Ex.No.3

Date:

CHARACTERISTICS OF BJT IN CE CONFIGURATION

AIM:

To study and plot the transistor characteristics in CE configuration.

APPARATUS REQUIRED:

S.No.	Name	Range	Type	Qty
1	R.P.S	(0-30)V		2
2	Ammeter	(0–10)mA		1
		(0–1)A		1
3	Voltmeter	(0–30)V		1
		(0–2)V		1

COMPONENTS REQUIRED:

S.No.	Name	Range	Type	Qty
1	Transistor	BC 147		1
2	Resistor	10kΩ 1KΩ		1
3	Bread Board			1
4	Wires			

THEORY:

A BJT is a three terminal two – junction semiconductor device in which the conduction is due to both the charge carrier. Hence it is a bipolar device and it amplifier the sine waveform as they are transferred from input to output. BJT is classified into two types – NPN or PNP. A NPN transistor consists of two N types in between which a layer of P is sandwiched. The transistor consists of three terminal emitter, collector and base. The emitter layer is the source of the charge carriers and it is heartily doped with a moderate cross sectional area. The collector collects the charge carries and hence moderate doping and large cross sectional area. The base region acts a path for the movement of the

charge carriers. In order to reduce the recombination of holes and electrons the base region is lightly doped and is of hollow cross sectional area. Normally the transistor operates with the EB junction forward biased.

In transistor, the current is same in both junctions, which indicates that there is a transfer of resistance between the two junctions. Hence known as transfer resistance of transistor.

PROCEDURE:

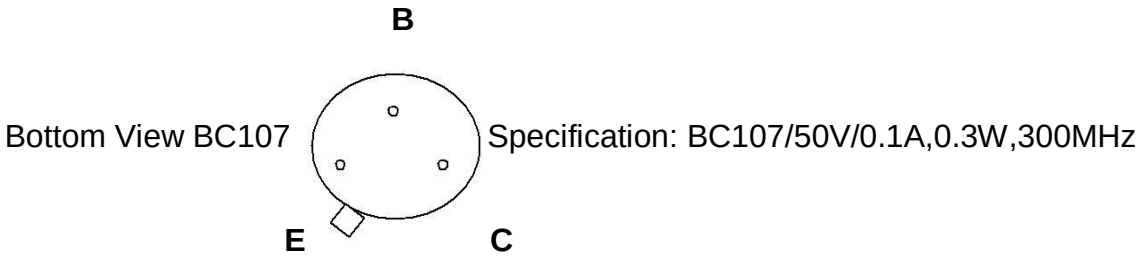
INPUT CHARECTERISTICS:

1. Connect the circuit as per the circuit diagram.
2. Set V_{CE} , vary V_{BE} in regular interval of steps and note down the Corresponding $_B$ reading. Repeat the above procedure for different values of V_{CE}.
3. Plot the graph: V_{BE} Vs I_B for a constant V_{CE}.

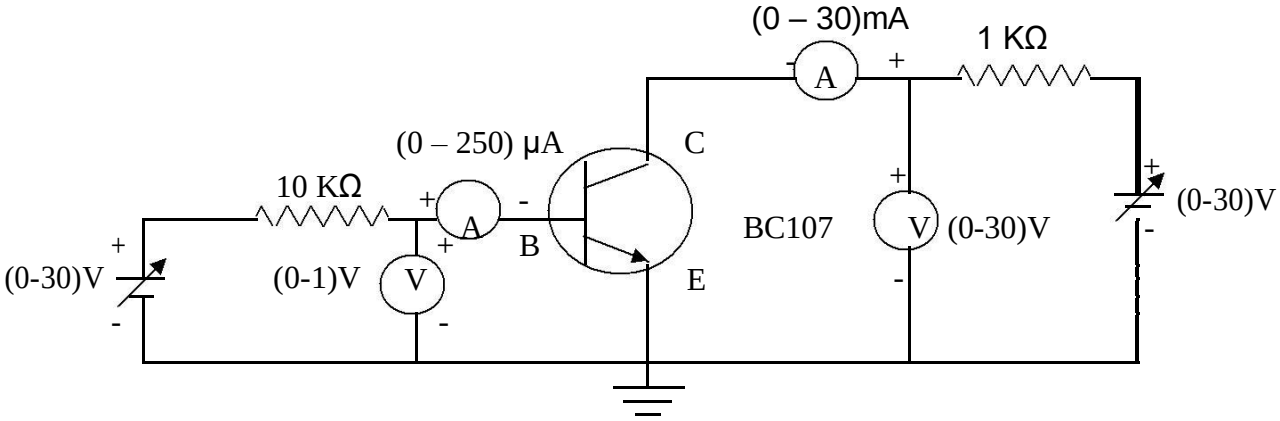
OUTPUT CHARACTERISTICS:

1. Connect the circuit as per the circuit diagram.
2. Set $I_{B,}$ Vary V_{CE} in regular interval of steps and note down the corresponding I_C reading. Repeat the above procedure for different values of I_B.
3. Plot the graph: V_{CE} Vs I_C for a constant I_B.

