



**East West University**  
**Department of Computer Science and Engineering**

**Course: CSE251 Electronic Circuits**

**Expt No.: 4**

**Title: Introduction to Transistor**

**Objectives:**

1. Identify base, emitter and collector terminals and connections of NPN and PNP transistors.
2. Demonstrate and measure the effects on base current of forward and reverse bias in the emitter-base circuit.

**Theory:**

It is convenient to represent the current voltage characteristics of transistor graphically. In a BJT common-emitter (CE) configuration, the emitter serves as the common terminal between input and output. The input is applied at the base terminal and the output is taken from the collector terminal. The typical CE output describes  $i_C$  as a function of  $V_{CE}$  with  $i_B$  as a parameter. In the active mode,  $i_C$  of practical BJTs shows some dependence on  $V_{CE}$  due to early effect. As a result,  $i_C$  characteristics are not horizontal straight lines. This dependency of  $i_C$  on  $V_{CE}$  is included in the equivalent circuit via an output resistance  $r_O$ .

**Equipments and Components Needed:**

1. Power supply
2. Multimeter
3. Resistor ( $100K\Omega$  and  $1.8K\Omega$ )
4. Transistor (NPN and PNP)
5. Voltmeter
6. DC milli-ammeter and DC micro-ammeter

## PROCEDURE:

1. Measure  $\beta$  ( $h_{FE}$ ) of the transistor with the ammeter and record the value.
2. Construct the circuit as shown in the figure 1. Use DC power supply for  $V_{BB}$  and 0-15 V variable DC voltage from trainer board for  $V_{CC}$ . Connect the micro-ammeter in the base circuit and milli-ammeter in the collector circuit. Make sure to connect the ammeters with the correct polarity.
3. Adjust  $V_{BB}$  so that  $I_B$  is about 5  $\mu$ A. Vary  $V_{CE}$  in steps of 1 V from 10 V to 1 V by changing  $V_{CC}$ . Keep  $I_B$  constant during this measurement.  $V_{CE}$  may be measured with digital multimeter. Next vary  $V_{CE}$  in steps of 0.1 V from 1 V to 0V. Measure  $I_C$  and  $V_{CE}$  in each step.

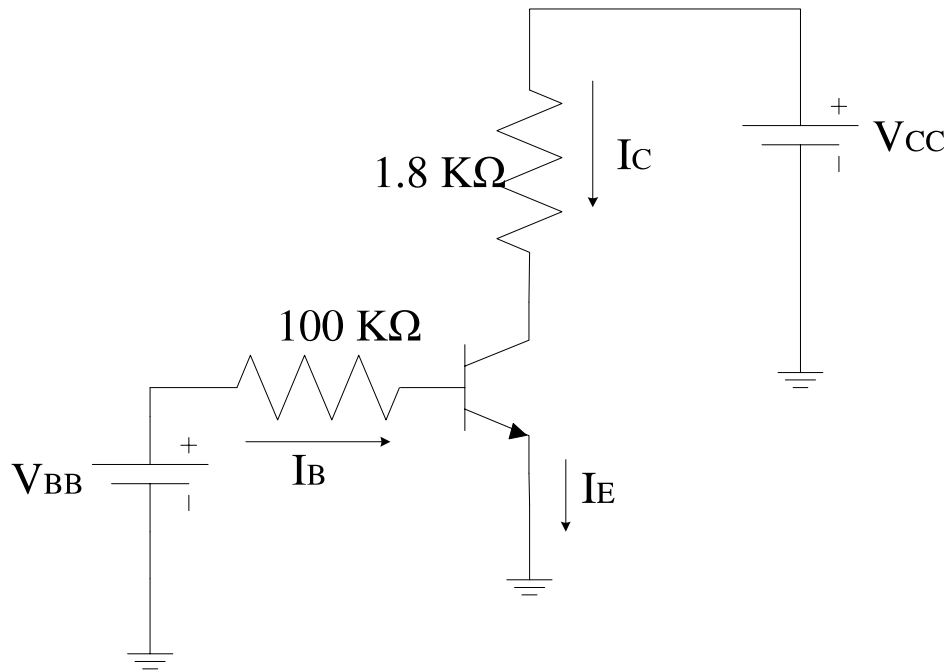


Figure 1 Circuit diagram for measuring I-V characteristics of Transistor

## Post-Lab Report Questions:

Plot  $I_C$ - $V_{CE}$  characteristics curves from the measured data using PSPICE and MATLAB