There are a total of 6 problems in this exam.

1. (12%) For the circuit shown in Fig. 1, the switch is closed at $t = 0$. Solve for the current through the inductor $i_L(t)$ for $t > 0$.
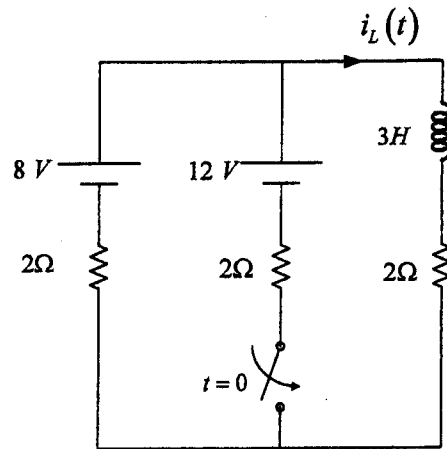

Fig. 1

2. The circuit shown in Fig. 2(a) can be represented by the Norton equivalent circuit in Fig. 2 (b).
   i) Determine the phasors I_N and Z_N (10%)
   ii) A load Z_L is connected to the circuit. For maximum average power transfer, find the average power transferred and Z_L. (8%)
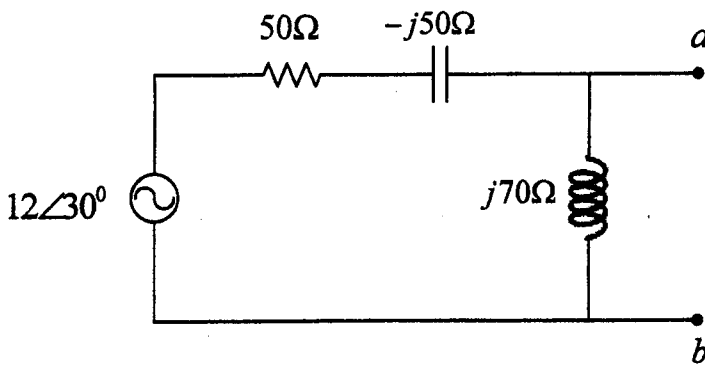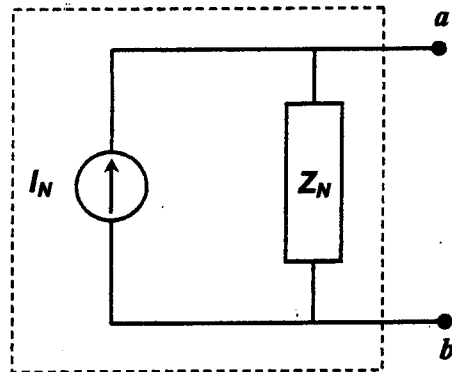

Fig. 2(a)　　　　　　　　　　　　**Fig. 2 (b)**

3. (12%) The op-amp circuit shown in Fig. 3 has a transfer function

$$T(s) = \frac{V_{out}(s)}{V_{in}(s)} = -\frac{s+100}{s+20}$$

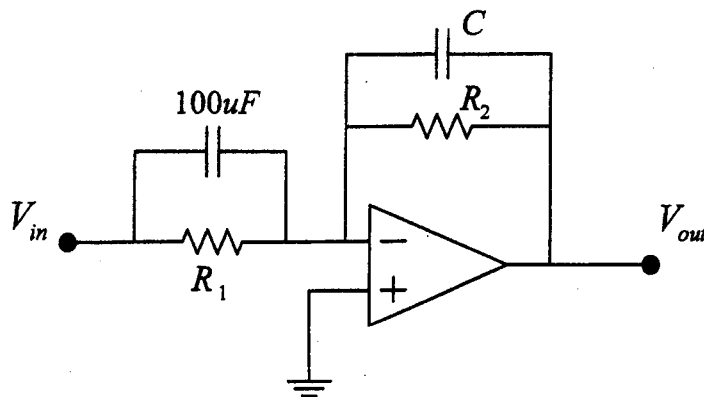Design the values for C, R_1 and R_2 to realize the above transfer function.

