18EES101J-BASIC ELECTRICAL AND ELECTRONICS ENGINEERING (LAB)

RECORD

SEMESTER I

ACADEMIC YEAR: 2020-21

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SRM INSTITUTE OF SCIENCE & TECHNOLOGY
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DEPARTMENT OF ELECTRICAL & ELECTRONICS ENGINEERING

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BONAFIDE CERTIFICATE

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Certified to be the bonafide record of work done by ABDUL AHAD of CSE – O1 CLOUD COMPUTING department, B.Tech degree course in the Practical of 18EES101J Basic Electrical and Electronics Engineering in **SRM IST, Kattankulathur** during the academic year 2020-2021.

Lab in-charge

Sahayaponrekha A

Date:24/11/2021

LIST OF EXPERIMENTS

1. Verification of Kirchhoff's laws
2. Verification of All Theorems (Thevenin's theorem, Norton's theorem, Maximum power transfer theorem)
3. Transient analysis of RL an RC series circuits
4. Load test on single phase transformer
5. Demo of DC/AC machines & Parts
6. Types of wiring (fluorescent lamp wiring, staircase wiring)
7. Characteristics of semiconductor devices (PN junction, Zener diode, BJT)
8. Wave shaping circuits (Half and full wave rectifier, clipper)
9. Displacement measurement using LVDT and pressure measurement using Strain gauge
10. Verification and interpretation of Logic Gates.
11. Reduction of Boolean expression using K-map
12. Study of modulation and demodulation techniques.

INDEX

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Experiment No. 7 c) Date :24/11/2021	CHARACTERISTICS OF BJT (CE CONFIGURATION)

Aim

To plot the transistor (BJT) characteristics of CE configuration.

Apparatus Required

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

Components Required

S.No.	Name	Range	Qty
1	Transistor	BC 107	1
2	Resistor	10 KΩ	1
	Resistor	1 KΩ	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. BJT is classified into two types – NPN & 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 heavily 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.

Procedure

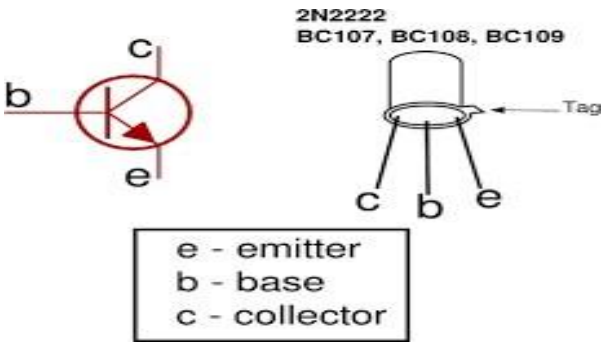
Input Characteristics

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_{BE} Vs I_B for a constant V_{CE}.

Output Characteristics

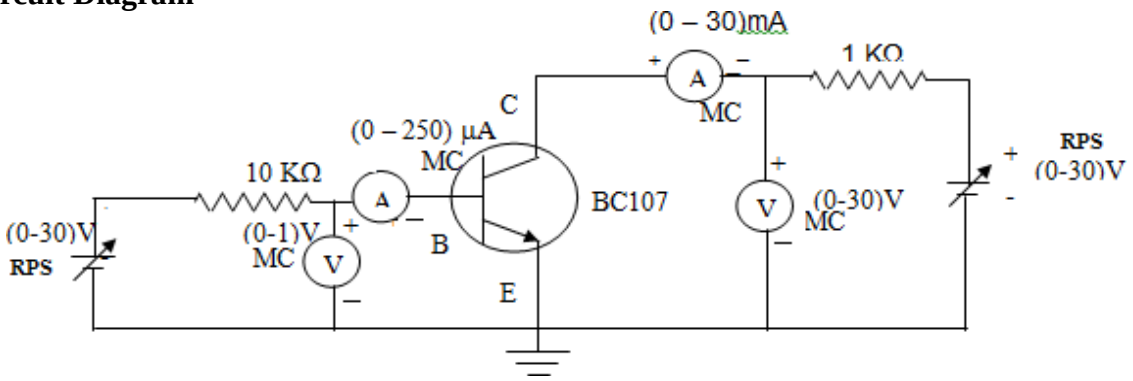
1. Connect the circuit as per the circuit diagram.
2. Set I_B, Vary V_{CE} in regular interval of steps and note down the corresponding I_C reading. Repeat the above procedure for different values of I_B.
3. Plot the graph: V_{CE} Vs I_C for a constant I_B.

