

國立臺灣科技大學  
八十七學年度碩士班招生考試試題

所 別： 電機工程技術研究所  
學 程 別：

組 別： 電力組

科 目： 電路學

1. Two balanced three-phase loads are connected to a balanced three-phase line as shown in Fig. 1 with  $Z_1 = 0.1 + j0.1 \Omega$ ,  $Z_2 = 2 - j2 \Omega$  and  $Z_3 = 12 + j12 \Omega$ . The line-to-line voltage at the load terminals A, B, C is known to be 220 V (rms).
- (a) Find the line current required for the combined loads. (5%)
- (b) Find the total complex power and power factor for the system. (10%)
- (c) Find the line-to-line voltage at the source terminals a, b, c. (5%)

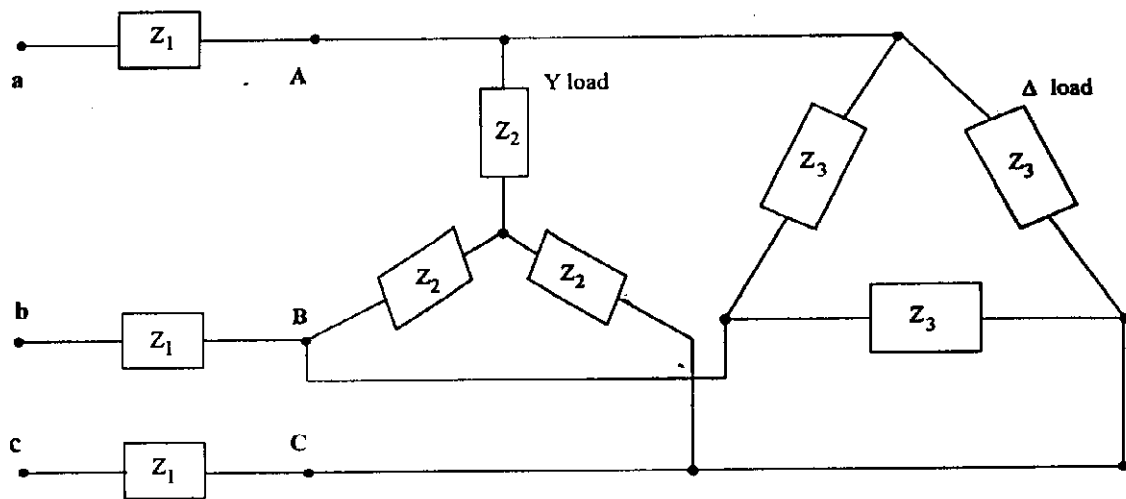


Fig. 1

2. Find the admittance matrix  $Y$  and impedance matrix  $Z$  for the two-port circuit shown in Fig. 2. The  $Y$  and  $Z$  are defined by

$$\begin{bmatrix} I_1 \\ I_2 \end{bmatrix} = Y \begin{bmatrix} V_1 \\ V_2 \end{bmatrix} \text{ and } \begin{bmatrix} V_1 \\ V_2 \end{bmatrix} = Z \begin{bmatrix} I_1 \\ I_2 \end{bmatrix}. \quad (20\%)$$

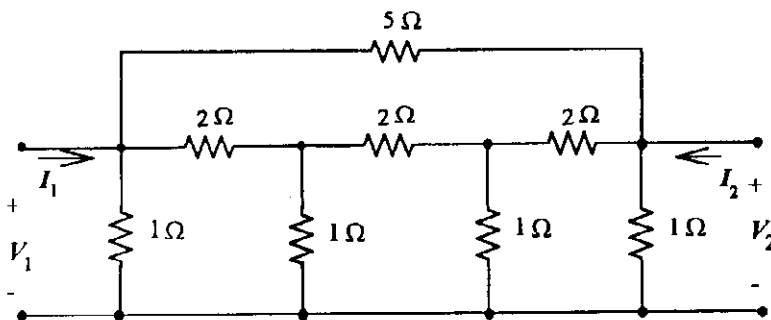


Fig. 2

國立臺灣科技大學  
八十七學年度碩士班招生考試試題

所 別：電機工程技術研究所  
學程別：

組別：電力組

科目：電路學

3. After being open for a long time, the switch in the circuit of Fig. 3 is closed at  $t=0$ . For  $t > 0$ , find the capacitor voltage  $v_c(t)$  and inductor current  $i_L(t)$ . (20%)

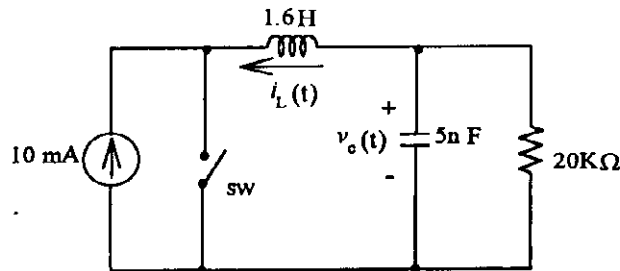


Fig. 3

4. Consider the circuit shown in Fig. 4 .  
 (a) Find the resonant frequency  $\omega_o$  and input impedance  $Z_{in}(j\omega_o)$ . (10%)  
 (b) If input voltage  $v_{ab}(t) = 100 \cos(300t)$  V, find the steady state capacitor voltage  $v_c(t)$  and inductor current  $i_L(t)$ . (10%)

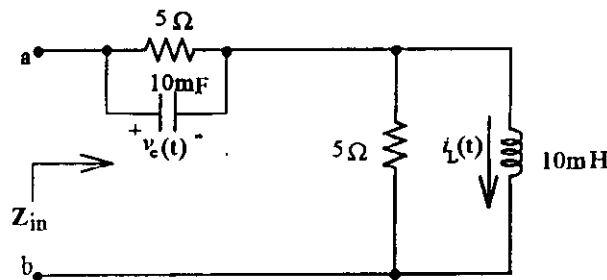


Fig. 4

5. (a) Find the load impedance  $Z_L$  that maximizes the average power drawn from the network shown in Fig. 5. (10%)  
 (b) If the input voltage  $V_{in} = 120$  V (rms), find the average power delivered to the load impedance  $Z_L$ . (10%)

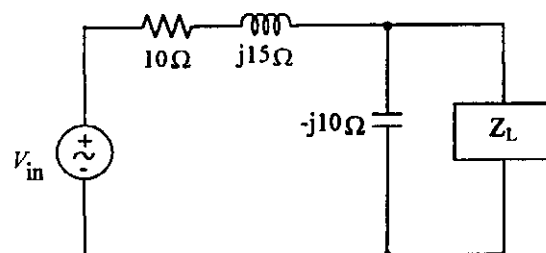


Fig. 5