

國立臺北科技大學  
九十九學年度研究所碩士在職專班入學考試

電腦與通訊研究所  
丁組：電子學試題

填准考證號碼

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第一頁 共二頁

**注意事項：**

1. 本試題共五題，配分共 100 分。
2. 請按順序標明題號作答，不必抄題。
3. 全部答案均須答在試卷答案欄內，否則不予計分。

一、 Suppose supply voltage =  $V_{DD}$  and threshold voltage =  $V_{th}$ . Give the expression of the output voltage Y for the pass transistor networks shown in Fig.1(a)&(b). (10%)

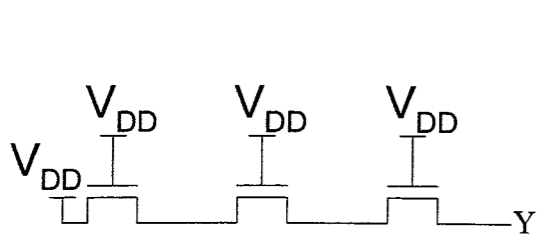


Fig.1(a)

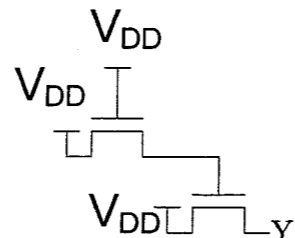


Fig.1(b)

二、 (a) Please sketch the transfer characteristic  $V_o$  versus  $V_i$  for the circuit in Fig.2a. Assume the diodes are ideal. (10%)

(b) For Fig.2b, please sketch the output for the input shown in Fig.2d. Label the most positive and most negative output levels. Assume the diodes are ideal and  $CR \ll T$ . (10%)

(c) For Fig.2c, please sketch the output for the input shown in Fig.2d. Label the most positive and most negative output levels. Assume the diodes are ideal and  $CR \gg T$ . (10%)

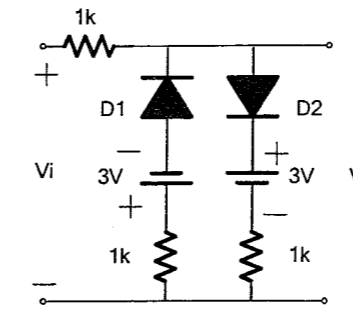


Fig.2a

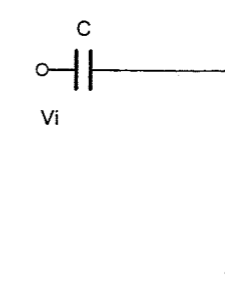


Fig.2b

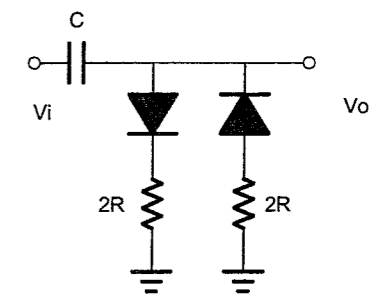


Fig.2c

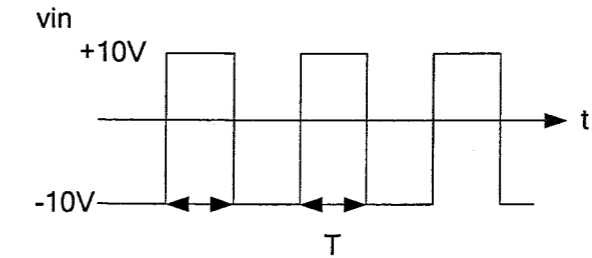


Fig.2d

三、 Assume the  $M_1$  is in saturation with transconductance  $g_{m1}$  and output resistance  $r_{o1}$ .

