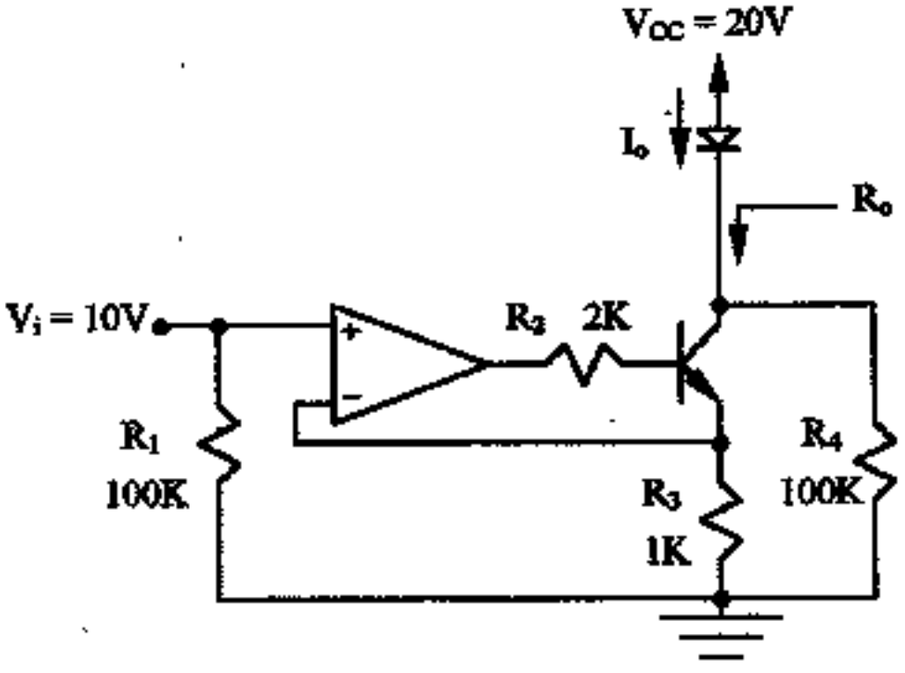
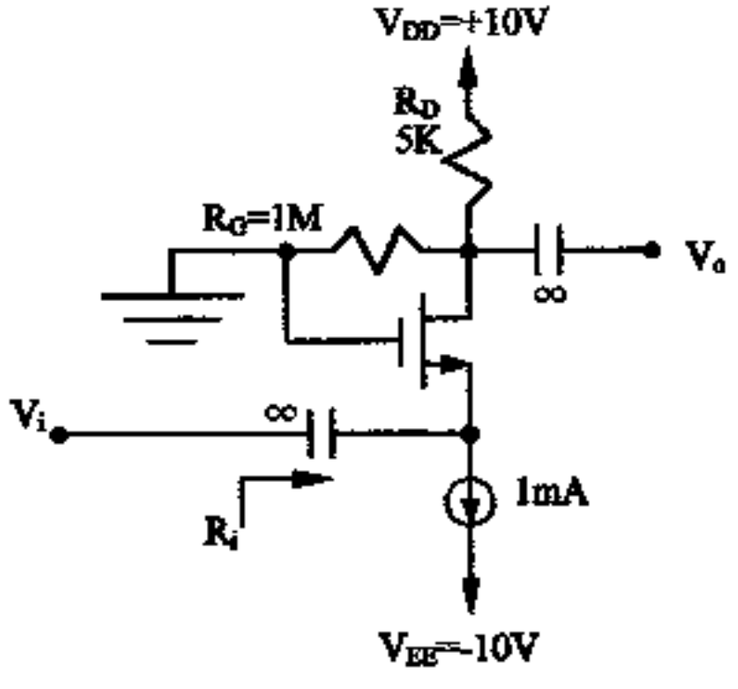
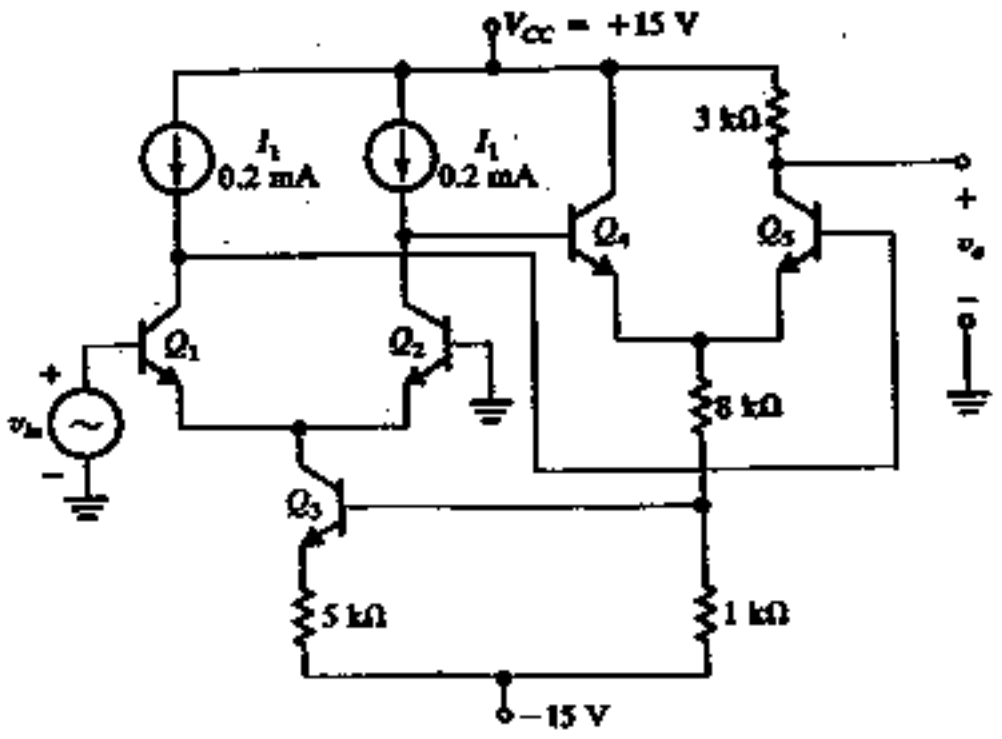
1. The op-amp in the circuit is ideal and the BJT has $\beta = 99$. The forward voltage drop of the diode is $V_D = 0.7$ V.
   (1) Calculate the current I_o. (6%)
   (2) Find the output resistance R_o. (6%)