PIN DIAGRAM:

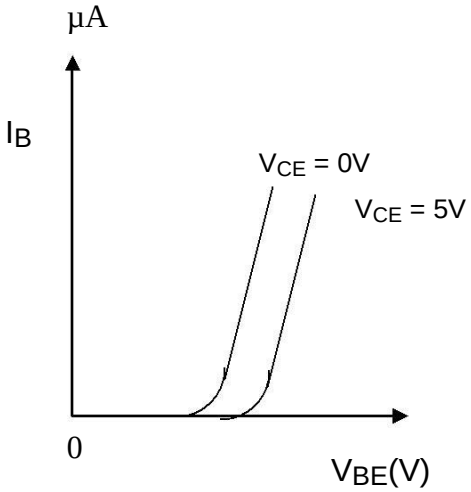


CIRCUIT DIAGRAM:

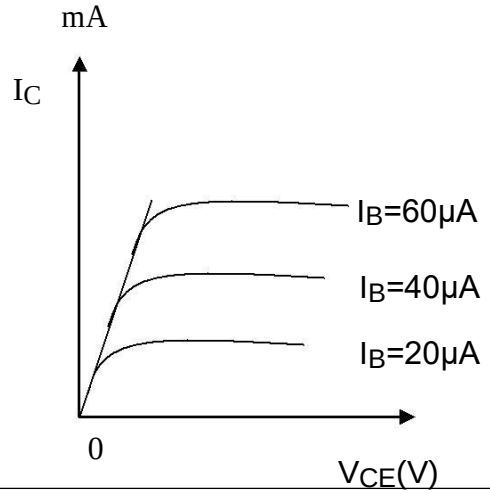


MODEL GRAPH:

INPUT CHARACTERISTICS:



OUTPUT CHARACTERISTICS:



TABULAR COLUMN:

INPUT CHARACTERISTICS:

V_{CE}=1V		V_{CE}=2V	
V_{BE}(V)	I_B(μA)	V_{BE}(V)	I_B(μA)

OUTPUT CHARACTERISTICS:

I_B=20μA		I_B=40μA	
V_{CE}(V)	I_C(mA)	V_{CE}(V)	I_C(mA)

RESULT:

The transistor characteristics of a Common Emitter (CE) configuration were plotted

Date:

CHARACTERISTICS OF BJT IN CB CONFIGURATION

AIM:

To study and plot the transistor characteristics in CB configuration.

APPARATUS REQUIRED:

S.No.	Name	Range	Type	Qty
1	R.P.S	(0-30)V		2
2	Ammeter	(0–10)mA		1
		(0–1)A		1
3	Voltmeter	(0–30)V		1
		(0–2)V		1

COMPONENTS REQUIRED:

S.No.	Name	Range	Type	Qty
1	Transistor	BC 107		1
2	Resistor	10kΩ 1KΩ		1
3	Bread Board			1
4	Wires			

THEORY:

In this configuration the base is made common to both the input and out. The emitter is given the input and the output is taken across the collector. The current gain of this configuration is less than unity. The voltage gain of CB configuration is high. Due to the high voltage gain, the power gain is also high. In CB configuration, Base is common to both input and output. In CB configuration the input characteristics relate I_E and V_{EB} for a constant V_{CB}. Initially let $V_{CB} = 0$ then the input junction is equivalent to a forward biased diode and the characteristics resembles that of a diode. Where $V_{CB} = +V_I$ (volts) due to early effect I_E increases and so the characteristics shifts to the left. The output characteristics relate I_C and V_{CB} for a constant I_E. Initially I_C increases and then it levels for a value $I_C = \alpha I_E$. When I_E is increased I_C also increases proportionality. Though increase in

V_{CB} causes an increase in α, since α is a fraction, it is negligible and so I_C remains a constant for all values of V_{CB} once it levels off.

