LAB #4

BJT Common-Emitter Amp

Introduction:

In electronics, a **common-emitter** amplifier is one of three basic single-stage bipolar-junction-transistor (BJT) amplifier topologies, typically used as a voltage amplifier. In this circuit the base terminal of the transistor serves as the input, the collector is the output, and the emitter is *common* to both (for example, it may be tied to ground reference or a power supply rail), hence its name. The analogous field-effect transistor circuit is the common-source amplifier.

Materials:

Breadboard
Multiple Resistors
0.33 µF Capacitor
2N2222 NPN BJT Transistor

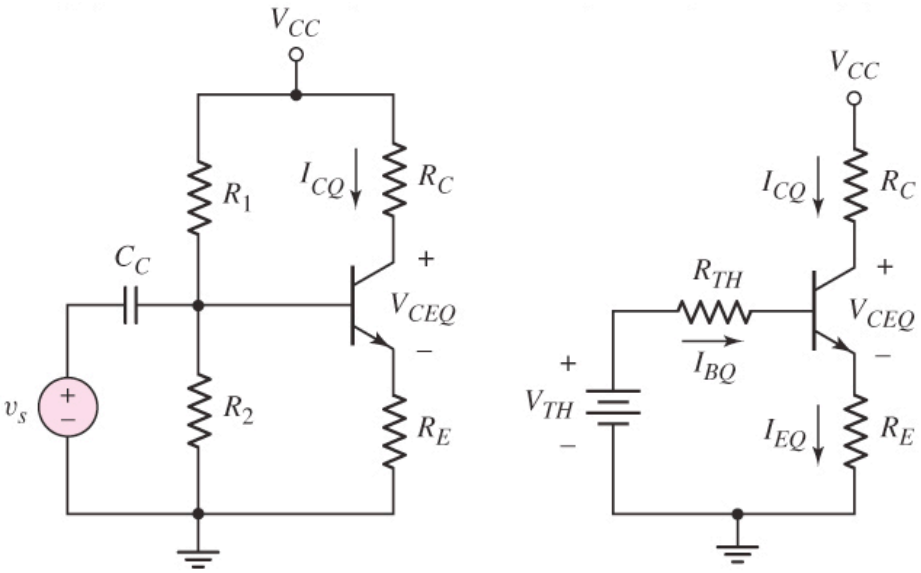
Pre-Lab:

No pre-lab, all calculations must be done in lab.

Procedure:

Given the following circuit, find the correct resistor values for the given parameters and both physically build the circuit and simulate it using PSPICE.

$v_i = 10\ mV_{pp}$, $R_{th} = 10\ k\Omega$, $V_{th} = 2\ V$, $V_{cc} = 10V$, $I_{BQ} = 22\ \mu A$



1. Use the ELVIS board to produce a curve trace of the BJT 2N2222 transistor.
    a. Under NI ELVISmx Instrument Launcher use the 3-wire instrument.
    b. Save image and label the regions of operation
2. Using the curve trace and given values determine β.
3. Using the information you've gathered calculate R_1, R_2, R_C, and R_E
4. Simulate the circuit in PSPICE and provide the output and input signals on two plots.
5. Build the circuit and take an image of the oscilloscope showing the input and output signals of the circuit. What's the gain of this circuit?

Analysis and Conclusions:

1. Draw the cross section of a conventional npn BJT transistor and label everything.
2. What type of output did you expect for this type of circuit and what would you expect for a common-collector?
3. What are some differences between FETs and BJTs?
4. Discuss any problems you had with the lab and how you feel it could have been improved.

Report:

Be sure to provide calculations, graphs, and questions asked in analysis and conclusions. You will be marked off 1 point for each item missing.