TRANSISTOR CE CHARACTERSTICS

AIM: To draw the input and output characteristics of transistor connected in CE configuration

APPARATUS:

Transistor (SL100 or BC107)

R.P.S (O-30V) 2Nos

Voltmeters (0-20V) 2Nos

Ammeters (0-200mA)

Resistors 100Kohm, 100ohm

Bread board and connecting wires

THEORY:

A transistor is a three terminal device. The terminals are emitter, base, collector. In common emitter configuration, input voltage is applied between base and emitter terminals and out put is taken across the collector and emitter terminals.

Therefore the emitter terminal is common to both input and output.

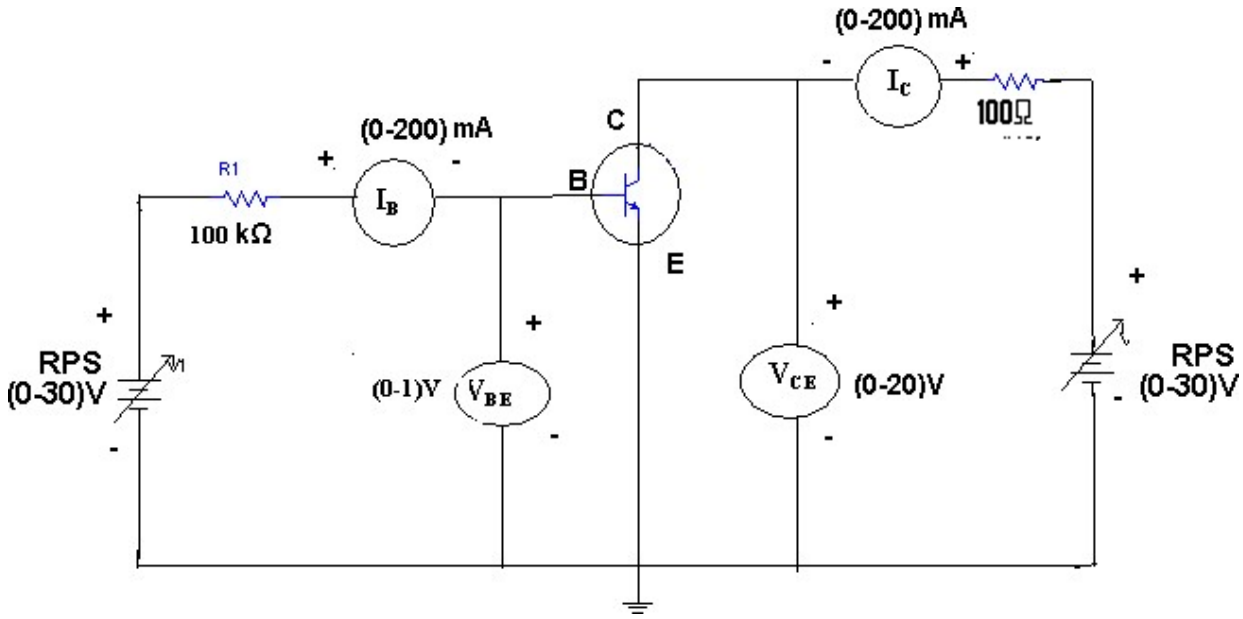
The input characteristics resemble that of a forward biased diode curve. This is expected since the Base-Emitter junction of the transistor is forward biased. As compared to CB arrangement I_B increases less rapidly with V_{BE} . Therefore input resistance of CE circuit is higher than that of CB circuit.

The output characteristics are drawn between I_c and V_{CE} at constant I_B. the collector current varies with V_{CE} unto few volts only. After this the collector current becomes almost constant, and independent of V_{CE}. The value of V_{CE} up to which the collector current changes with V_{CE} is known as Knee voltage. The transistor always operated in the region above Knee voltage, I_C is always constant and is approximately equal to I_B.

