

國立台灣科技大學九十八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.P1 has  $v_s = 10V$ . Find:
  - (a) the voltage of  $v_1$  and the current of  $i_1$ . (10%)
  - (b) The equivalent input resistance  $R_{eq} = v_s / i_s$ . (5%)

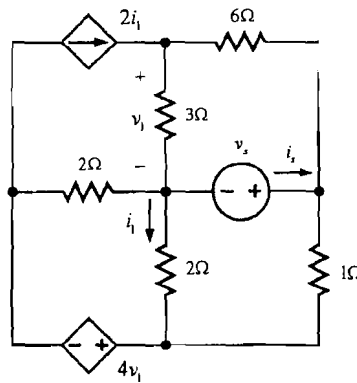


Fig.P1

2. Assuming that the load impedance is to be purely resistive when  $v_s(t) = 120 \cos(100t)$  V, what load should be connected to terminals a-b of the circuits in Fig.P2 so that the maximum power is transferred to the load? Also calculate the maximum average power absorbed by this load. (20%)

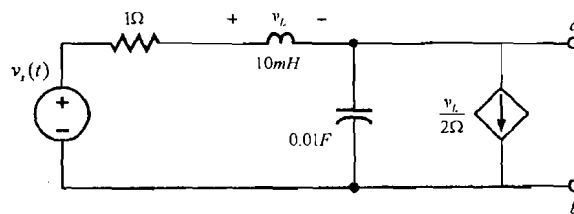


Fig.P2

3. Find the step response of  $i_L$  in Fig.P3 when  $v_s(t) = 20 u(t)$  V. Let  $L = 1$  H,  $R = 5\Omega$ , and  $C = 1/50$  F. (15%)

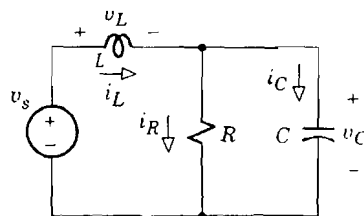


Fig.P3

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4. In the circuit of Fig.P4,  $R = 4\ \Omega$ ,  $L = 1\ \text{mH}$ ,  $C = 0.4\ \mu\text{F}$  and  $v_s = 100\sin\omega t\ \text{V}$ .
- (a) Find the resonant frequency  $\omega_o$  and the half-power frequencies  $\omega_1, \omega_2$ . (5%)
- (b) Calculate the bandwidth and quality factor. (5%)
- (c) Determine the amplitude of the current at  $\omega_o, \omega_1$  and  $\omega_2$ . (5%)

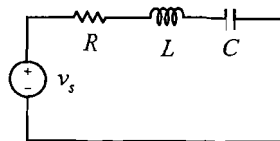


Fig.P4

5. In the circuit of Fig.P5, if  $\bar{V}_{ab} = 440\angle 0^\circ\ \text{V}$ ,  $\bar{V}_{bc} = 440\angle -120^\circ\ \text{V}$ ,  $\bar{V}_{ca} = 440\angle 120^\circ\ \text{V}$ , find: (a) the line currents  $\bar{I}_a, \bar{I}_b, \bar{I}_c$ , (b) the total complex, real and reactive powers absorbed by the load. (20%)

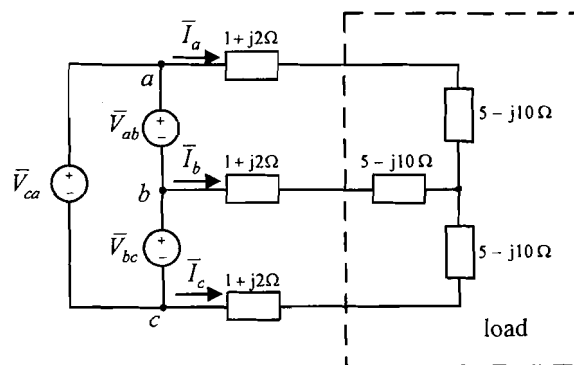


Fig.P5

6. Find  $\bar{I}_1$  and  $\bar{I}_2$  if the transmission parameters for the two-port network in Fig.P6

$$\text{are } \begin{bmatrix} \bar{V}_1 \\ \bar{I}_1 \end{bmatrix} = [T] \begin{bmatrix} \bar{V}_2 \\ -\bar{I}_2 \end{bmatrix} = \begin{bmatrix} 6 & 10\Omega \\ 0.5S & 1 \end{bmatrix} \begin{bmatrix} \bar{V}_2 \\ -\bar{I}_2 \end{bmatrix}. \quad (15\%)$$

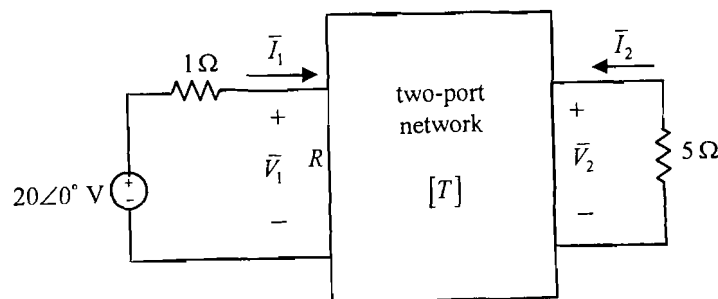


Fig.P6

