

※ 考生請注意：本試題 可 不可 使用計算機

1. (15%) In Fig. 1, let the switch S1 be opened at $t = 0$. Please determine $i(t)$ and $v(t)$ for $t \geq 0$.

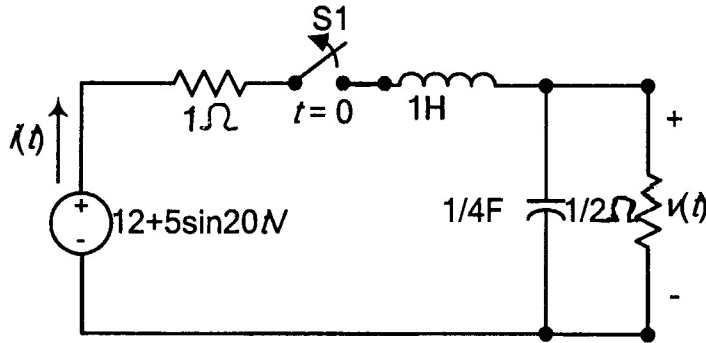


Fig. 1

2. (20%) In Fig. 2, please draw the Bode amplitude and phase plots of the transfer function $H(s)=V_o/V_s$?

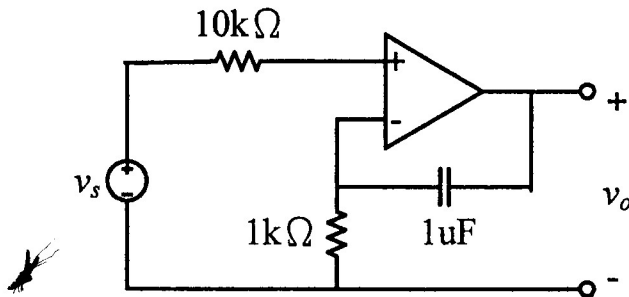


Fig. 2

3. (15%) Suppose your camping tent is at the end of a rural distribution system and is far away from the power station which supplies power to your tent. The line voltage there is 100 Vrms (the nominal voltage is 110V) with or without your game set with a monitor (total capacity is 90VA) being turned on. The consequence of the low voltage is that your 14-inch monitor has a 12-inch picture. You would like to play the game to kill the time in the tent and need to ameliorate the picture shrinking problem due to the low voltage. You happen to find a 110/12V transformer in your car with the circuit shown on its plate as in Fig. 3.

- (a) Show how you would use the transformer to supply the power to your game set to have the voltage needed to ameliorate the picture shrinking problem. Draw the circuit how the power line, the transformer, and the game set are connected with the dots marked.
- (b) Show if the connection in (a) will overload the 12-VA transformer and explain why.

(背面仍有題目,請繼續作答)

※ 考生請注意：本試題 可 不可 使用計算機

(c) If the connection in (a) would not overload the transformer, do you have any concerns about the connection you do in (a)?

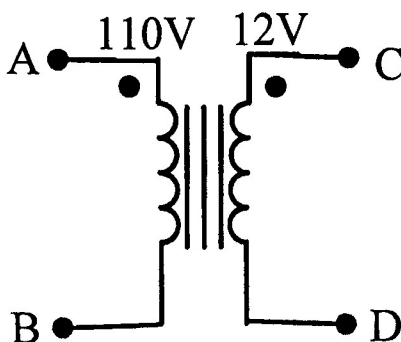


Fig. 3

4. (20%) Assume $V_{in}(t)=10\sin(10\pi t)$, $V_B=2$ volts, and $R=10k\Omega$, please plot the $V_{out}(t)$ waveforms of the circuits, shown in Fig. 4(a) and Fig. 4(b), respectively. (Note: ALL diodes are ideal.)

