(100)輔仁大學碩士班招生考試試題	考試日期：100 年 3 月 18 日第 三 節
	本試題共 二 頁 (本頁為第 一 頁)

科目：電子學　　系所組：電機工程學系乙、丁組

1. For the circuit in Fig.1, assuming the amplifier is ideal:
   (1) Find the transfer function $T(s)=V_o(s)/V_i(s)$ in terms of C_1, C_2, and R.(8%)
   (2) For $C_1=C_2=0.5\mu F$ and $R=100k\Omega$, find the location of the pole(s) and zero(s), and sketch Bode plots for the magnitude response and the phase response. (12%)

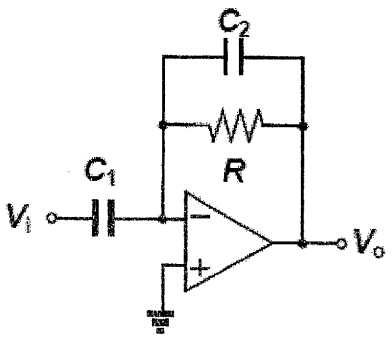


Fig. 1.

2. In Fig. 2, for the emitter follower biased at $I_C=1mA$ and having $r_x=100\Omega$, $r_o=100k\Omega$, $R_{sig}=R_L=1k\Omega$, $\beta=100$, $C_\mu=2pF$, and $f_T=400MHz$:
   (1) Find low-frequency gain. (10%)
   (2) Find the f_z, R_μ, R_π, and f_H. (10%)

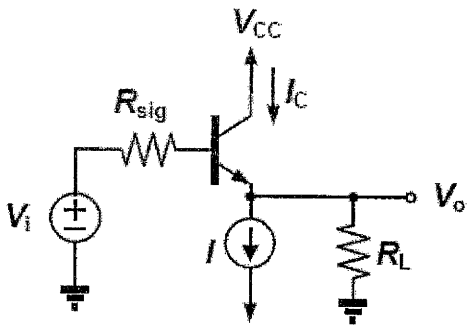


Fig. 2.

3. For the circuit in Fig.3, $I_D=1mA$, $R_1=1M\Omega$, $R_2=4M\Omega$, and $V_{GS}=0.8V$. The MOSFET has $V_t=0.6V$. When channel length modulation, and parasitic are neglected,
   (1) What is the feedback type of this circuit in terms of series and shunt? (2%)
   (2) Find the feedback factor (β). (3%)
   (3) Find voltage gain V_o/V_i by feedback analysis. (10%)
   (4) Find input resistance (R_i) and output resistance (R_o). (5%)

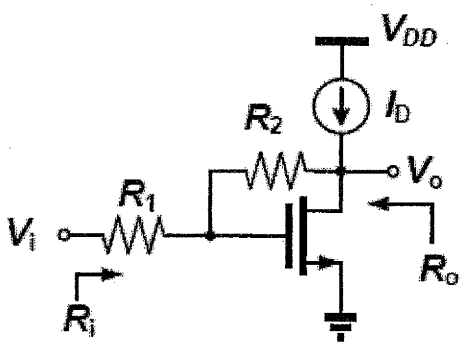
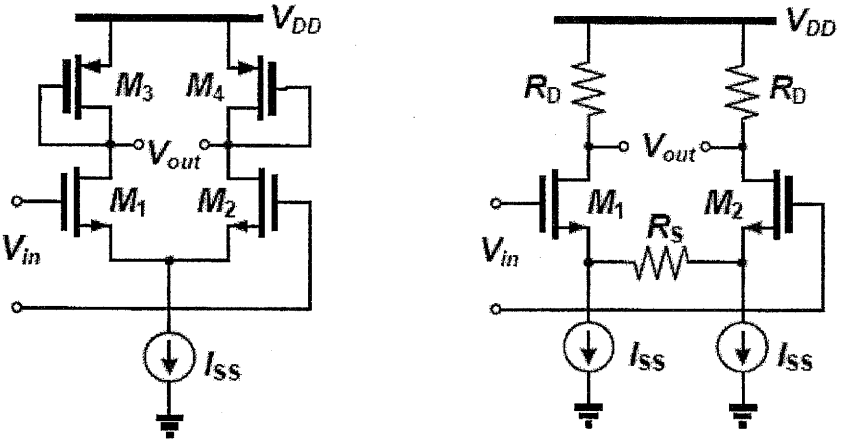


Fig. 3.

※ 注意：1.考生須在「彌封答案卷」上作答。
2.本試題紙空白部份可當稿紙使用。
3.考生於作答時可否使用計算機、法典、字典或其他資料或工具，以簡章之規定為準。

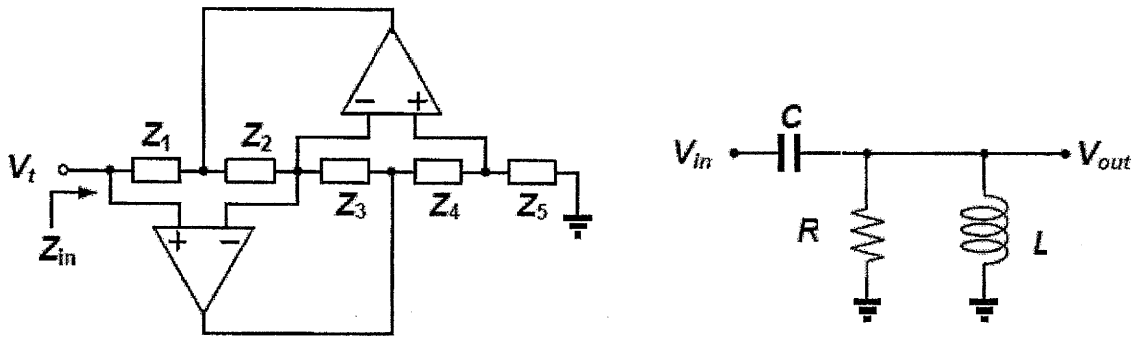
4. For circuits in Fig. 4, all transistors operate at saturation region and their corresponding transconductance of M_x is denoted as g_{mx}. As the transistors are symmetric, and the channel length modulation, the body effect, parasitic are neglected,
   (1) Find the voltage gain of Fig. 4(a). (10%)
   (2) Find the voltage gain of Fig. 4(b). (10%)



(a) (b)

Fig. 4

5. Consider the circuit shown in Fig. 5(a)
   (1) If Z_1~Z_5 represent general impedances and the two op amps are ideal, find the impedance (Z_{in}) from V_t to the ground. (10%)
   (2) Derive the transfer function of Fig. 5(b) and determine the type of this filter. After that, find out the design of Z_1~Z_5 with resistors and capacitors to replace the inductor. (10%)



(a) (b)

Fig. 5