- (a) Calculate the small-signal voltage gain of the circuit in Fig.3. (10%)
- (b) Calculate the input impedance from  $V_{in}$ . (10%)

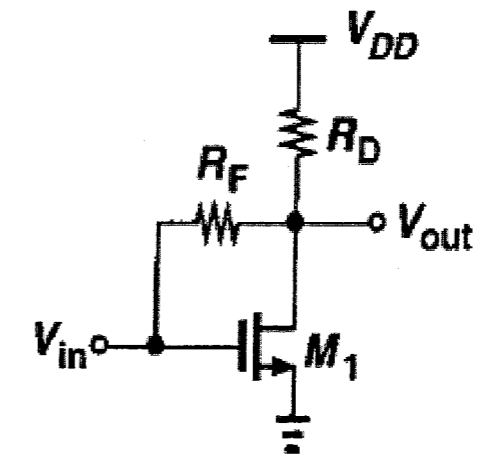


Fig.3

注意：背面尚有試題

- 四、 The circuit in Fig.4 utilizes an ideal op-amp with a tunable  $R_L$ .
1. Find  $V_o$ . (10%)
  2. If  $V_o$  is not to be lower than  $-13V$ , find the maximum allowed value for  $R_L$ . (10%)
  3. If  $R_L$  is varied in the range  $100\Omega$  to  $1k\Omega$ , what is the corresponding change in  $I_L$  and in  $V_o$ ? (10%)

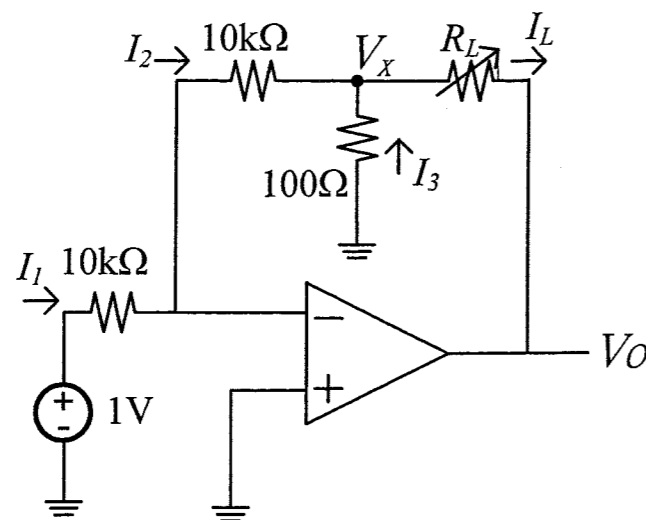


Fig.4

- 五、 In Fig.5, assume  $V_{id}=V_2-V_1$ . Find the differential voltage gains of  $A_m$  and  $A_o$ , where  $A_m = V_m / V_{id}$ ,  $A_o = V_o / V_{id}$ . (10%)

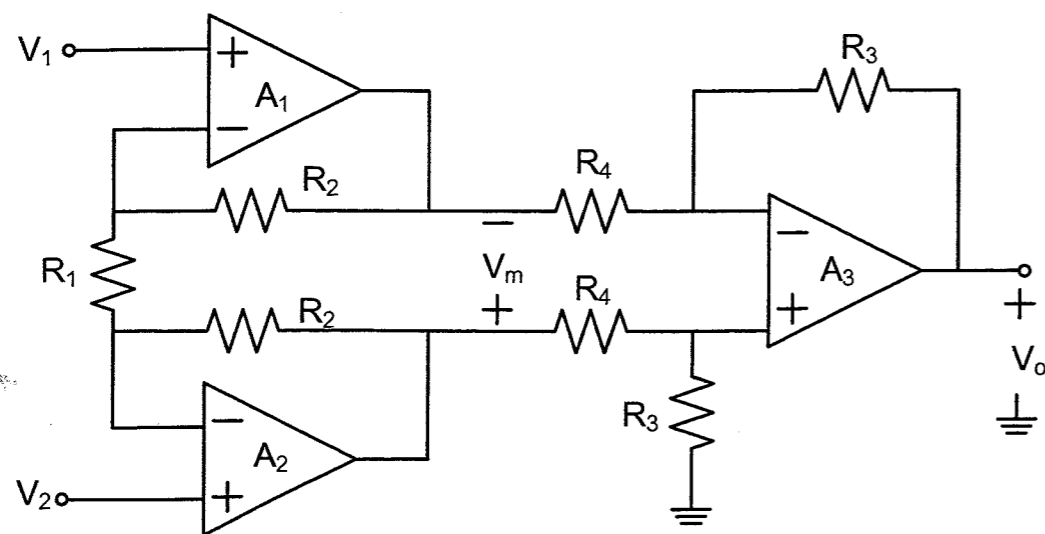


Fig.5