國立勤益科技大學九十六學年度研究所碩士班招生筆試試題卷

所別：電子工程系碩士班　　**組別：**電子組

科目：電子學

准考證號碼：□□□□□□□□□（考生自填）

考生注意事項：
一、考試時間 100 分鐘。
二、共 3 頁考題，可使用計算機。

試題一：〈20 分〉

For the circuit shown in Fig. 1 first, evaluate $T_i(s)=V_i(s)/V_s(s)$ and the corresponding cutoff (corner) frequency. Second, evaluate $T_o(s)=V_o(s)/V_i(s)$ and the corresponding cutoff frequency.

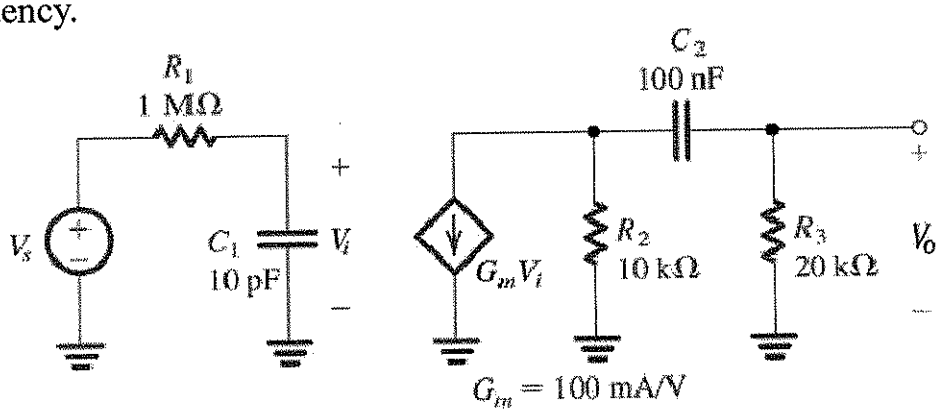


Fig. 1

試題二：〈10 分〉

Assuming the op amp to be ideal, derive an expression for the closed-loop gain v_o/v_i of the circuit shown in Fig. 2.

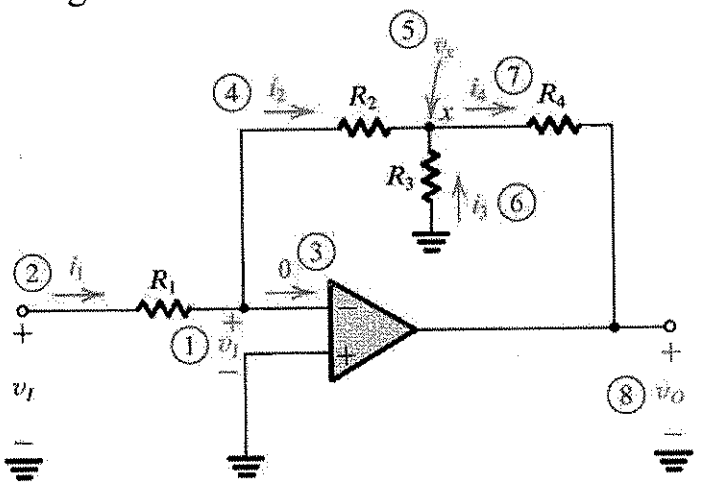


Fig. 2

試題三：〈10 分〉

The 6.8-V zener diode in the circuit of Fig. 3 is specified to have V_z=6.8 V at I_z=5 mA, r_z=20 Ω, and I_{ZK}=0.2 mA. The supply voltage V+ is nominally 10 V but can vary by ±1 V. Find V_o with no load and with V+ at its nominal value.

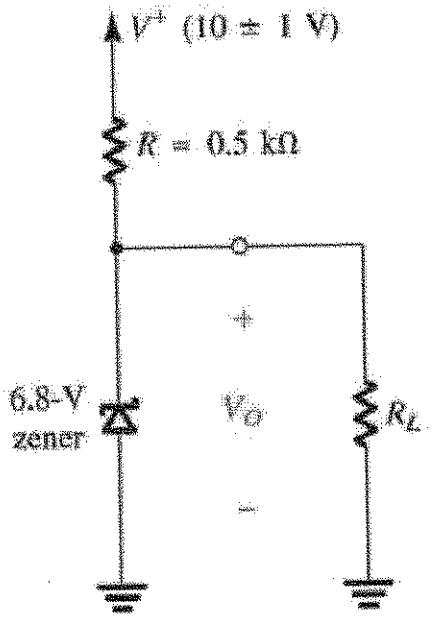


Fig. 3

試題四：〈20 分〉

Design the circuit in Fig. 4 to obtain a current I_D of $80\mu A$. Find the value required for R, and find the dc voltage V_D. Let the NMOS transistor have $V_t = 0.6V$, $\mu_n C_{ox} = 200\mu A/V^2$, $L = 0.8\mu m$, and $W = 4\mu m$. Neglect the channel-length modulation effect (i.e., assume $\lambda = 0$).

