UNIVERSITY OF CALIFORNIA AT BERKELEY
College of Engineering
Department of Electrical Engineering and Computer Sciences

EE105 Lab Experiments

Prelab 5: Single Stage BJT Amplifiers: Common Collector and Common Base

Name:

Lab Section:

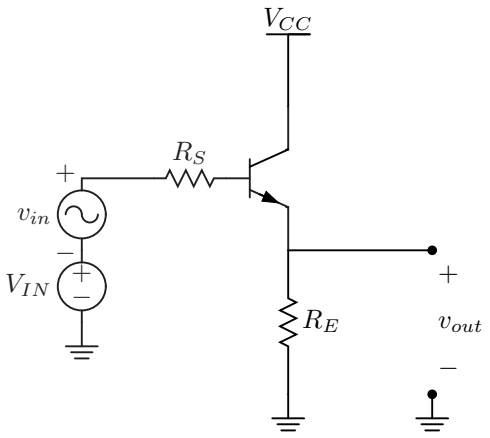

Figure 1: Common collector amplifier

1. Draw the small signal model for the common collector amplifier shown in Figure 1.

2. State (do not derive) the formulas for the input impedance, output impedance, and voltage gain of a common collector amplifier.

3. Using the following parameters, calculate the numerical values of the properties above: $I_S = 26.03$ fA, $R_S = 10$ kΩ, $R_E = 100$ Ω, $V_{IN} = 6.350$ V, and $\beta = 270$. Ignore the Early effect and make approximations when appropriate.

4. How do these properties compare to those of the common emitter amplifier?

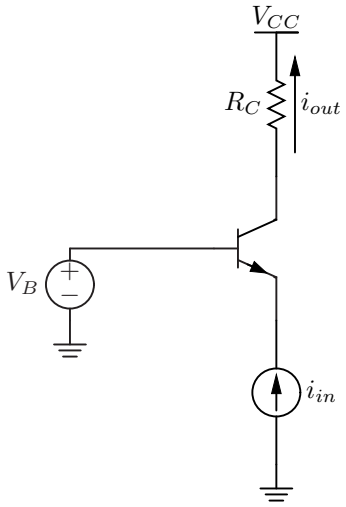

Figure 2: Common base amplifier with a current input

5. Draw the small signal model for the common base amplifier shown in Figure 2. *Note: The current source i_{in} is a small-signal AC current source, not a DC current source, so you must include it in the small-signal model.*

6. State (do not derive) the formulas for input impedance, output impedance, and current gain ($A_i = i_{out}/i_{in}$) of a common base amplifier.

7. Using the following parameters, calculate the numerical value of the properties above: $I_S = 26.03$ fA, $R_C = 1$ kΩ, and $V_{BE} = 640$ mV. Ignore the Early effect and make approximations when appropriate.

8. How do these properties compare to those of the common emitter amplifier?