國立彰化師範大學 102 學年度碩士班招生考試試題

系所：工業教育與技術學系　　組別：乙組(選考丙)　　科目：電路學

☆☆請在答案紙上作答☆☆　　

1. There is no energy stored in the circuit seen in Fig. 1 at the time the two sources are energized. Please find v_0 for $t > 0$. (15%)

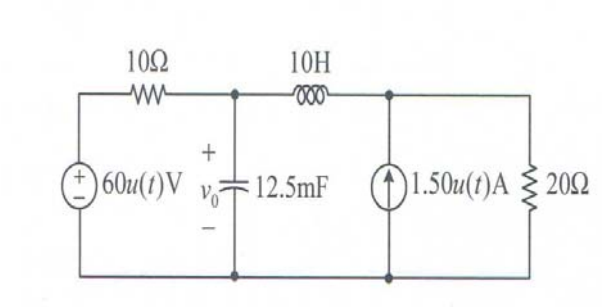

Fig. 1

2. Determine the y-parameters of the two-port circuit shown in Fig. 2. (15%)

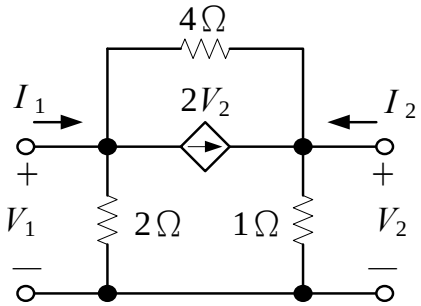

Fig. 2

3. Consider the circuit shown in Fig. 3.

(1) Write the state equation in matrix form $\begin{bmatrix} \frac{d\,i_L}{dt} \\ \frac{d\,v_C}{dt} \end{bmatrix} = A \begin{bmatrix} i_L \\ v_C \end{bmatrix} + B\,v_s$. (10%)

(2) Find the transfer function $\frac{v_C(s)}{v_s(s)}$. Let $v_C(s)$ and $v_s(s)$ be the Laplace transform of v_C and v_s, respectively. (10%)

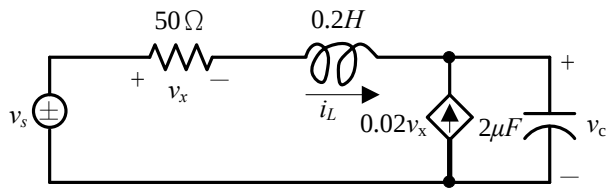

Fig. 3

4. Using mesh analysis, $L = 2H$, $C = \frac{1}{8}F$, $R = 8\Omega$

(1)Find the transfer function $H(s)$. (5%)

(2)Find the response $v(t)$ to $i_g(t)$ for the circuit. (5%)

(3)Find the unit impulse response. (5%)

(4)Find the step response. (5%)

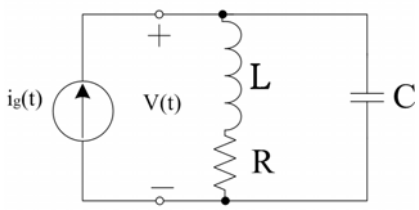

Fig. 4

5. When $C = 1\mu F$, $R_1 = 1k\Omega$, $R_2 = 1k\Omega$

(1) Sketch the linearized Bode Gain. (5%)

(2) Sketch and phase plots. (5%)

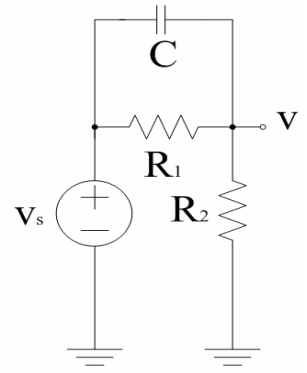

Fig. 5

6. Find $i(t)$ for $i_s(t) = 2u(t), C = 1/12\,F, L = 2H, R_1 = 2k\Omega, R_2 = 2k\Omega, R_3 = 2k\Omega, a = 0.25$. (10%)

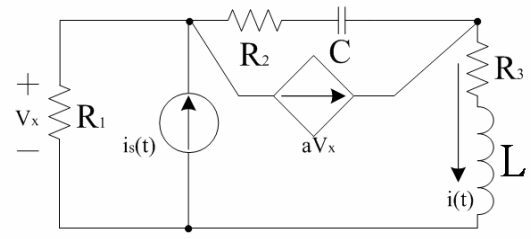

Fig. 6

7. When $C = \frac{1}{2}F$, $C = \frac{1}{2}F$, $L = 1H$, Investigate the stability of the circuit and sketch the PZD. (10%)

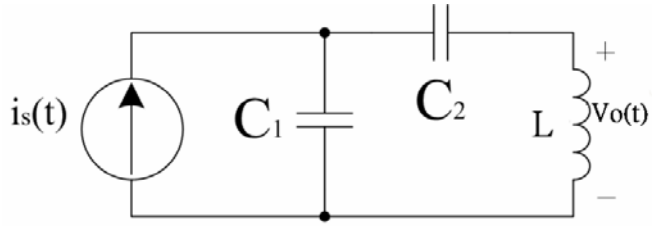

Fig. 7