PROCEDURE:

INPUT CHARACTERISTICS:

It is the curve between emitter current I_E and emitter-base voltage V_{BE} at constant collector-base voltage V_{CB}.

1. Connect the circuit as per the circuit diagram.
2. Set V_{CE}=5V, vary V_{BE} in steps of 0.1V and note down the corresponding I_B. Repeat the above procedure for 10V, 15V.
3. Plot the graph V_{BE} Vs I_B for a constant V_{CE}.
4. Find the h parameters.

OUTPUT CHARACTERISTICS:

It is the curve between collector current I_C and collector-base voltage V_{CB} at constant emitter current I_E.

1. Connect the circuit as per the circuit diagram.
2. Set I_B=20μA, vary V_{CE} in steps of 1V and note down the corresponding I_C. Repeat the above procedure for 40μA, 80μA, etc.
3. Plot the graph V_{CE} Vs I_C for a constant I_B.
4. Find the h parameters

RESULT:

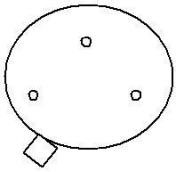
The transistor characteristics of a Common Base (CB) configuration were plotted and studied.

PIN DIAGRAM:

B

Bottom View

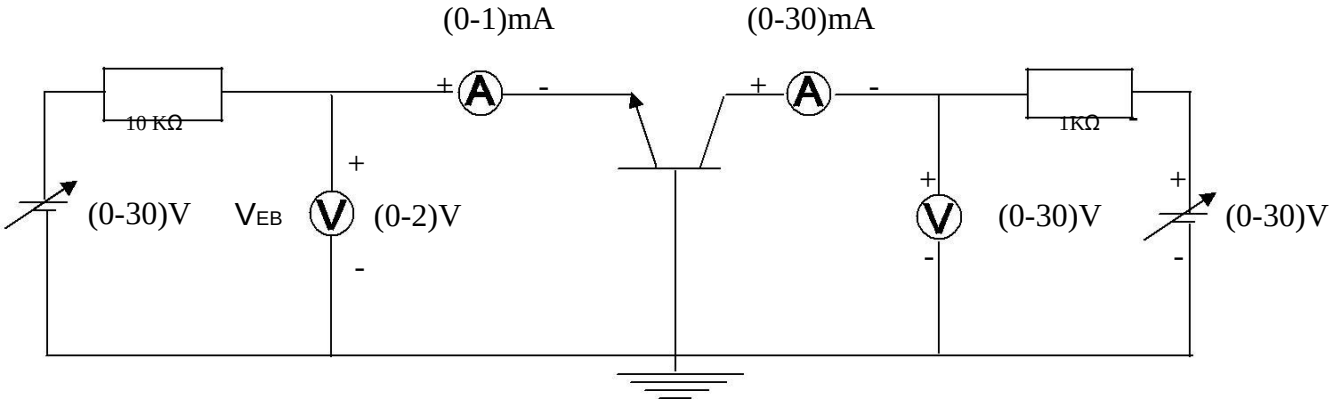
BC107



Specification: BC107/50V/0.1A,0.3W,300MHz

E **C**

CIRCUIT DIAGRAM:



TABULAR COLUMN:

INPUT CHARACTERISTICS:

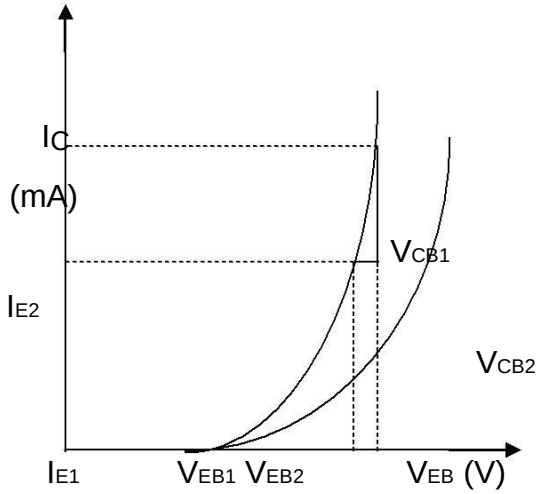
S.No.	V_{CB} = V		V_{CB} = V		V_{CB} = V	
	V_{EB} (V)	I_E (μA)	V_{EB} (V)	I_E (μA)	V_{EB} (V)	I_E (μA)

