台灣科技大學一百零七學年度上學期期末考

科目名稱：電路學(一)　開課系所：電子系 ET2103301　地點：國際大樓 IB501

考試時間：108 年 1 月 3 日　下午 13:20 至 15:10 (可使用工程計算機)

1. (10%) Please find V_o in Fig. 1.

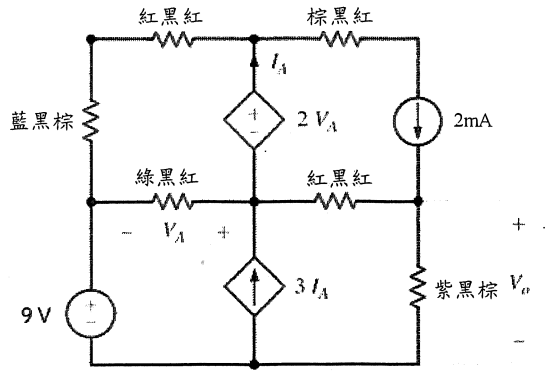

Fig. 1.

2. (10%) Please answer the following questions in Fig. 2.
   (a) What is the characteristic equation? (2%)
   (b) What is the resonant frequency ω_n? (2%)
   (c) What is the type of damping exhibited by the circuit? (3%)
   (d) Please compute $v_o(t)$ for $t > 0$ (3%)

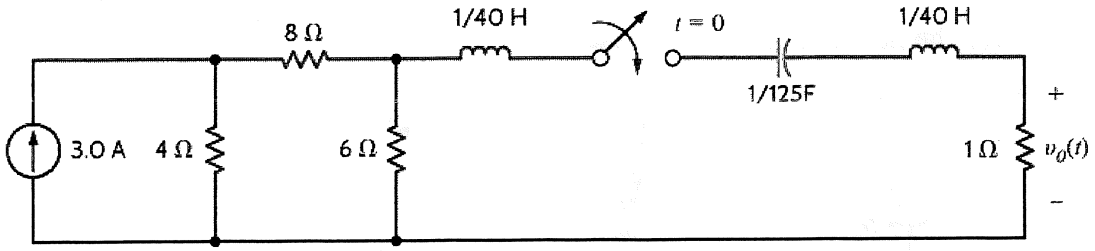

Fig. 2.

3. (15%) If Z_L has unity power factor feature, please find Z_L for maximum power transfer and the maximum power that can be transferred to the load Z_L in Fig. 3.

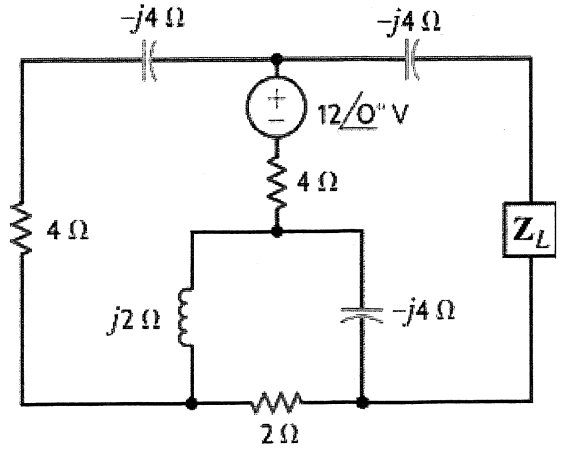

Fig. 3.

4. (10%) In Fig. 4, a load is modeled by an impedance of $4+j4$. Please determine the value of capacitance that must be connected in parallel with the load to correct the power factor of the combined load and capacitor to 0.97 lagging at $f = 50\text{Hz}$.

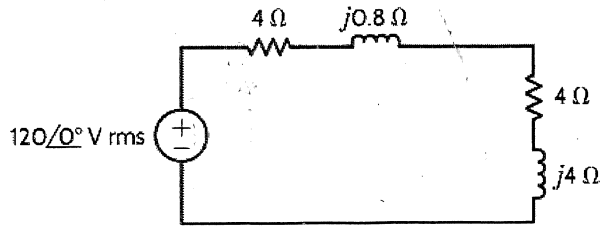

Fig. 4

5. (15%) The circuit in Fig. 5 is operated at steady state before the switch open. Please determine the inductor current $i(t)$ for $t>0$.

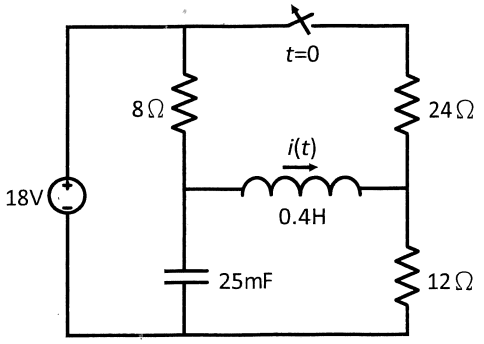

Fig. 5.

6. (20%) Given the network in Fig. 6. Please compute (a) the input source voltage and (b) the input power factor.

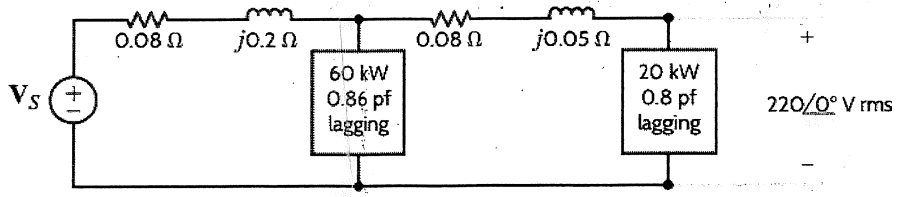

Fig. 6.

7. (20%) There are two input voltage in Fig. 7 including $v_1(t) = 50\cos(20t - 75^o)\text{V}$ and $v_2(t) = 35\cos(20t + 110^o)\text{V}$. If the node voltage can be obtained as $v(t) = 21.25\cos(20t - 168.8^o)\text{V}$ at steady state, please determine the values of R and L.

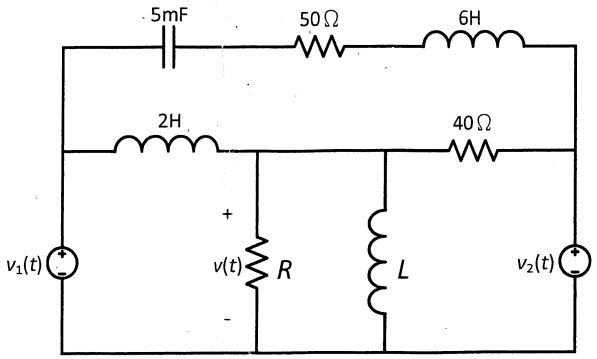

Fig. 7.