Pin Diagram



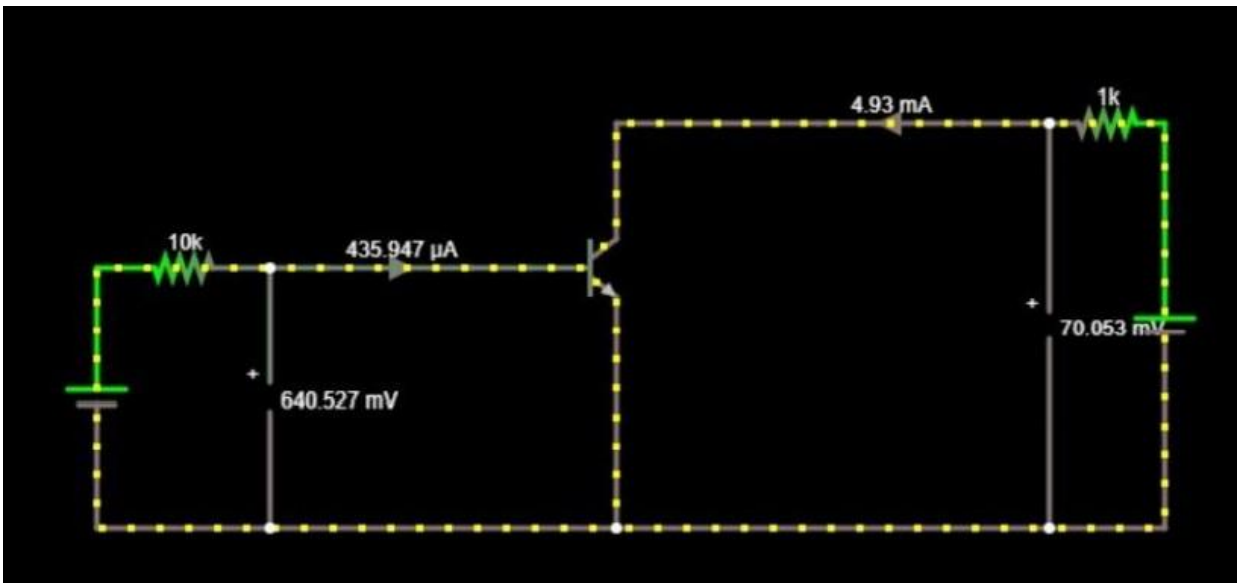
Specification: BC107/50V/0.1A,0.3W,300 MH

