

科目：電子學

適用：應光系

考生注意：

1. 依次序作答，只要標明題號，不必抄題。
2. 答案必須寫在答案卷上，否則不予計分。
3. 限用藍、黑色筆作答；試題須隨卷繳回。

本 試 題
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1. Consider the circuit shown in Fig.1, the diodes are ideal. Plot V_O versus V_I over the range $-30V \leq V_I \leq 30V$. (25%)
2. For the NMOS common-source amplifier shown in Fig.2, the transistor parameters are: $V_{TN} = 0.8\text{ V}$, $K_n = 1\text{ mA/V}^2$, and $\lambda = 0$. The circuit parameters are: $V_{DD} = 5\text{ V}$, $R_S = 1\text{ k}\Omega$, $R_D = 4\text{ k}\Omega$, $R_1 = 225\text{ k}\Omega$, $R_2 = 175\text{ k}\Omega$, and $R_L = 20\text{ k}\Omega$.
 - (a) Calculate the quiescent values I_{DQ} and V_{DSQ} . (10%)
 - (b) Determine the small-signal voltage gain $A_v = v_o/v_i$. (15%)
3. The transistor current gain β in the circuit shown in Fig.3 is in the range $50 \leq \beta \leq 150$.
 - (a) Determine the range in the dc values of I_E and V_E . (10%)
 - (b) Determine the range in the values of input resistance R_i and voltage gain $A_v = v_o/v_s$. (20%)
4. For the ideal op-amp in Fig.4, calculate voltage gain $A_v = v_o/v_i$. (20%)

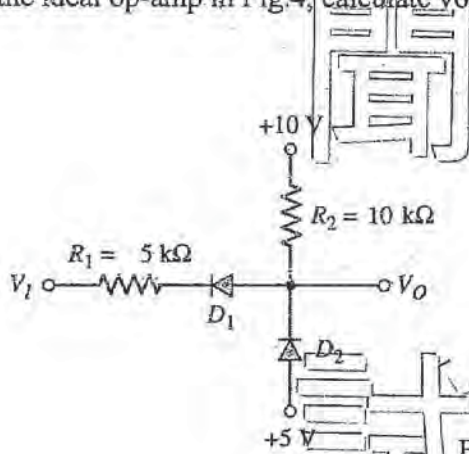


Fig.1

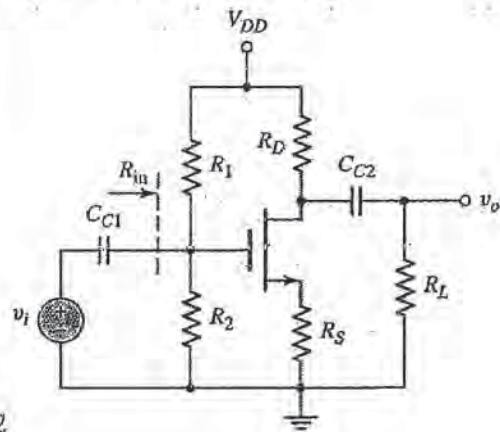


Fig.2

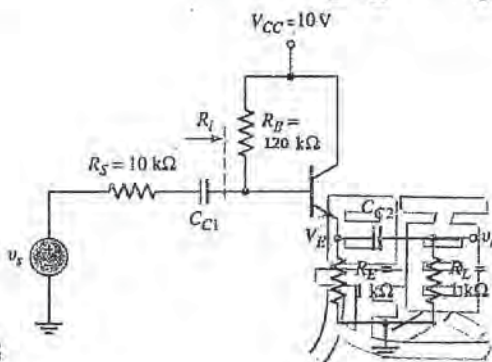


Fig.3

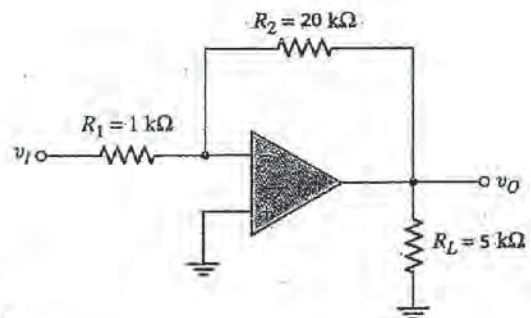


Fig.4