

## Experiment (1): BJT Amplifiers

### COMMON EMITTER AMPLIFIER

#### OBJECTIVES

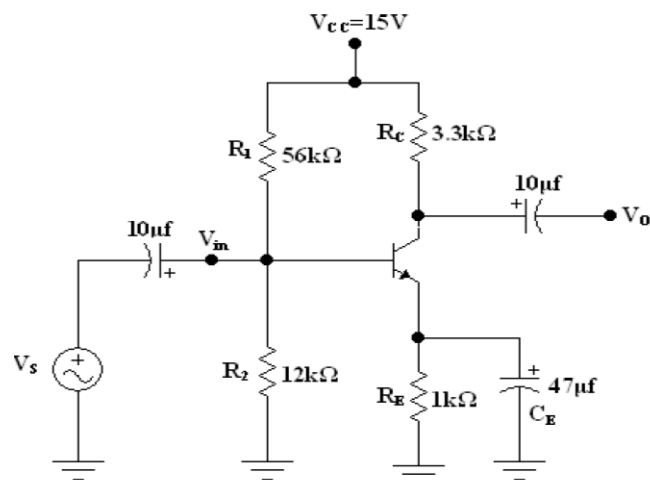
1. To measure the open-circuit voltage gain, loaded voltage gain, input resistance, and output resistance of the common emitter amplifier.
2. To evaluate the common emitter amplifier using the small-signal equivalent model.
3. To demonstrate the differences in voltage, gain and input resistance due to the removal of the emitter bypass capacitor.

#### COMPONENTS USED

1. Resistors (56k, 3.3k, 1k)
2. Capacitors (10 $\mu$ F and 47 $\mu$ F)
3. Signal generator
4. oscilloscope

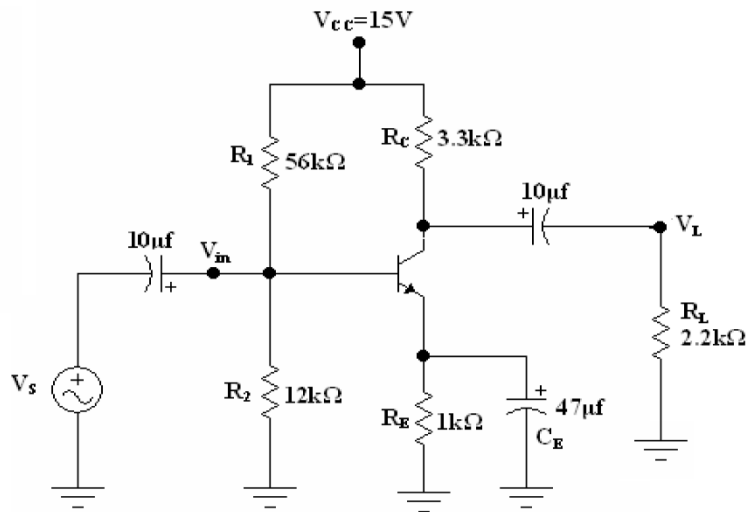
#### PROCEDURES

1. Use Digital Multimeter (DMM) to measure the  $\beta$  of the transistor.
2. To measure the open-circuit voltage gain  $A_V$  of the common emitter amplifier, connect the following circuit in figure 1.1:



**Figure 1.1**

3. With the signal generator's frequency set to 10 kHz, and  $V_S = 20\text{mVp-p}$ . Measure and record the peak-to-peak output voltage  $V_O$  and the phase relationship between  $V_{in}$  and  $V_O$ . The open-circuit voltage gain  $A_V$  is  $V_O/V_{in}$ .
4. To measure the voltage gain from source-to-load,  $V_L/V_S$  of the common emitter amplifier, connect the circuit in figure 1.2.
5. With the signal generator's frequency set to 10 kHz, and  $V_S = 50\text{mVp-p}$ . Measure and record the peak-to-peak output voltage  $V_L$  and the phase relationship between  $V_{in}$  and  $V_L$ . The voltage gain from source to load is  $V_L/V_S$ .
6. Disconnect the emitter bypass capacitor  $C_E$  from the circuit shown in figure 1.2 and repeat procedure steps 3, and 5.



**Figure 1.2**