

### Objective:

This lab will introduce you to common-collector and common-emitter amplifiers.

### Introduction:

In electronics, a common-collector amplifier (also known as an emitter follower or BJT voltage follower) is one of three basic single-stage bipolar junction transistor (BJT) amplifier topologies, typically used as a voltage buffer. In this circuit the base terminal of the transistor serves as the input, the emitter is the output, and the collector is common to both, hence its name. The analogous field-effect transistor circuit is the common-drain amplifier.

### Materials:

Various resistors

1 2N2222 NPN BJT transistor

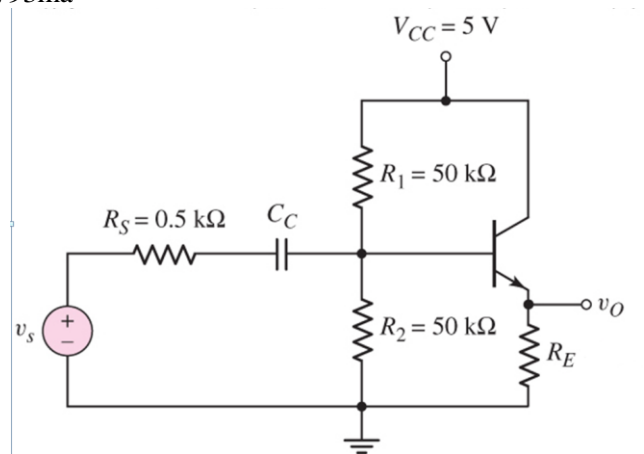
2 0.33  $\mu\text{F}$  capacitors

Breadboard

### Procedure:

Given the following values, design, build, and implement the following Common Collector Circuit in PSPICE. Submit the output file along with waveforms in your report.

Design and build the amplifier using the following values:  $V_s = 10 \text{ mV}_{\text{pp}}$ ,  $R_1 = R_2 = 50\text{k}$ ,  $V_a = 80\text{V}$ ,  $V_{\text{be(on)}} = 0.7\text{V}$ ,  $I_{\text{cq}} = .793\text{ma}$



- 1) Using the curve tracer calculate beta
- 2) Solve for  $R_E$
- 3) Solve for  $V_{ce}$
- 4) Build and simulate circuit, provide SPICE simulation and waveform provided by oscilloscope in your report.
- 5) Outside of lab solve for Small signal Voltage gain, what are potential causes for this to hand calculation to be incorrect?

### Circuit 2:

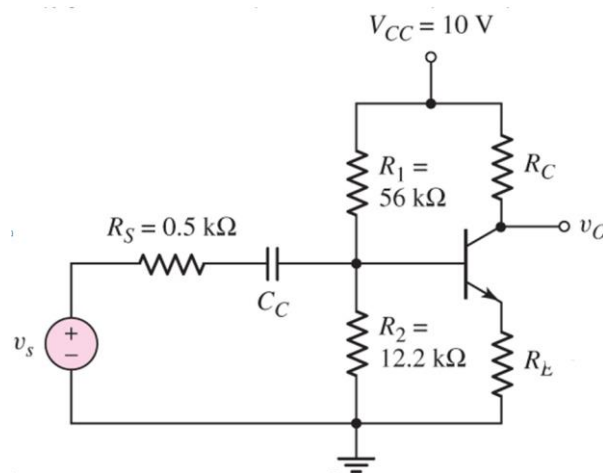
### Materials:

Same as above

### Procedure:

Given the following values, design, build, and implement the following Common Emitter Circuit in PSPICE. Submit the output file along with waveforms in your report.

Design and build the amplifier using the following values:  $V_s = 10 \text{ mV}_{pp}$ ,  $R_1 = 56 \text{ k}\Omega$ ,  $R_2 = 12.2 \text{ k}\Omega$ ,  $V_a = \text{inf}$ ,  $V_{be(on)} = 0.7 \text{ V}$ ,  $I_{cq} = 2.16 \text{ mA}$ ,  $V_{ce} = 4.81 \text{ V}$



- 1) Using the curve tracer calculate beta
- 2) Solve for  $R_E$  and  $R_C$
- 3) Solve for  $V_{ce}$
- 4) Build and simulate circuit, provide SPICE simulation and waveform provided by oscilloscope in your report.
- 5) Outside of lab solve for Small signal Voltage gain, what are potential causes for this to hand calculation to be incorrect?

### Conclusions:

- 1) What differences did you observe between the two amplifiers?
- 2) Which amplifier would be better for the input stage with a given input impedance in a multi-transistor circuit?