Circuit Diagram



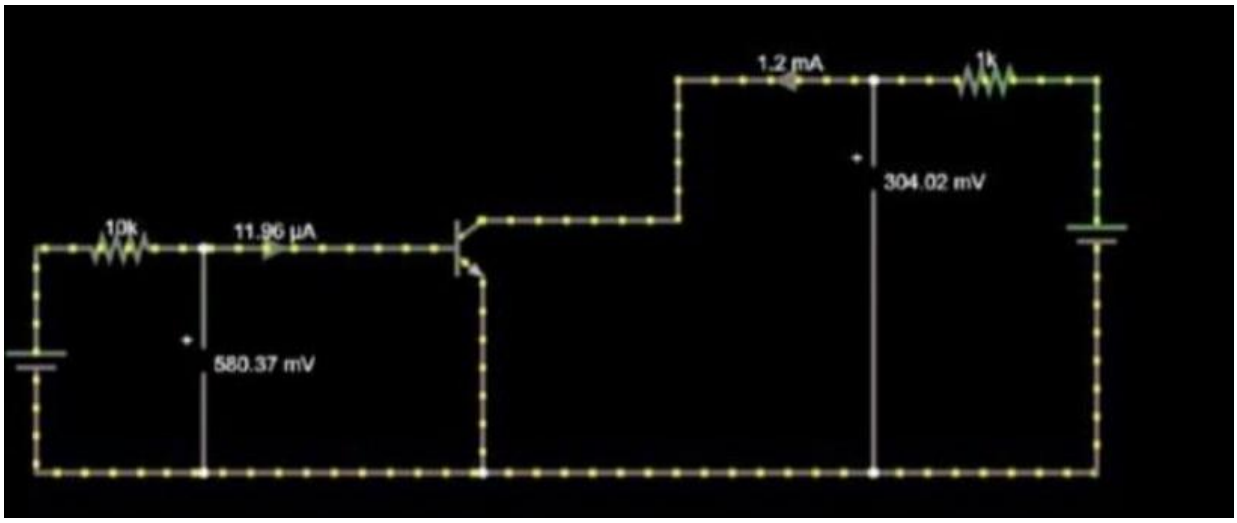
Input characteristics-

Sample



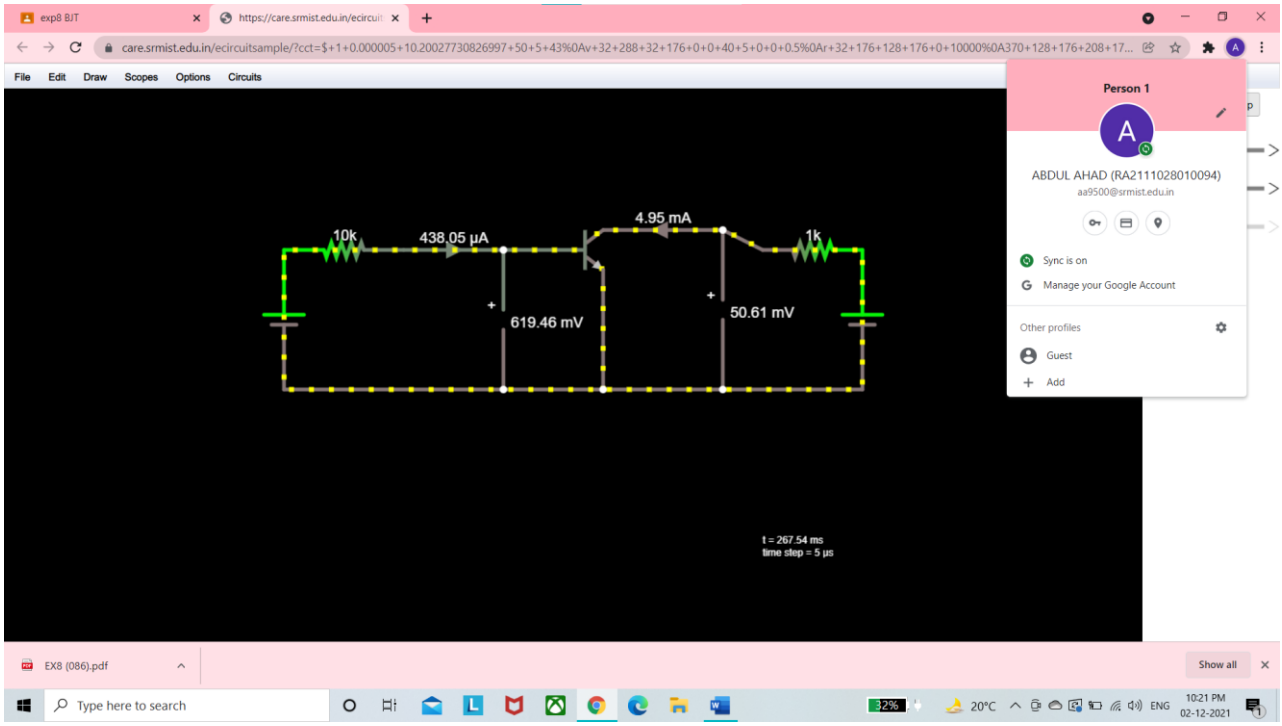
Output characteristics

Sample

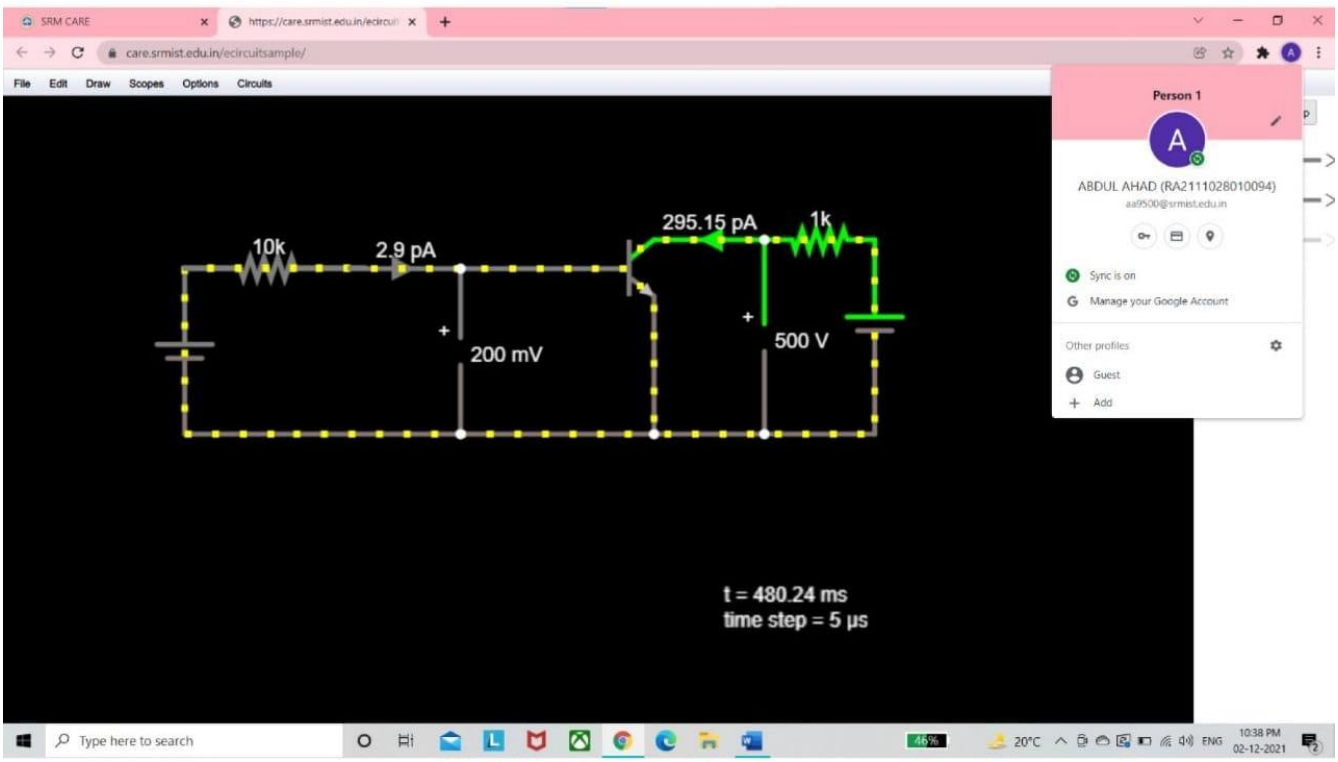


Actual circuits

