

## LAB 7: Bipolar Transistor

### Objective:

The object of this lab is to measure bipolar transistor characteristics. For this we compare the I-V characteristics of a transistor.

### Bipolar Transistor Basics:

A transistor is a solid state semiconductor device able to amplify a signal in forward bias. When plugged into electric circuit, it has 3 states: cut-off (in this state it does not conduct, no current flowing through it), active region (regular, useful, amplifying state, in which it is possible to control output voltage and/or current, i.e..  $I_C$  and  $V_{CE}$ , by varying input voltage and/or current, i.e..  $I_B$  and  $V_{BE}$ ), and saturation (transistor still conducts, but with limited capabilities of controlling output via input).

### General Safety Guidelines:

Always reset the power supply dial to zero, before building or changing the circuit.

Keep your hands and the work area dry to avoid shock.

Follow safe and correct procedures for operating the power supply.

### Lab Equipment:

You must determine what equipment you need.

### Procedure:

You must determine the procedure for measuring  $I_C$  and  $V_{ce}$  values of the BJT. Measure  $I_C$  and  $V_{ce}$  for  $I_B$  values of 0.01 A, 0.05 A and 0.08 A. (**Do not apply more than 5 volts across  $V_{ce}$** )

### Data and Analysis:

After obtaining these results, you will need to plot a graph:

$I_C$  vs.  $V_{CE}$ , for different, but fixed values of  $I_B$ . Be sure to plot each curve on the same graph. It should look like graph on following page ( $E_{collector}$  to emitter is  $V_{ce}$ ).

Plot  $I_C$  vs  $I_B$  for the active region and determine  $\beta$  (slope of the graph).