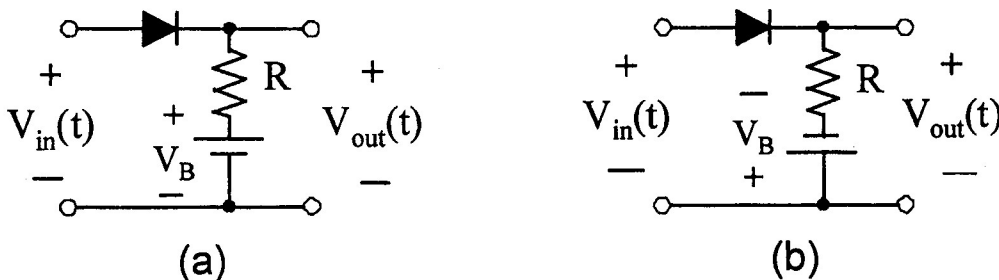


Fig. 4

5. (20%) Find the Z-parameters Z_{11} , Z_{12} , Z_{21} , and Z_{22} , as defined below, for the circuit network of Fig. 4.

$$\begin{bmatrix} V_{in} \\ V_{out} \end{bmatrix} = \begin{bmatrix} Z_{11} & Z_{12} \\ Z_{21} & Z_{22} \end{bmatrix} \cdot \begin{bmatrix} i_{in} \\ i_{out} \end{bmatrix}$$

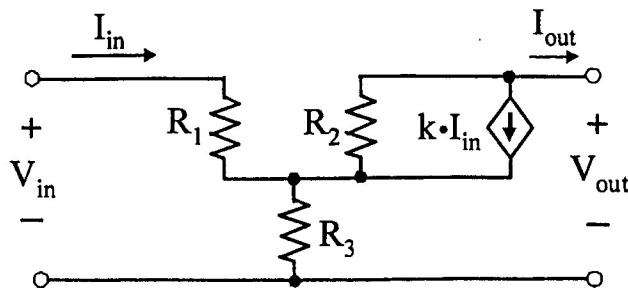


Fig. 5

※ 考生請注意：本試題 可 不可 使用計算機

6. (10%) Plot the V_o - V_i characteristic curve for the circuit in Fig. 6. (Note: ALL diodes and operational amplifiers are ideal.)

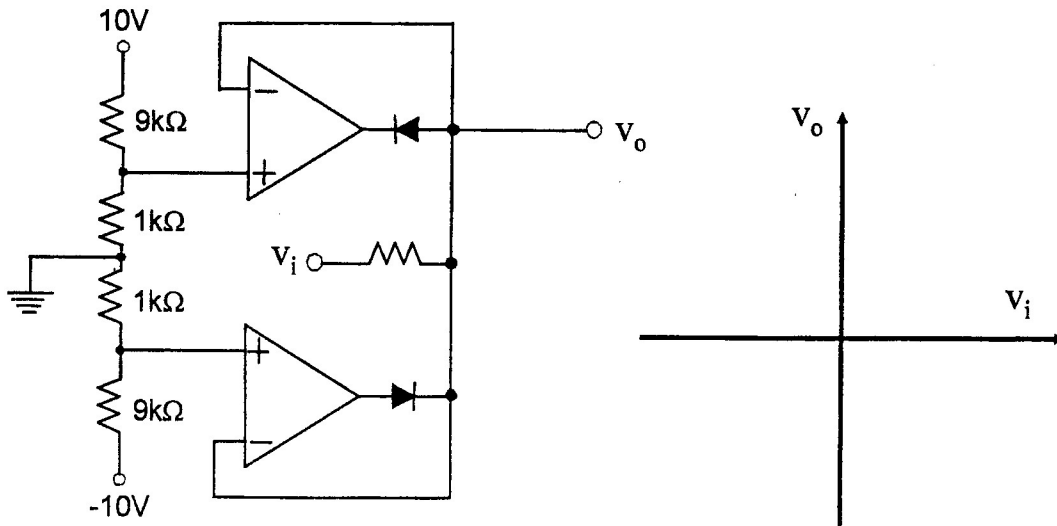


Fig. 6