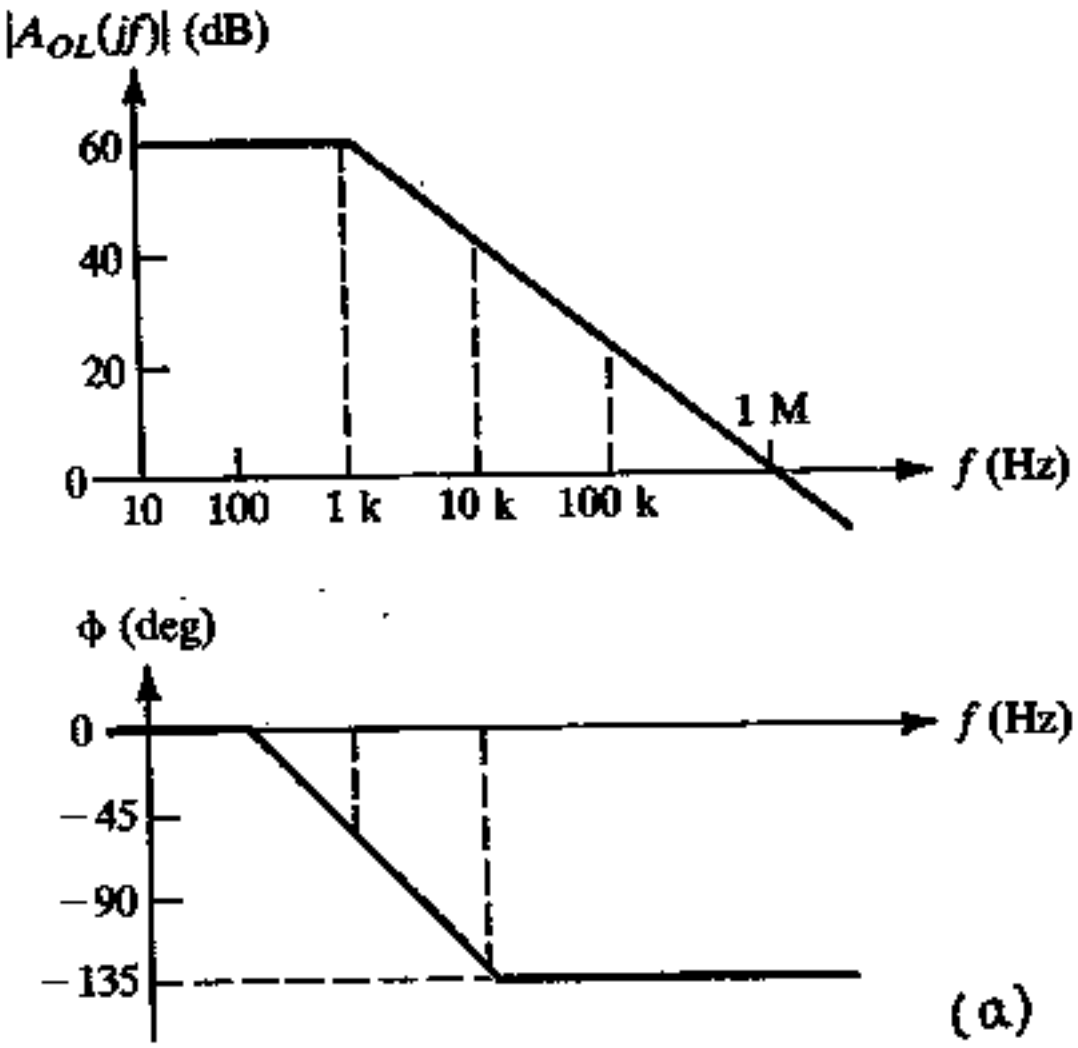
2. The MOSFET parameters in the circuit are $k_n = 1$ mA/V^2, $V_{TH} = 1$ V.
   (1) Calculate the values V_{DS} and g_m of the MOSFET. (8%)
   (2) Sketch the small signal equivalent circuit. (3%)
   (3) Find the voltage gain V_o/V_i and input resistance R_i. (7%)