The current amplification factor of CE configuration is given by

$$B = \Delta I_C / \Delta I_B$$

CIRCUIT DIAGRAM:



PROCEDURE:

INPUT CHARECTERSTICS:

1. Connect the circuit as per the circuit diagram.
2. For plotting the input characteristics the output voltage V_{CE} is kept constant at 1V and for different values of V_{BE} . Note down the values of I_C
3. Repeat the above step by keeping V_{CE} at 2V and 4V.
4. Tabulate all the readings.
5. plot the graph between V_{BE} and I_B for constant V_{CE}

OUTPUT CHARACTERSTICS:

1. Connect the circuit as per the circuit diagram
2. for plotting the output characteristics the input current I_B is kept constant at 10μA and for different values of V_{CE} note down the values of I_C
3. repeat the above step by keeping IB at 75 μA 100 μA

4. tabulate the all the readings
5. plot the graph between V_{CE} and I_C for constant I_B

OBSERVATIONS:

INPUT CHARACTERISTICS:

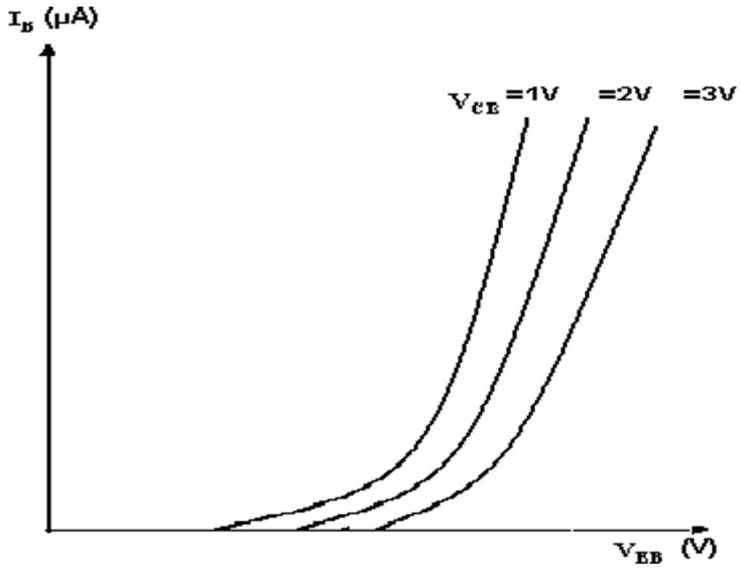
S.NO	V_{CE} = 1V		V_{CE} = 2V		V_{CE} = 4V	
	V_{BE}(V)	I_B(μA)	V_{BE}(V)	I_B(μA)	V_{BE}(V)	I_B(μA)

OUT PUT CHAREACTARISTICS:

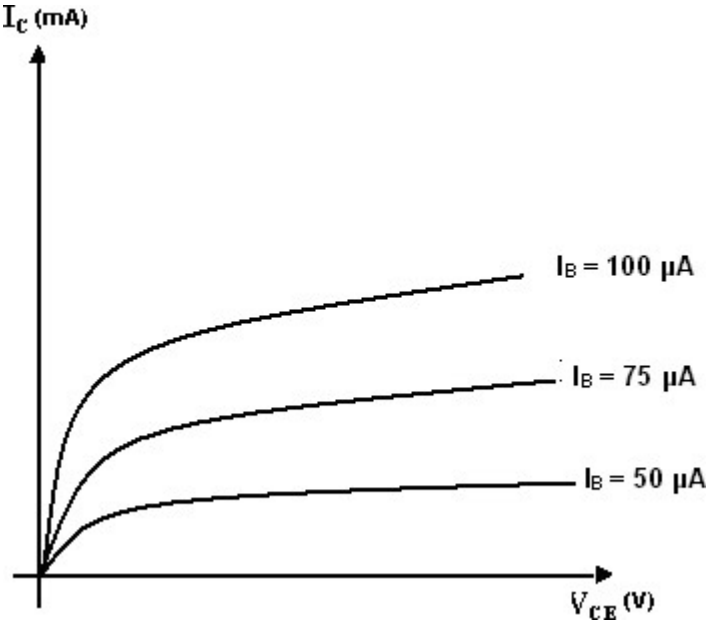
S.NO	I_B = 50 μA		I_B = 75 μA		I_B = 100 μA	
	V_{CE}(V)	I_C(mA)	V_{CE}(V)	I_CmA)	V_{CE}(V)	I_C(mA)

MODEL GRAPHS:

INPUT CHARACTERSTICS:



OUTPUT CHARECTERSTICS:



PRECAUTIONS:

1. The supply voltage should not exceed the rating of the transistor
2. Meters should be connected properly according to their polarities

VIVA QUESTIONS:

1. What is the range of β for the transistor?
2. What are the input and output impedances of CE configuration?
3. Identify various regions in the output characteristics?
4. what is the relation between α *and* β
5. Define current gain in CE configuration?
6. Why CE configuration is preferred for amplification?
7. What is the phase relation between input and output?
8. Draw diagram of CE configuration for PNP transistor?
9. What is the power gain of CE configuration?
10. What are the applications of CE configuration?