

國立臺北科技大學 104 學年度碩士班招生考試

系所組別：1111、1132 機電整合研究所甲、丙組

第三節 電子學 試題 (選考)

第一頁 共二頁

**注意事項：**

1. 本試題共 8 題，配分共 100 分。
2. 請標明大題、子題編號作答，不必抄題。
3. 全部答案均須在答案卷之答案欄內作答，否則不予計分。

1. As the following figure, if the input voltage  $V_i$  is square signal as Figure 1, and the silicon based diode was used on Figure 2. Please calculate the  $V_o$  and draw the relative waveform between the  $V_i$  and  $V_o$  (10%)

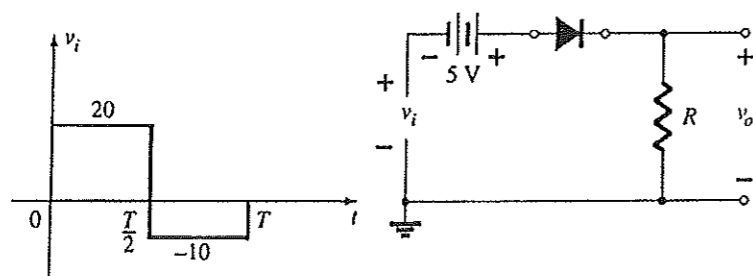


Fig. 1

Fig. 2

2. The OP-AMPS as the following circuit Figure 3, Please derive the relation between the  $V_o$ ,  $V_1$  and  $V_2$ . (10%)

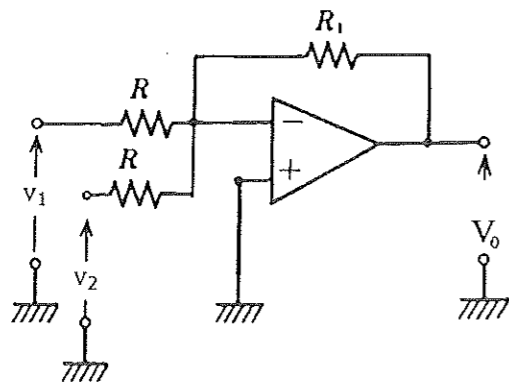


Fig.3

3. The input signal in Figure 4 is applied to the comparator and  $R_1$  is  $10K\Omega$ ,  $C$  is  $0.001\mu F$ , please derive the relation between the  $V_o$  and  $V_{in}$ , if the input  $V_{in}$  is square waveform as shown in Figure 4, Please draw waveform and calculate the output voltage to show its proper relationship with the input signal. (10%)

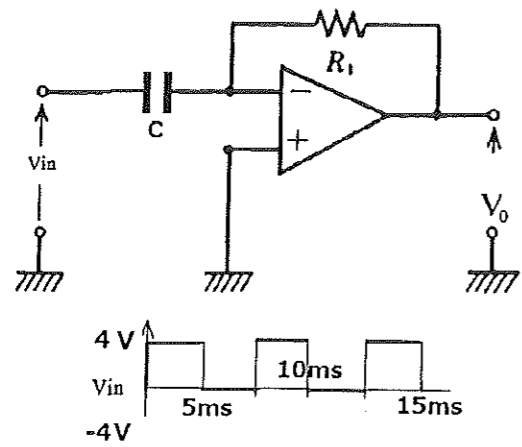


Fig. 4

4. The following **Figure 5** circuit uses UJT(unijunction transistor) to generate the pulse and the UJT stand-off rate is 0.5. If the initial condition of capacitor is  $V_c=0$ , please calculate the time of the first pulse generation after S-switch closing (10%)

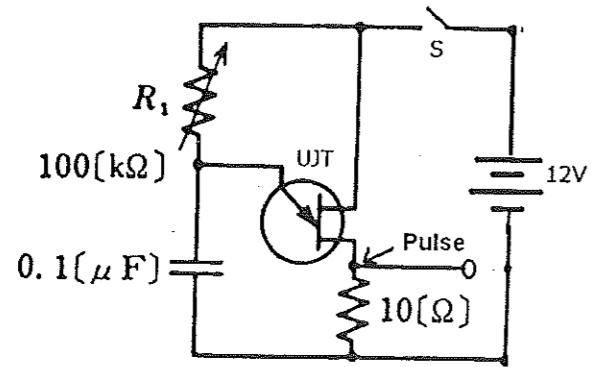


Fig. 5

5. Determine the working voltage value of  $V_{in}$  when the transistor becomes saturation condition in the **Figure 6** ( $\beta$  is 150 of the transistor) (20%)

