

114CC04

國立臺北科技大學 114 學年度碩士班招生考試

系所組別：2240 電子工程系碩士班丁組

第一節 電子學 試題

第 1 頁 共 1 頁

注意事項：

1. 本試題共四題，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。
4. 每題需詳列解題過程，僅寫答案不予計分。

一、(25%) Fig. 1 shows an ideal operation amplifier with $v_I(t) = B\cos(\omega t + \theta)$.

1. Derive the voltage $v_L(t)$. (15%)
2. Derive the voltage $v_O(t)$. (10%)

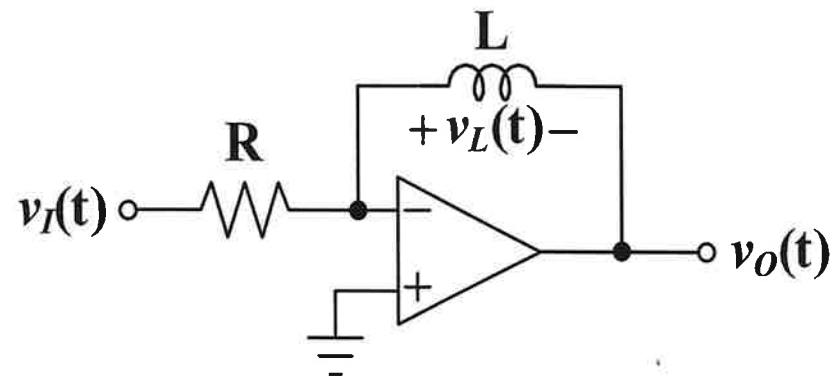


Fig. 1

二、(25%) Bridge-rectifier circuit design.

1. Plot the bridge-rectifier circuit constructed by a transformer, 4 diodes, and a resistor (8%)
2. Input signal is $v_I(t) = V_s \sin(\omega t)$, and the turn on voltage of a diode is V_{DO} . Derive the peak inverse voltage (PIV) of a diode in detail. (8%)
3. Plot the output voltage (v_O) versus input voltage (v_I). (9%)

三、(25%) Consider a circuit in Fig. 2. $V_{CC}=18V$, $R_E=390\Omega$, $R_F=3.3M\Omega$, $C_{in}=C_{out}=\infty$. The BJT parameters are $\beta_1=80$, $\beta_2=100$, $V_{BE1(on)}=0.9V$, $V_{BE2(on)}=0.7V$, $V_{T1}=V_{T2}=26mV$. (註：各小題答案需四捨五入到小數第二位)

1. Find the dc current I_{B2} of transistor Q_2 . (10%)
2. Find the ac current gain (i_{out}/i_{in}). (15%)

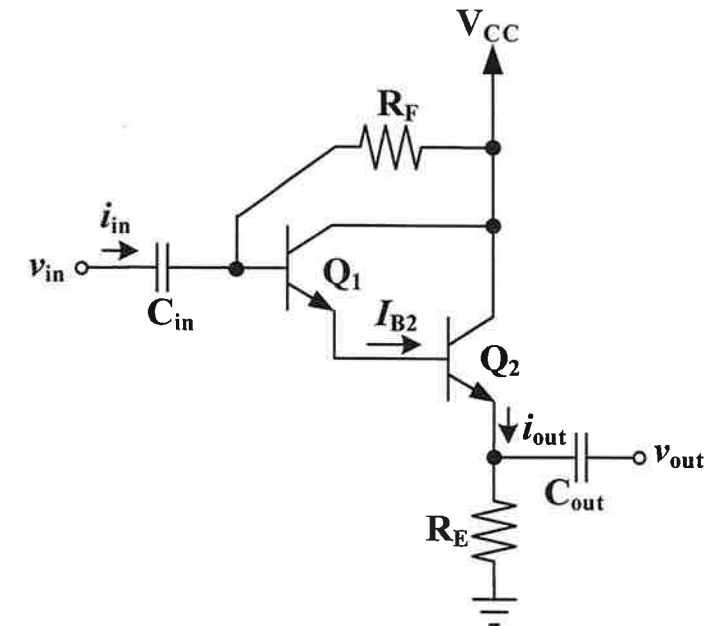


Fig. 2

四、(25%) Fig. 3 shows a zener diode circuit and the zener model. The $V_z = 8.0V$ at $I_z = 6mA$. The $r_z = 25\Omega$, $V_{DD}=15V$, and $R=1K\Omega$. (註：各小題答案需四捨五入到小數第二位)

1. Consider the zener model, find the V_O with no load. (10%)
2. Consider the zener model, find the V_O when $R_L=2K\Omega$. (15%)

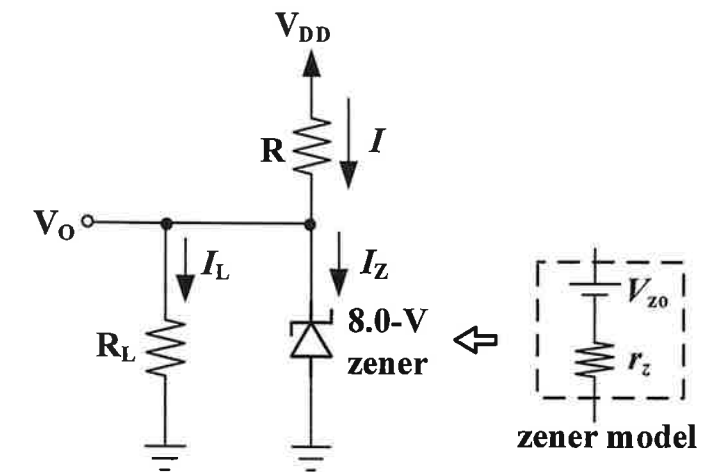


Fig. 3