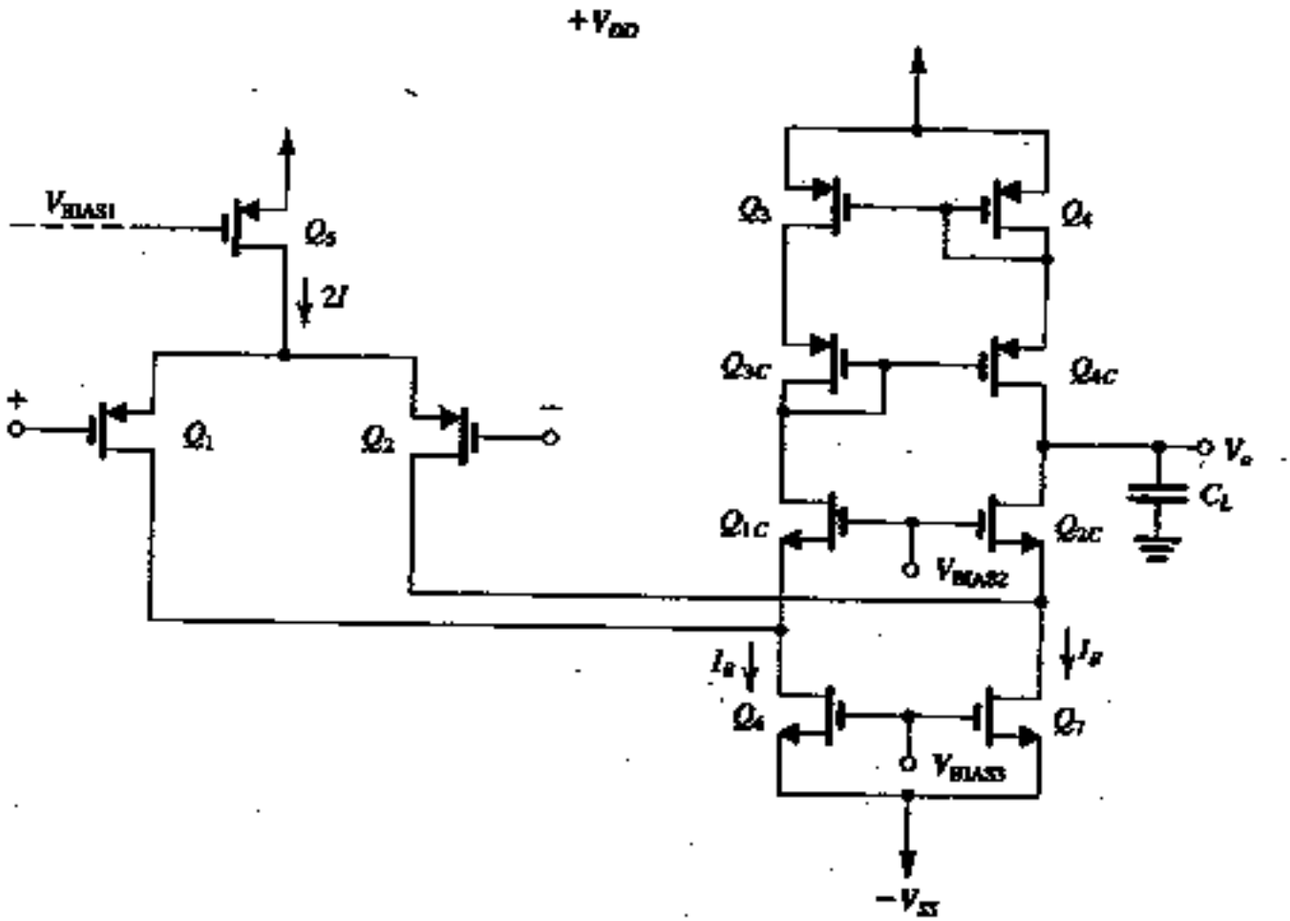
3.For the following circuit, r_π=1kΩ, and β=100 for all BJTs. (a) Determine the dc values of V_O and V_{CE5} if v_{in}=0, $I_{B4}\neq 0$, and $I_{B5}\neq 0$. (8%) (b) Find the small-signal ac gain v_o/v_{in}. (7%)



4.If the A_{OL} gain-phase characteristics are shown in Fig.(a), determine the overall stability of the circuit shown in Fig. (b). (15%)



5.Describe the important features of the circuit shown below, and explain how does this circuit obtain the superior performance over conventional-structured amplifiers. (20%)



6.For the following circuit the diodes have a constant 0.7V drop when conducting, and the op-amp saturates at ±10V. (a) Sketch and label the transfer characteristic v_o-v_i and find the maximum diode current. (10%) (b) Redo part (a) with R_1 eliminated and R_2 short-circuited. (10%)