台灣科技大學一百零八學年度下學期期末考

科目名稱：電路學(二)　開課系所：電子系 ET2104301　地點：國際大樓 IB306

考試時間：109 年 6 月 4 日 下午 13:20 至 15:10 (可使用工程計算機)

1. (10%) Please sketch the magnitude characteristic of the Bode plot, labeling all critical slopes and points for the following function:

$$G(j\omega) = \frac{0.2(j\omega+1)}{j\omega[(j\omega/12)^2 + (j\omega/36) + (1/144)]}$$

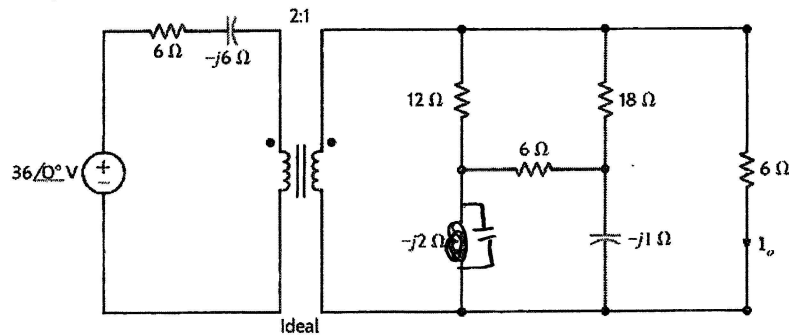2. (10%) Please find I_o in the network in Fig. 1.

Fig. 1

3. (20%) The circuit in Fig. 2 is operated at steady state before the switch open.
    (a)Please use the Laplace transforms to calculate the current $i(t)$ for $t>0$.(10%)
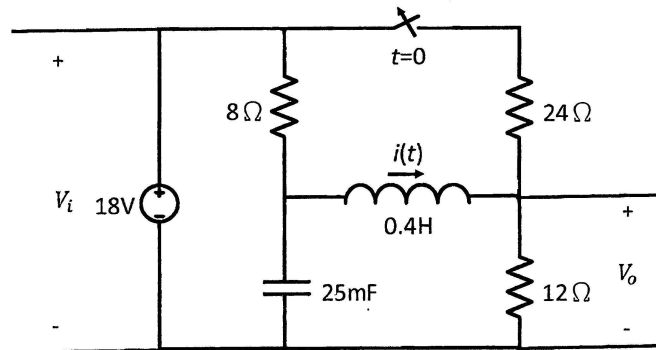   (b)Please determine the transfer function of V_o/V_i for $t>0$.(10%)

Fig. 2

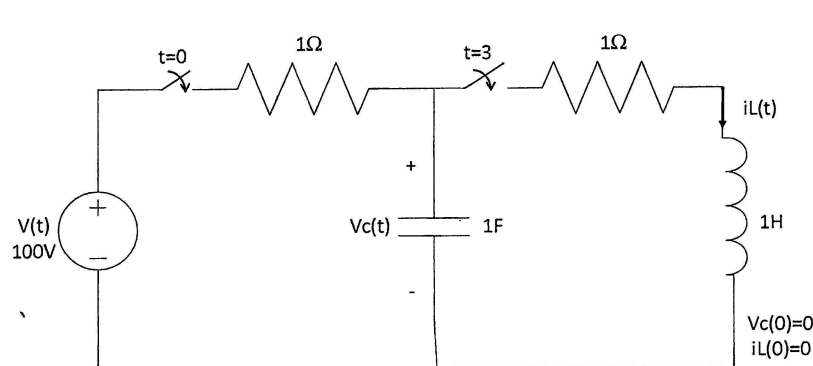4. (15%) Please use the Laplace transforms to calculate the current $iL(t)$ in Fig. 3.

Fig. 3

5. (10%) Please find Z parameters for the two-port network shown in Fig. 4 and determine the voltage gain of the entire circuit with a 4kΩ load attached to the output.
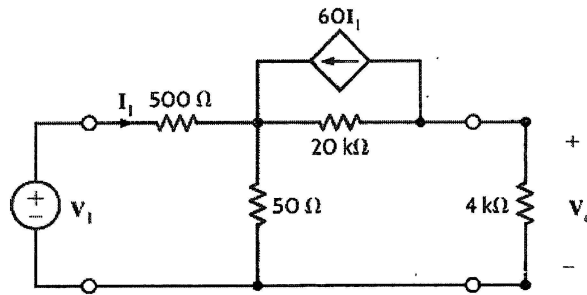
$$\begin{pmatrix} v_1 \\ v_2 \end{pmatrix} = \begin{pmatrix} z_{11} & z_{12} \\ z_{21} & z_{22} \end{pmatrix} \begin{pmatrix} I_1 \\ I_2 \end{pmatrix}$$

Fig. 4.

6. (15%) Please modify the circuit in Fig. 5 to form a high-pass notch filter, and then determine the transfer function from the input voltage to the output voltage (V_o/V_{in}), plot the magnitude of the transfer function v.s. angular frequency, and analyze the frequency responses including the notch frequency ω_n, resonant frequency ω_o, low-frequency gain and high-frequency gain.
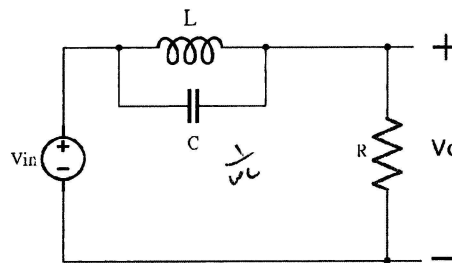
$$\omega_n \times \sqrt{LC} = \omega_o^2$$

$$\frac{1}{R} \cdot \omega_o L = \frac{1}{\omega_o R C} \quad R = Q_s$$

$$BW = \frac{\omega_o}{Q}$$

有2個枝值點 一個是 ω_o
一個是 Notch

Fig. 5.

7. (10%)A balanced Y-connected load and a balanced Δ-connected load are supplied by a three-phase 480-Vrms 50Hz generator. The branch impedances of the Y and Δ loads are $26\angle 35°\Omega$ and $34\angle -50°\Omega$, respectively.
(a) Please determine the active and reactive powers drawn by Y and Δ-connected loads. (5%)
(b) Please determine the phasor voltage and phasor current for any one branch of each three-phase load, and substitute into the power equation for balanced three-phase loads. Given that the phase angle for Y system V_{AN} is $30°$ and the phase angle for Δ system V_{BA} is $180°$. (5%)

8. (10%) Given the circuit in Fig. 6, please find the complex power supplied by the source, and the source power factor. If $f = 50Hz$, please find $V_s(t)$.
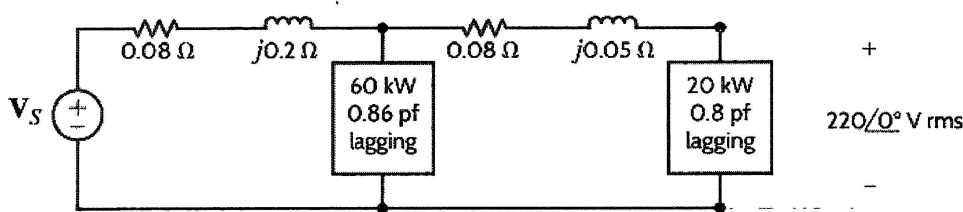

Fig. 6