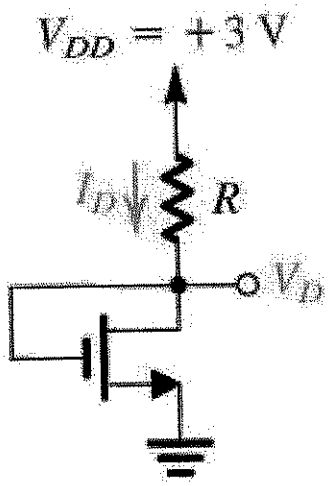


Fig. 4

試題五：〈20 分〉

For the circuit shown in Fig. 5, measurement indicates that $V_B = -1.5V$. Assuming $V_{BE} = 0.7V$, calculate V_E, α, β, and V_C. If a transistor with $\beta = \infty$ is used, what values of V_B, V_E, and V_C result?

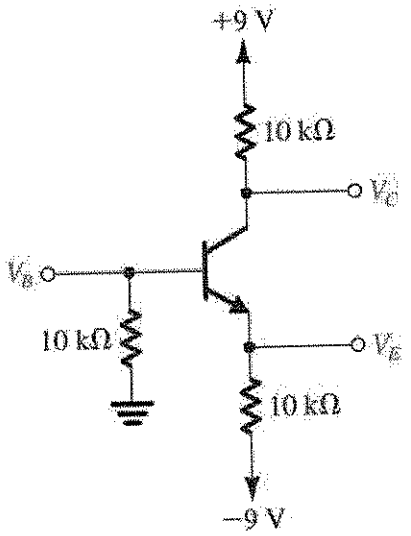
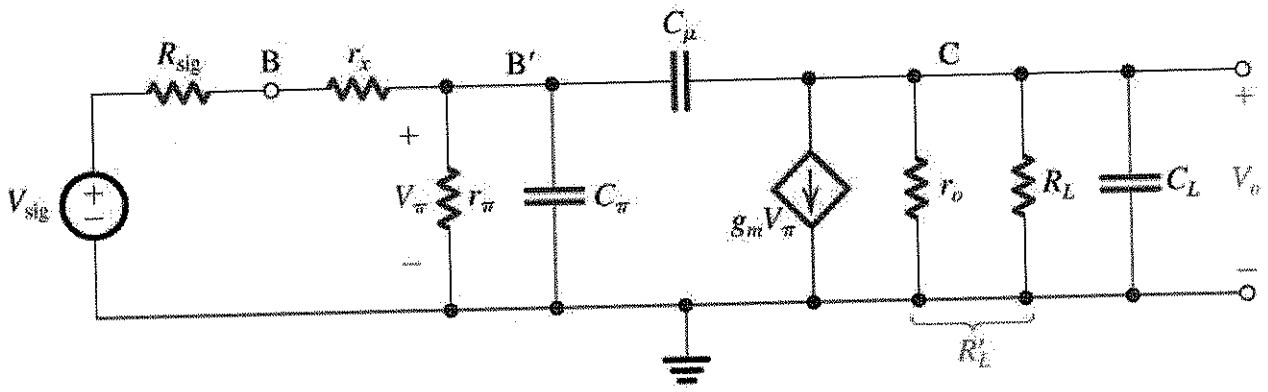


Fig.5

試題六：〈20 分〉

A common-emitter amplifier that can be represented by the equivalent circuit of Fig.6 has $C_\pi = 10pF$, $C_\mu = 0.5pF$, $C_L = 2pF$, $g_m = 20mA/V$, $\beta = 100$, $r_x = 200\Omega$, $R'_L = 5k\Omega$, and $R_{sig} = 1k\Omega$. Find the midband gain A_M and an estimate of the 3-dB frequency f_H using the Miller equivalence.



(a)

Fig. 6