

# 國立臺北科技大學 109 學年度碩士班招生考試

系所組別：1503 自動化科技研究所

## 第二節 電子學 試題 (選考)

第 1 頁 共 1 頁

**注意事項：**

1. 本試題共五題，每題 20 分，共 100 分。
2. 不必抄題，作答時請將試題題號及答案依照順序寫在答案卷上。
3. 全部答案均須在答案卷之答案欄內作答，否則不予計分。

一、In Figure 1, derive the relation between  $V_1$ ,  $V_2$  and  $V_{out}$ . (10%) If  $R_1=1\text{K}\Omega$ ,  $R_2=2\text{K}\Omega$  and  $R_3=5\text{K}\Omega$  and assume that  $V_1=2\text{V}$  and  $V_2=4\text{V}$ , what is the output  $V_{out}$ ? (10%)

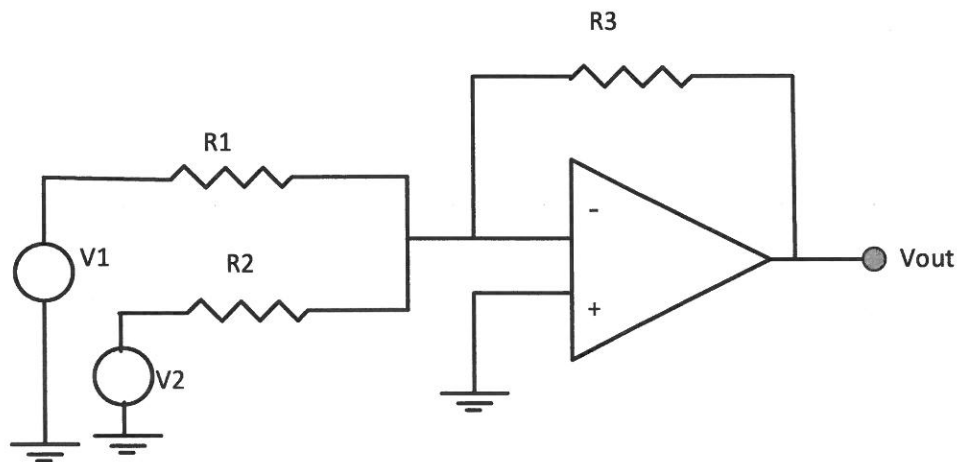


Fig. 1

二、Suppose that the resistors  $R_1=R_2=10\text{K}\Omega$  and  $R_3=R_4=100\text{K}\Omega$  in Fig. 2. Assume also that  $V_1=2\text{V}$  and  $V_2=4\text{V}$ , what is the output  $V_{out}$ ? (20%)

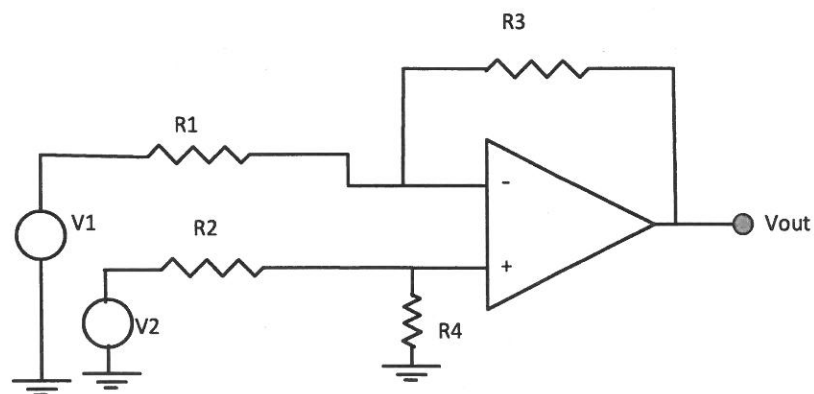


Fig. 2

三、The regulator is shown in Fig. 3. If  $R_z$  is  $15\Omega$ , the unregulated input is  $12\text{V}$ , and the zener operates at  $6\text{V}$ . What is the diode dissipation when the load current is  $0\text{A}$ ? (20%)

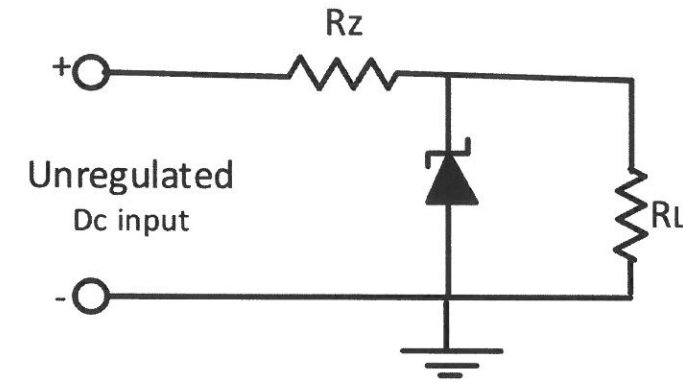


Fig. 3

四、The dc bias circuit shown in Fig. 4 has  $R_B=200\text{k}\Omega$ ,  $R_C=1\text{k}\Omega$ , and  $V_{CC}=15\text{V}$ . The transistor has  $\beta=100$ . Solve for  $I_C$  and  $V_{CE}$ . (20%)

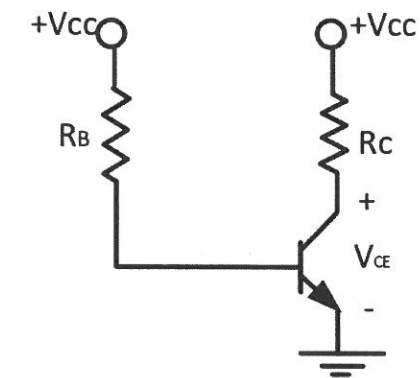


Fig. 4

五、Fig. 5. shows a low-pass filter with  $f_c = 1\text{kHz}$  and a gain of 10. If  $R=1\text{K}\Omega$  and  $R_i=1\text{K}\Omega$ , what are  $R_f$  and  $C$ ? (20%)

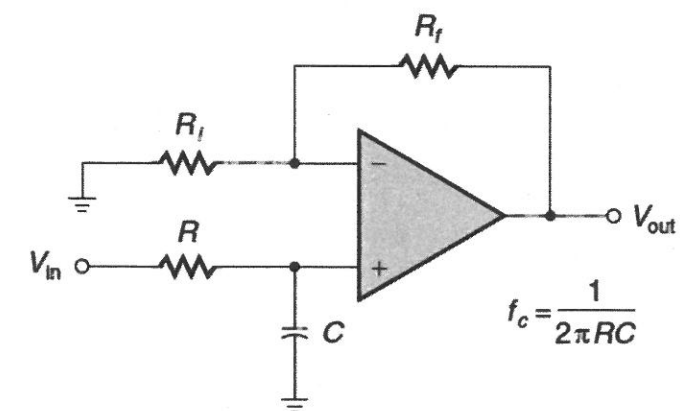


Fig. 5