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）

1. The LC network, as shown in Fig. P1(a), can be described with a block diagram, as shown in Fig. P1(b).   Find the transfer functions $H_2(s)$ and $H_3(s)$. (10%)
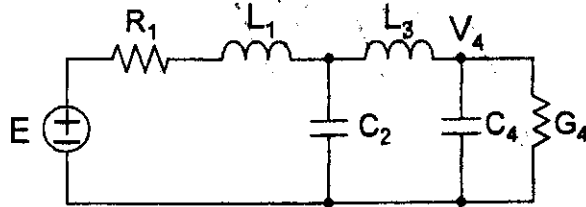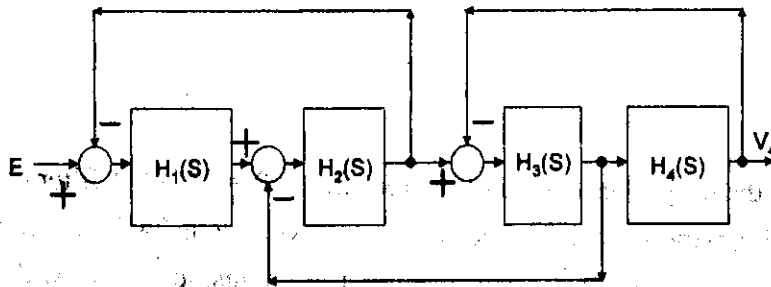

Fig. P1(a).

Fig. P1(b).

2. The output impedance transfer function $Z_o(s)$ of the network, as shown in Fig. P2, can be expressed as below.   Please find the values of k_o, S_{z1}, S_{z2}, and k_2. (20%)

$$Z_0(s)=k_o \cdot \frac{(1+s/s_{z1})(1+s/s_{z2})}{s^2 \cdot k_2 + s \cdot k_1 + 1}$$
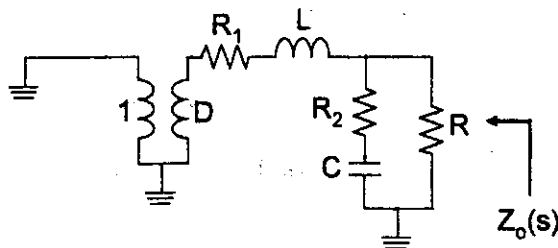

Fig. P2.

3. Please use one dependent current source and one dependent voltage source to model an **IDEAL** transformer with turns ration N. (10%)

（背面仍有題目，請繼續作答）
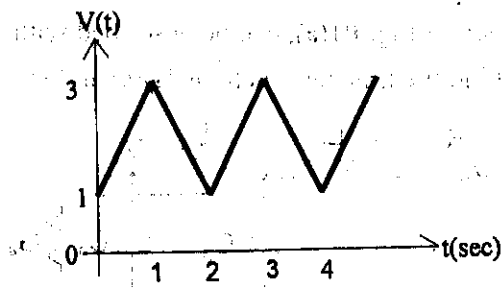
4. Find the RMS value of the signal V(t), as shown in Fig. P4. (10%)

Fig. P4.

5. For Fig. P5, the output resistance of the rectifier is R = 160Ω. A filter capacitor C is connected in parallel with R. The peak output voltage is 24V and the ripple voltage shall be no more than 0.6V. The input is a sinusoidal wave with frequency = 40Hz. Note: the diode forward voltage V_F = 0.7V. (a) Determine the required rms value of v_I. (b) Determine the required filter capacitance value. (c) Determine the peak current through the diode. (25%)
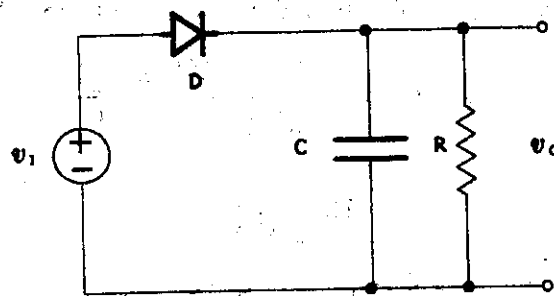
Fig. P5

6. Given the circuit as shown in Fig. P6, determine the V_O in terms of V_1 and V_2 assuming the operational amplifier is ideal. (13%)
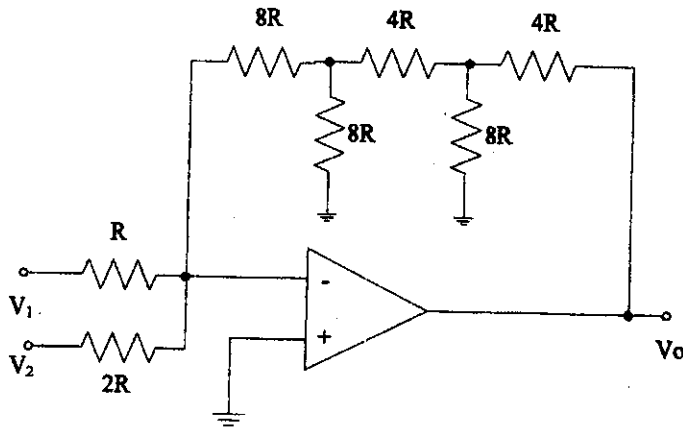

Fig. P6

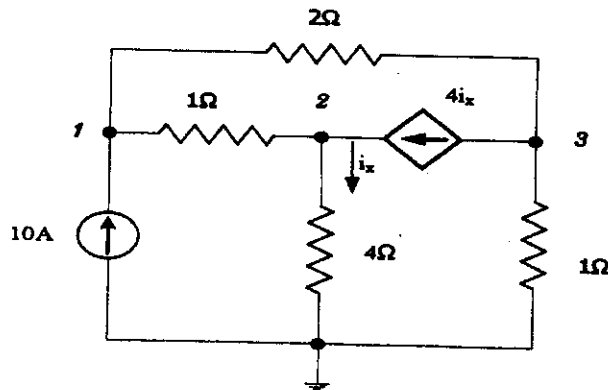7. Find the voltages at the node 1, 2 and 3 in the circuit of Fig. P7. (12%)

Fig. P7