國立高雄第一科技大學 97 學年度 碩士班 招生考試　試題紙

系 所 別：電腦與通訊工程系　　組　別：晶片設計組

考科代碼：2132　　考　科：電子學

注意事項：

1、本科目可使用本校提供之電子計算器。

2、請於答案卷上規定之範圍作答，違者該題不予計分。

(一) Define or explain the following terms: (40%)

(1) Transfer function

(2) Emitter follower

(3) Gain margin

(4) Zener effect

(5) Schottky diode

(二) Consider the circuit in Figure 1. The transistor parameters are V_{TN}=1V and k'_n=36μA/V^2. Design the width-to-length ratio required in each transistor such that I_D=0.5mA, V_1=2V, and V_2=5V. (20%)

(三) The parameters of the transistor in the circuit in Figure 2 are: V_{TN}=2 V, K_n=4 mA/V^2, and λ=0. The circuit parameters are: V^+=10 V, V^-= -10V, R_G= 100 kΩ, R_L = 2 kΩ, and I_Q=5 mA. (a) Find R_D such that V_{DSQ}=12 V. (b) Calculate g_m and R_i. (c) Determine the small-signal voltage gain A_v=v_o/v_i. (20%)

(四) For the circuit in Figure 3, the parameter are V^+=5 V, V^-= -5V, R_S= 0.1 kΩ, R_1= 40 kΩ, R_2= 5.72 kΩ, R_E= 0.5 kΩ, R_C= 5 kΩ, and R_L= 10 kΩ. The transistor parameters are β=150, V_{BE}(on) = 0.7 V, V_A = ∞, C_π = 35 pF, and C_μ = 4 pF. Determine the upper corner frequency and midband gain of the circuit. (20%)

