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：電子與資訊工程研究所　　組　別：不分組

考科代碼：2301　　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。

1. Sketch a Widlar current source and explain the operation. (10 %)

2. Discuss an advantage of BiCMOS circuit. (10 %)

3. Explain the phase and gain margins. (10 %)

4. Sketch an active filter and indicate the -3dB point. (10 %)

5. Describe and explain the opration of a Wien-bridge oscillator. (10 %)

6. Describe and explain the opration of an astable multivibrator. (10 %)

7. Describe and explain the opration of a Differential Ampilifier. (10 %)

8. For the circuit in Figure 1, the transistor parameters are: $K_{n1} = K_{n2} = 4$ mA/V^2, $V_{TN1} = V_{TN2} = 2$ V, and $\lambda_1 = \lambda_2 = 0$. Determine (a) I_{DQ1}, I_{DQ2}, V_{DSQ1}, and V_{DSQ2}. (b) g_{m1} and g_{m2}. (c) the overall small-signal voltage gain $A_v = v_o / v_i$. (3%,3%,4%)

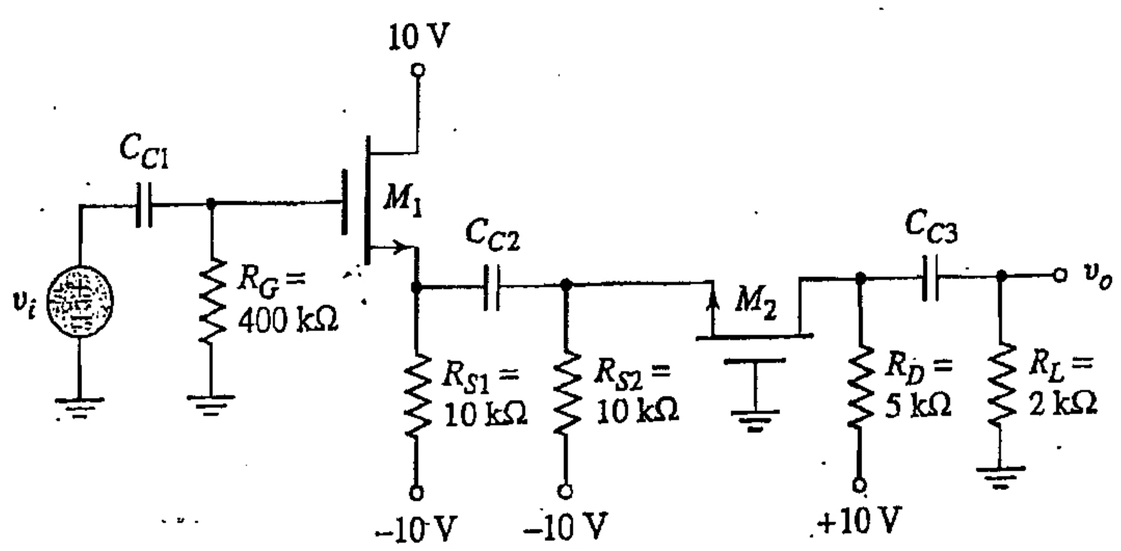

Figure 1

9. Design a common-emitter circuit whose output is capacitively coupled to a load resistor $R_L = 10K\Omega$. The minimum small-signal voltage gain is to be $|A_v| = 50$. The circuit is to be biased at ±5V and each voltage source can supply a maximum of 0.5 mA. The parameters of the available transistors are $\beta = 120$ and $V_A = \infty$. (10%)

10. Consider the circuit shown in Figure 2 where $v_s = 4 \sin \omega t$ (mV). Assume $\beta = 80$. (a) Determine $v_o(t)$ and $i_o(t)$. (b) What are the small-signal voltage and current gains? (10%)

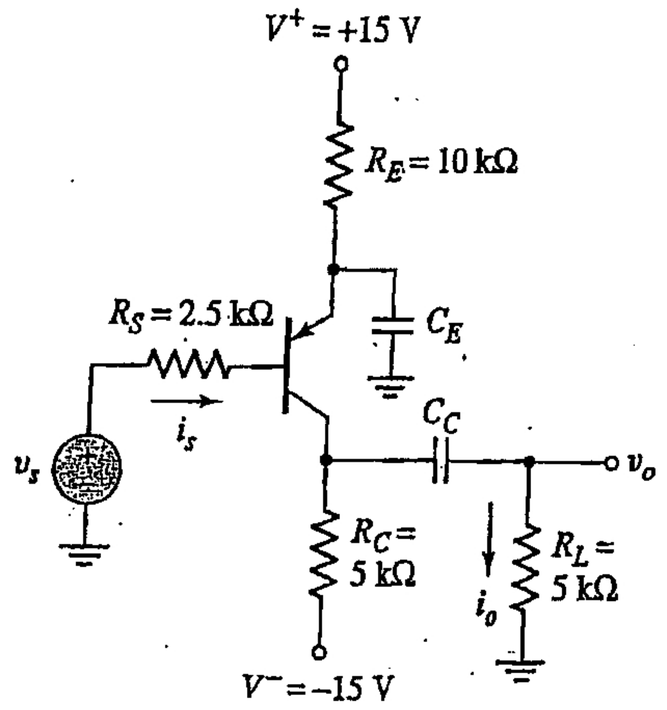

Figure 2