OUTPUT CHARACTERISTICS:

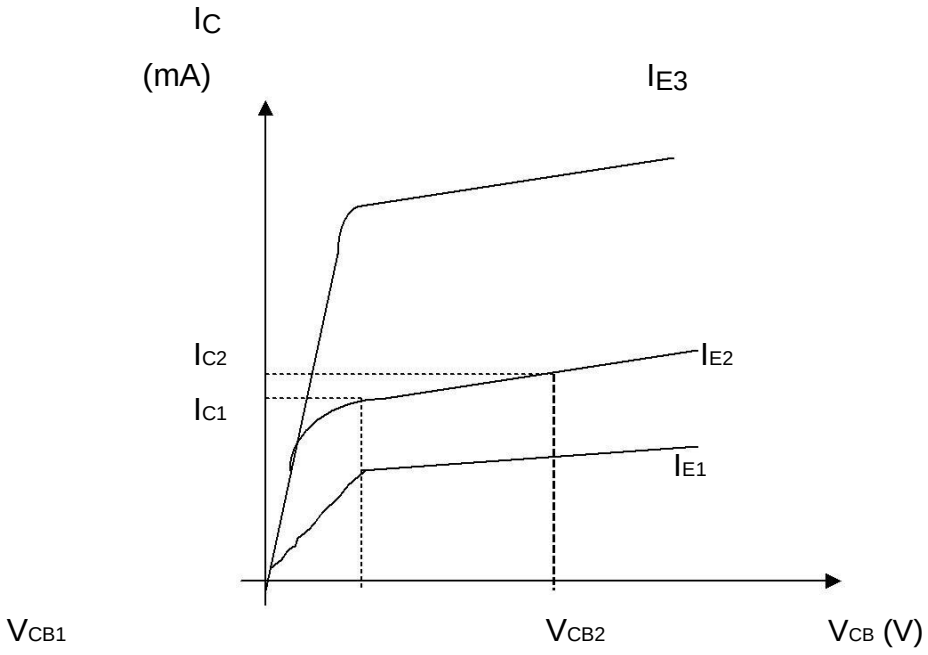
S.No.	I_E= mA		I_E= mA		I_E= mA	
	V_{CB} (V)	Ic (mA)	V_{CB} (V)	Ic (mA)	V_{CB} (V)	Ic (mA)

MODEL GRAPH:

INPUT CHARACTERISTICS:



OUTPUT CHARACTERISTICS:



Date:

CHARACTERISTICS OF BJT IN CC CONFIGURATION

AIM:

To plot and study the transistor characteristics in CC configuration.

APPARATUS REQUIRED:

S.No.	Name	Range	Type	Qty
1	R.P.S	(0-30)V		2
2	Ammeter	(0–30)mA		1
		(0–250)µA		1
3	Voltmeter	(0–30)V		1
		(0–5)V		1

COMPONENTS REQUIRED:

S.No.	Name	Range	Type	Qty
1	Transistor	BC 107		1
2	Resistor	1kΩ		2
3	Bread Board			1
4	Wires			

THEORY:

A BJT is a three terminal two – junction semiconductor device in which the conduction is due to both the charge carrier. Hence it is a bipolar device and it amplifier the sine waveform as they are transferred from input to output. BJT is classified into two types – NPN or PNP. A NPN transistor consists of two N types in between which a layer of P is sandwiched. The transistor consists of three terminal emitter, collector and base. The emitter layer is the source of the charge carriers and it is heartily doped with a moderate cross sectional area.

The collector collects the charge carries and hence moderate doping and large cross sectional area. The base region acts a path for the movement of the charge carriers. In order to reduce the recombination of holes and electrons the base region is lightly doped and is of hollow cross sectional area. Normally the transistor operates with the EB junction forward biased.

In transistor, the current is same in both junctions, which indicates that there is a transfer of resistance between the two junctions. One to this fact the transistor is known as transfer resistance of transistor.

PROCEDURE:

INPUT CHARECTERISTICS:

1. Connect the circuit as per the circuit diagram.
2. Set V_{CE}, vary V_{BE} in regular interval of steps and note down the corresponding I_B reading. Repeat the above procedure for different values of V_{CE}.
3. Plot the graph: V_{BC} Vs I_B for a constant V_{CE}.

