

國立台灣科技大學九十五學年度碩士班招生試題

系所組別：電子工程系碩士班乙二組

科目：電路學

總分 100 分

1. An RLC series-resonant circuit is excited by a voltage source, as shown in Fig. 1.
- Express the steady-state voltage gain in phasor form, and determine the frequency at which the maximum gain is achieved. (5 %)
 - When the phase of the voltage gain is 45° , determine the operating frequency and the phase of the input impedance Z . (10 %)
 - When the magnitude of the voltage gain is $\frac{1}{\sqrt{3}}$, determine the operating frequencies. (5 %)

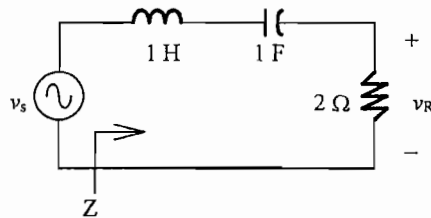


Fig. 1

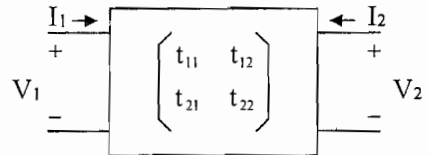


國立台灣科技大學九十五學年度碩士班招生試題

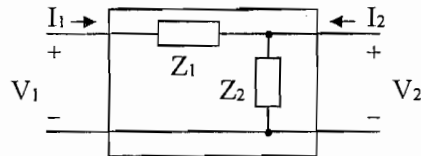
系所組別：電子工程系碩士班乙二組

科目：電路學

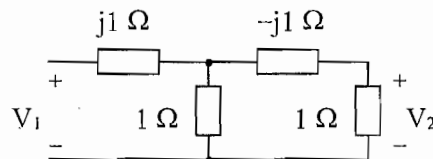
2. A two-port phasor circuit in terms of the T (or ABCD) parameters is shown in Fig. 2(a).
 (a) Express the open-circuit voltage gain (i.e., the ratio of V_2 to V_1 when $I_2 = 0$) in terms of the T parameters. (5 %)
 (b) For the two-port circuit shown in Fig. 2(b), determine its T matrix. (5 %)
 (c) Find the voltage gain V_2/V_1 of the circuit shown in Fig. 2(c). (10 %)



(a)



(b)



(c)

Fig. 2

3. For the phasor circuit shown in Fig. 3, the complex powers consumed by the two loads are described as follows. The first load consumes 100 kVA with a lagging power factor of 0.8. The second load dissipates 20 kW with an impedance angle of $\tan^{-1}(2)$. If the amplitude of V_s is 1 kV_{rms}, determine the amplitude of I_s . (10 %)

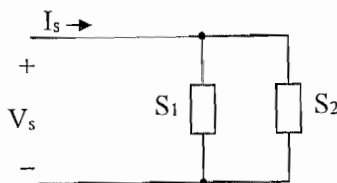


Fig. 3

97



國立台灣科技大學九十五學年度碩士班招生試題

系所組別：電子工程系碩士班乙二組

科目：電路學

4. Find $i_L(0^+)$, $v_c(0^+)$, $d i_L(0^+)/dt$ and $d v_c(0^+)/dt$ for the circuit shown in Figure 4. Assume that switch 1 has open and switch 2 has been closed for a long time and steady-state conditions prevail at $t=0^-$ (20%)

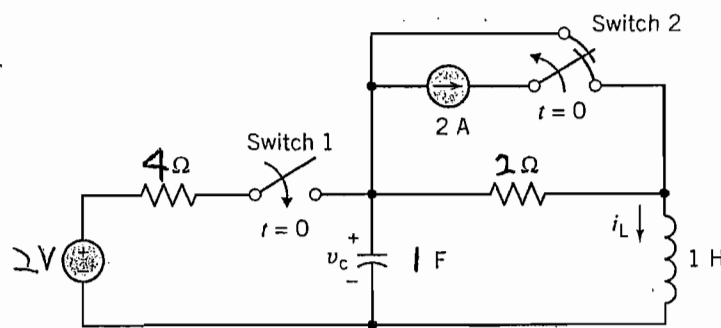


Figure 4

5. Find the Thévenin equivalent circuit for the circuit shown in Figure 5 (20%)

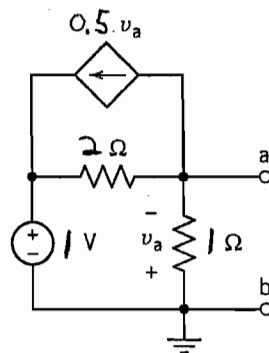


Figure 5

98



國立台灣科技大學九十五學年度碩士班招生試題

系所組別：電子工程系碩士班乙二組

科目：電路學

6. Determine the value of the current i_x in Figure 6. (10%)

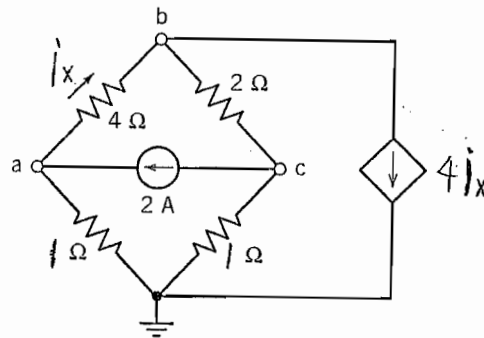


Figure 6