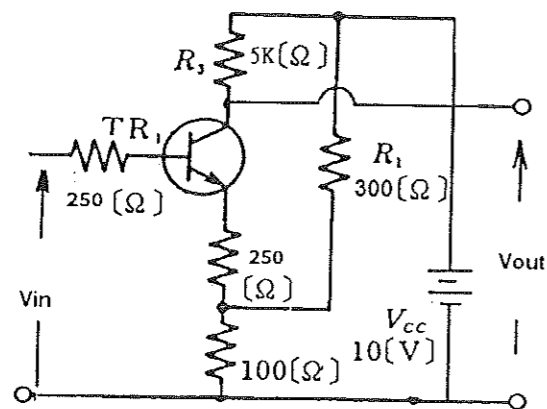


Fig.6

注意：背面尚有試題

6. Describe the output waveform for the OP-AMPs as the following **Figure 7** to show its proper relationship with the input signal and determine the peak voltage ( $V_u$ ) and the low voltage ( $V_L$ ). (10%)

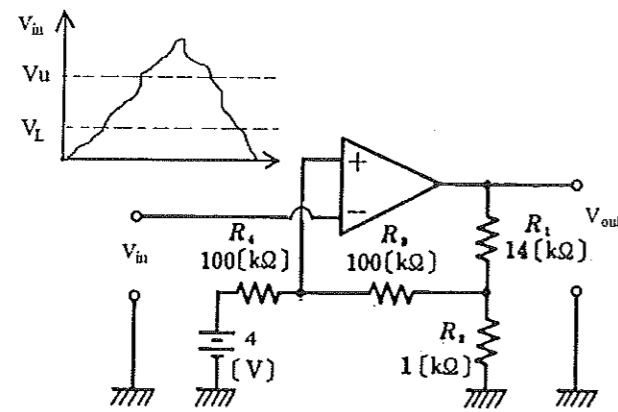


Fig. 7

7. For the circuit in **Figure 8** (20%)  
 (a) Find the mathematical expression for the transient behavior of the voltage  $V_c$  and the current  $i_c$  if the capacitor initially uncharged and switch is thrown into position 1 at  $t=0$ ms

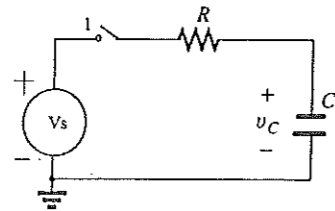


Fig. 8 a

- (b) If the input signal  $V_s$  is as following and  $R=15K\Omega$  and  $C=0.0056\mu F$ , Please draw the waveforms of  $V_c$  to show its proper relationship with the input signal.

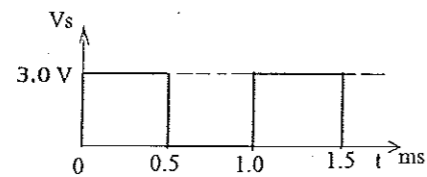


Fig. 8b

8. As the following **Figure 9** circuit, determine the value of  $V_{CE}$  and  $I_C$  (10%)

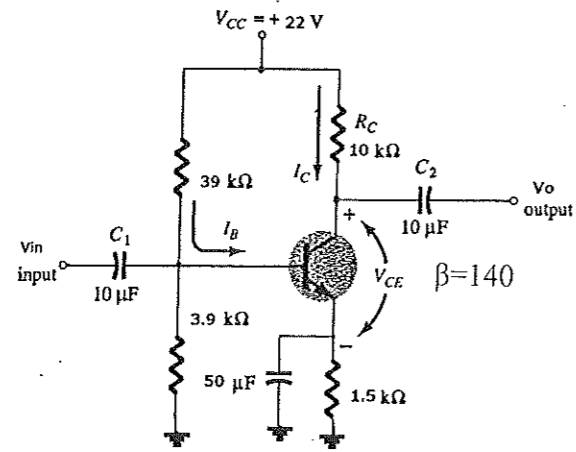


Fig. 9