Common-Emitter Amplifier

(Use Transistor BC-547)

Objective: To measure and analyze bias quantities (DC currents and voltages) and small-signal gain of the given common-emitter amplifier circuit.

1. Measure all the resistances that you will use in this experiment with a multi-meter (these measured values are to be used in your calculations)

2. Measurement of β: Connect the circuit shown in Fig. 1. Adjust the two DC source voltages such that I_C is approximately 4mA and V_{CE} is approximately 4V to ensure that the transistor is in active region. (A 20% variation is OK). Compute $\beta = I_C / I_B$.
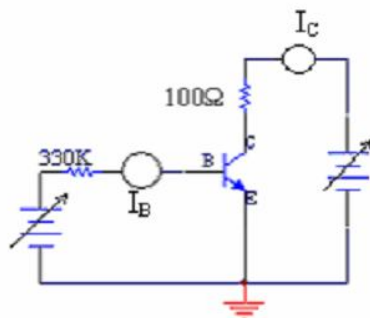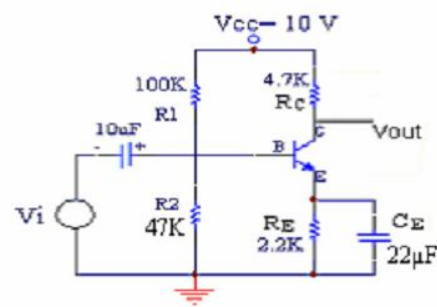

Figure 1

Figure 2

3. Common emitter amplifier: Connect the circuit shown in Fig.2. Measure the following without emitter bypass capacitor C_E. (i) All DC voltages, (ii) "Mid-band Gain" at 1 kHz, (iii) Frequency response: Here you must measure V_o and V_i (small-signal) at each frequency. Ensure that the output does not show any distortion. Adjust the input voltage amplitude so that the output voltage is not more than, say, 1V peak-to-peak. Take measurements in the range 10 Hz to 300 kHz, say 8 to 10 points in each decade. Now, connect C_E and repeat (2) and (3). You may have to attenuate the input using a voltage divider (say, 100Ω and 10kΩ) to ensure that output is not distorted. Also, increase the input voltage so that you can observe the clipping levels (make sure you use the oscilloscope in DC mode here.)