

EXPERIMENT 3: COMMON Emitter CHARACTERISTICS

AIM: To study characteristics of Bipolar Junction Transistor (BJT).

APPARATUS : BJT (547), power supply, ammeters, resistors and connecting wires.

THEORY: In Common Emitter (CE) configuration, input is applied between the base – emitter and output is taken across collector – emitter. Here emitter of the transistor is common to both input and output, hence the name common emitter configuration. The most important characteristics of transistor in any configuration are input and output characteristics.

A. Input Characteristics :-

It is the curve between input current I_B and input voltage V_{BE} constant collector emitter voltage V_{CE} . The input characteristic resembles a forward biased diode curve. After cut in voltage the I_B increases rapidly with small increase in V_{BE} . It means that dynamic input resistance is small in CE configuration. It is the ratio of change in V_{BE} to the resulting change in base current at constant collector emitter voltage. It is given by $\Delta V_{BE} / \Delta I_B$

B. Output Characteristics:-

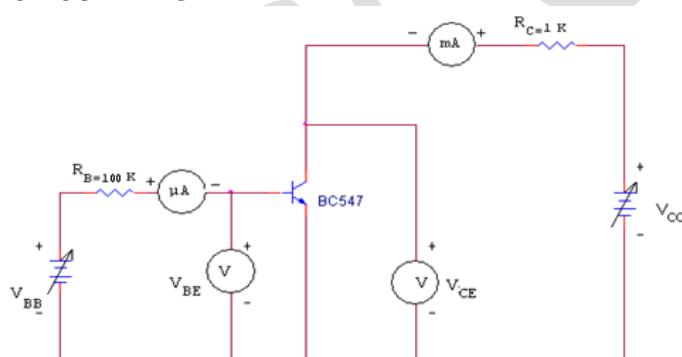
This characteristic shows relation between collector current I_C and collector voltage for various values of base current. The change in collector emitter voltage causes small change in the collector current for the constant base current, which defines the dynamic resistance and is given as $\Delta V_{CE} / \Delta I_C$ at constant I_B . The output characteristic of common emitter configuration consists of three regions: Active, Saturation and Cut-off.

Active region: In this region base-emitter junction is forward biased and base-collector junction is reversed biased. The curves are approximately horizontal in this region.

Saturation region: In this region both the junctions are forward biased.

Cut-off: In this region, both the junctions are reverse biased. When the base current is made equal to zero, the collector current is reverse leakage current I_{CEO} . The region below $I_B = 0$ is the called the cutoff region.

CIRCUIT DIAGRAM:



OBSERVATION TABLE :**Input Characteristics**

V _{BB}	V _{CE} =2V		V _{CE} =3V	
	V _{BE} (V)	I _B (μ A)	V _{BE} (V)	I _B (μ A)
0.1				
0.2				
.				
1				
1.5				
.				
5				

Output Characteristics

V _{cc}	I _B = 10(μ A)		I _B = 20(μ A)	
	V _{CE} (V)	I _c (mA)	V _{CE} (V)	I _c (mA)
0				
0.2				
.				
1				
1.5				
.				
5				
6				
.				
15				

PROCEDURE:**A. Input Characteristics**

- 1) Make the circuit connection as shown in the circuit diagram.
- 2) Set the voltage V_{CE} = 2 V and vary I_B with the help of V_{BB} and measure V_{BE}.
- 3) Set the voltage V_{CE} = 3 V and vary I_B with the help of V_{BB} and measure V_{BE}.
- 4) Plot graph of I_B v/s V_{BE}.

B. Output Characteristics

- 1) Keep I_B constant say 10 μ A, vary V_{CE} and note down the collector current I_C.
- 2) Now keep I_B = 20 μ A, vary V_{CE} and note down the collector current I_C.
- 3) Plot graph of I_B v/s V_{CE}.

CONCLUSION: