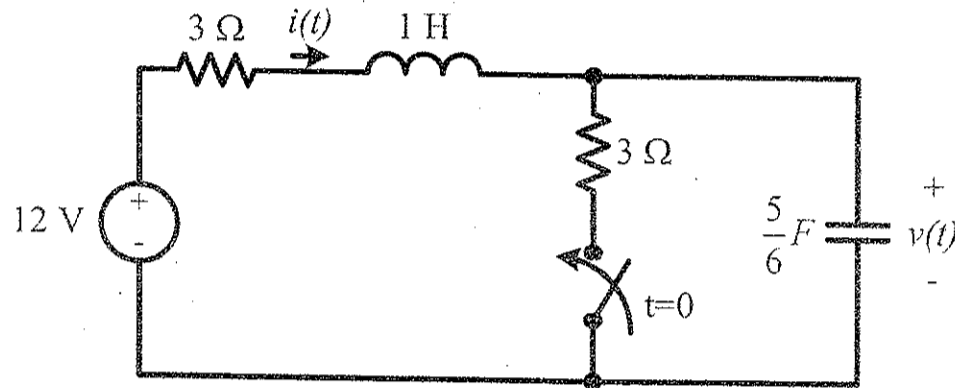


Fig. P4

5. Determine the voltage  $V_o$  in the circuit of Fig. P5 (15 分)

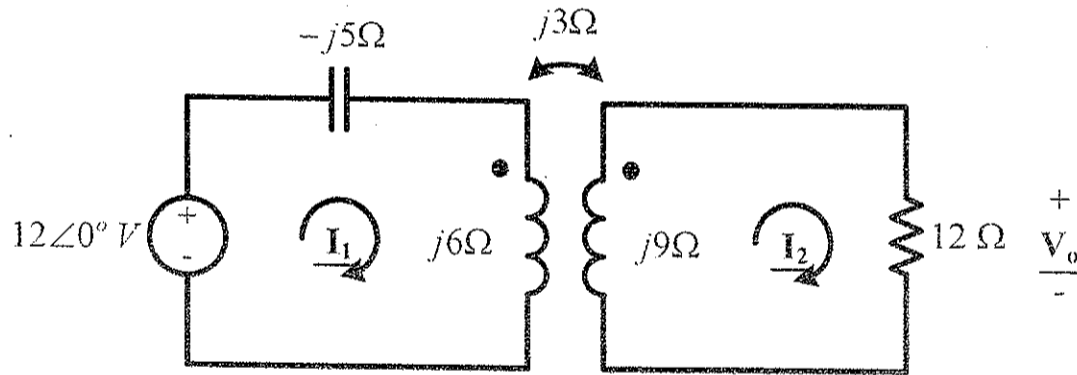


Fig. P5

6. For the Sallen-Key low-pass filter shown in Fig. P6, find the transfer function

$$H(s) = \frac{V_{OUT}(s)}{V_{IN}(s)} \quad (15 \text{ 分})$$

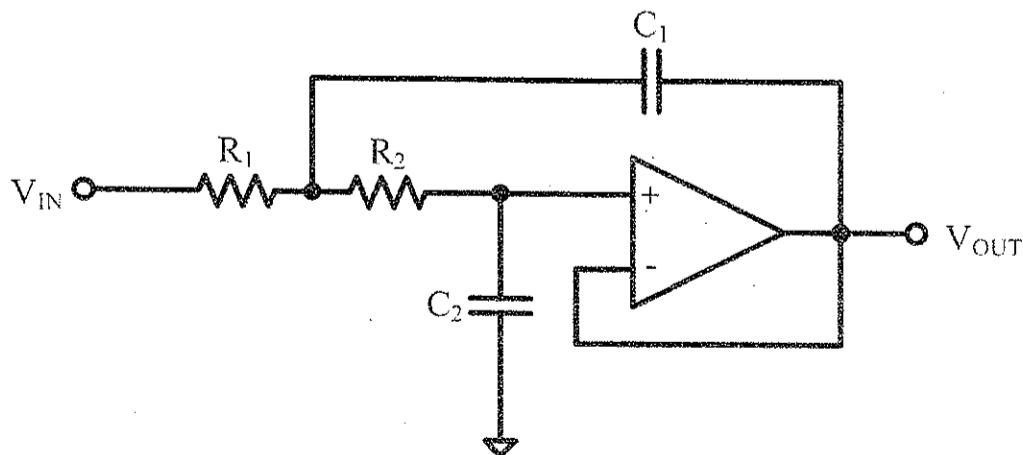


Fig. P6