OUTPUT CHARECTERISTICS:

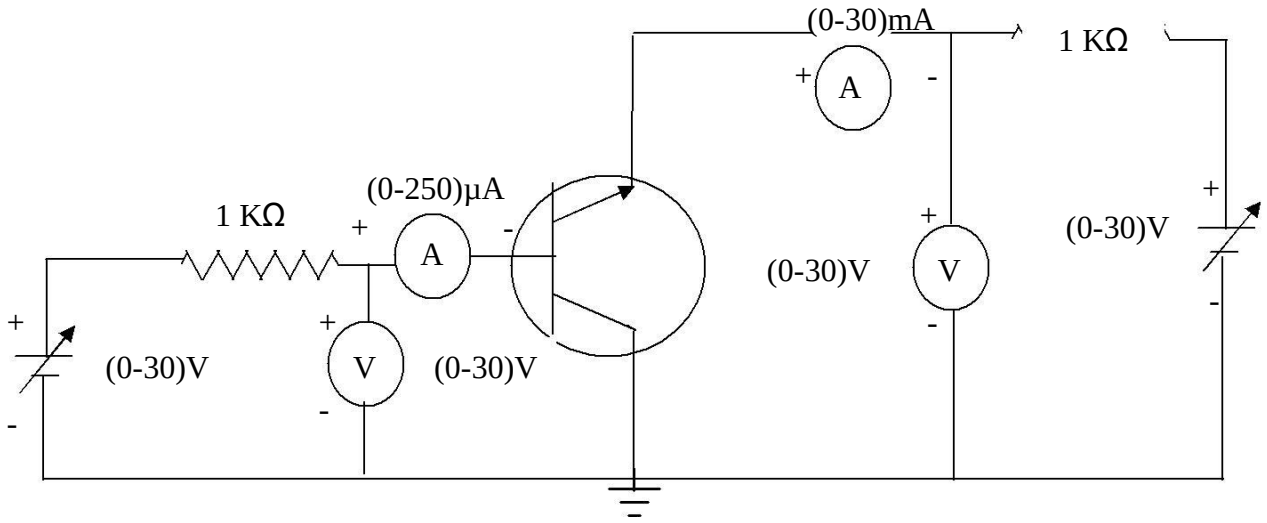
1. Connect the circuit as per the circuit diagram.
2. Set $I_{B,}$ Vary V_{CE} in regular interval of steps and note down the corresponding I_C reading. Repeat the above procedure for different values of I_B.
3. Plot the graph: V_{CE} Vs I_C for a constant I_B.

RESULT:

The transistor characteristics of a Common Emitter (CC) configuration were plotted.

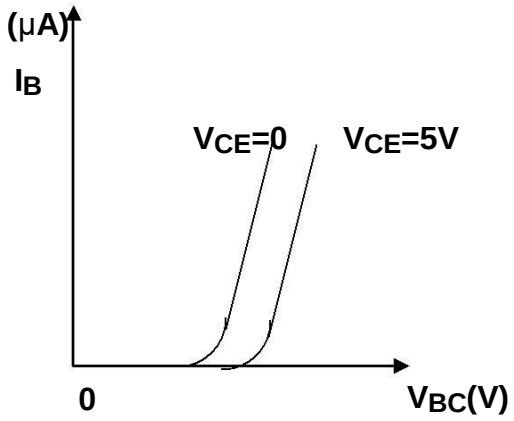
PIN DIAGRAM:

CIRCUIT DIAGRAM:

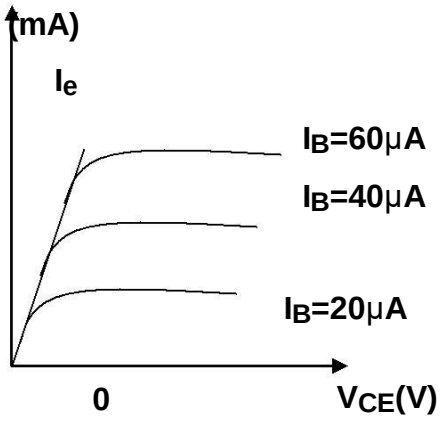


MODEL GRAPH:

INPUT CHARACTERISTICS:



OUTPUT CHARACTERISTICS:



TABULAR COLUMN:

INPUT CHARACTERISTICS:

V_{CE}=1V		V_{CE}=2V	
V_{BC}(V)	I_B(μA)	V_{BC}(V)	I_B(μA)

OUTPUT CHARACTERISTICS:

I_B=20μA		I_B=40μA	
V_{CE}(V)	I_E(mA)	V_{CE}(V)	I_E(mA)