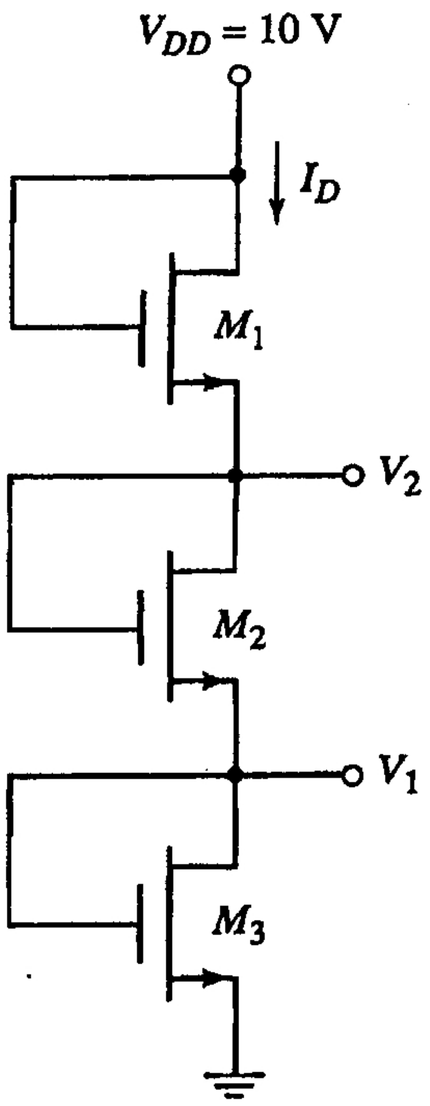

Figure 1

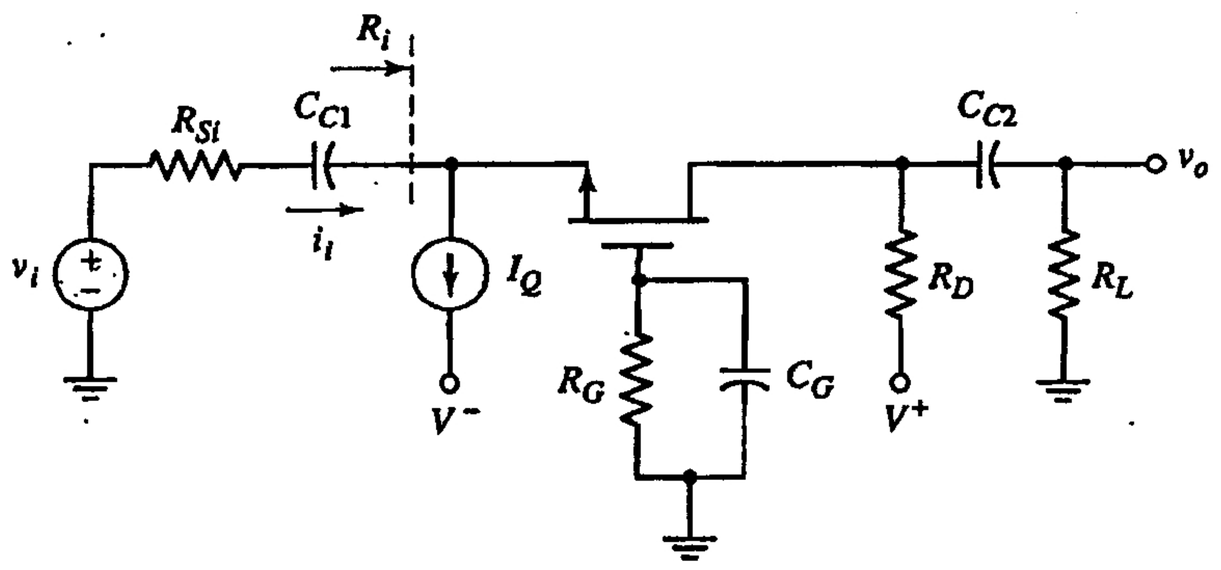

Figure 2

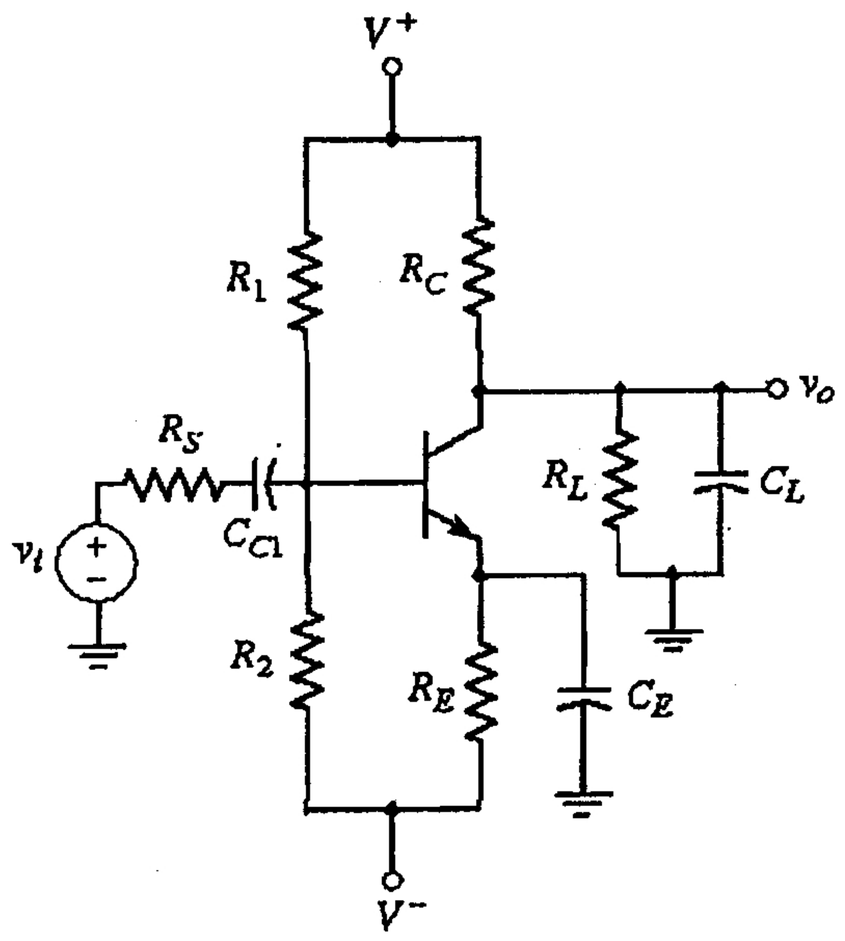

Figure 3