Fig. 3

（背面仍有題目，請繼續作答）

本試題是否可以使用計算機： ☑可使用 ， □不可使用 （請命題老師勾選）   考試日期：0301，節次：2

4. For the circuit shown in Fig. 4,

   i) Determine the resistance R which makes the transient response critical damping. (8%)

   ii) For an input (V_{in}) of 0 at $t < 0$ and $10e^{-5t}$ at $t > 0$, determine the total response of $V_{out}(t)$ with a given $R = 5.2 \ \Omega$. (14%)
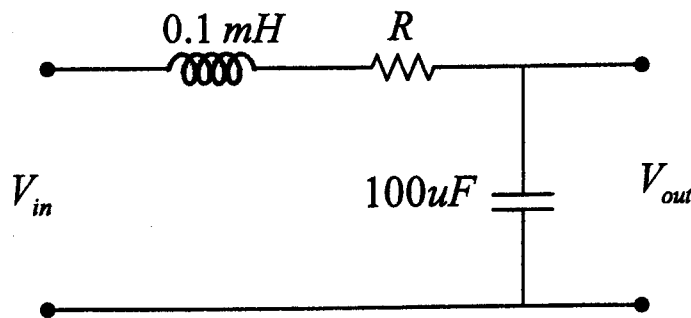

Fig. 4

5. (20%) The switch in the circuit shown in Fig. 5 has stayed at position a for a long time. At $t = 0$, the switch is moved to position b. Determine the current $i_L(t)$ for $t > 0$..
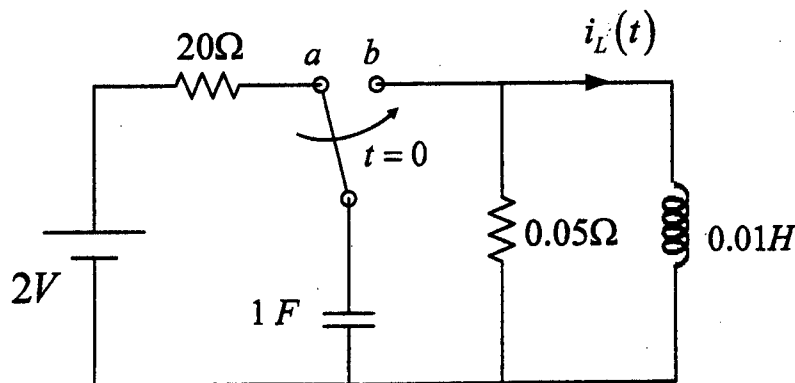

Fig. 5

6. (16%) The circuit shown in Fig. 6 has a current source of $i_s(t) = 15\cos\left(2t + 45^0\right)$. Determine the voltage $V(t)$.
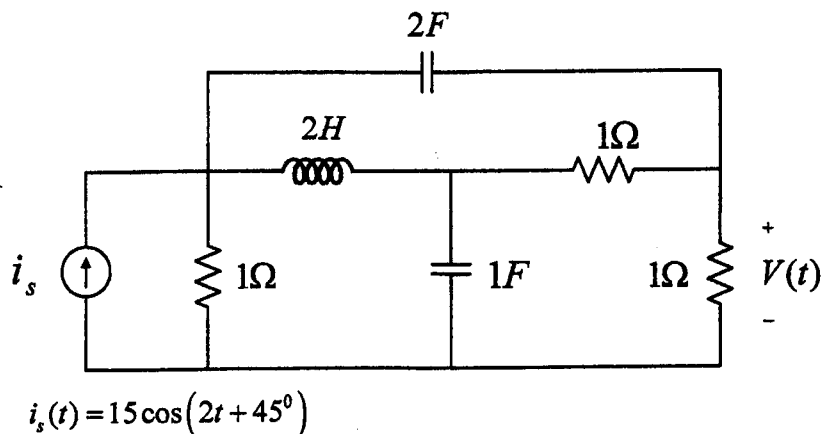

$i_s(t) = 15\cos\left(2t + 45^0\right)$

Fig. 6