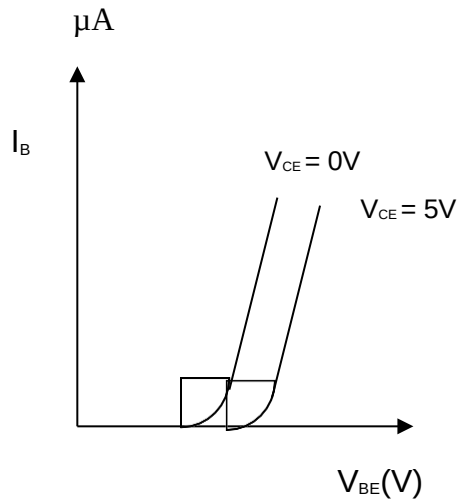
1. Input characterstic



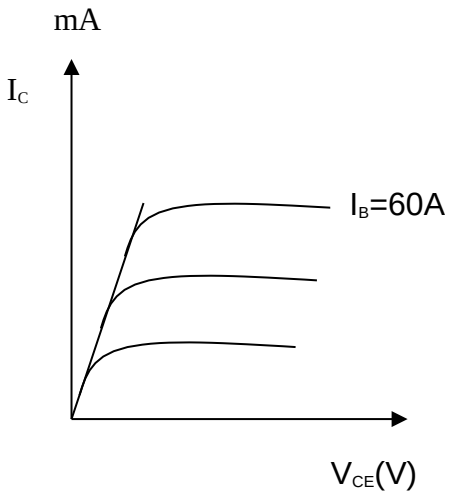
2. Output characterstic



Input Characteristics



Output Characteristics



Tabular Column

Input Characteristic

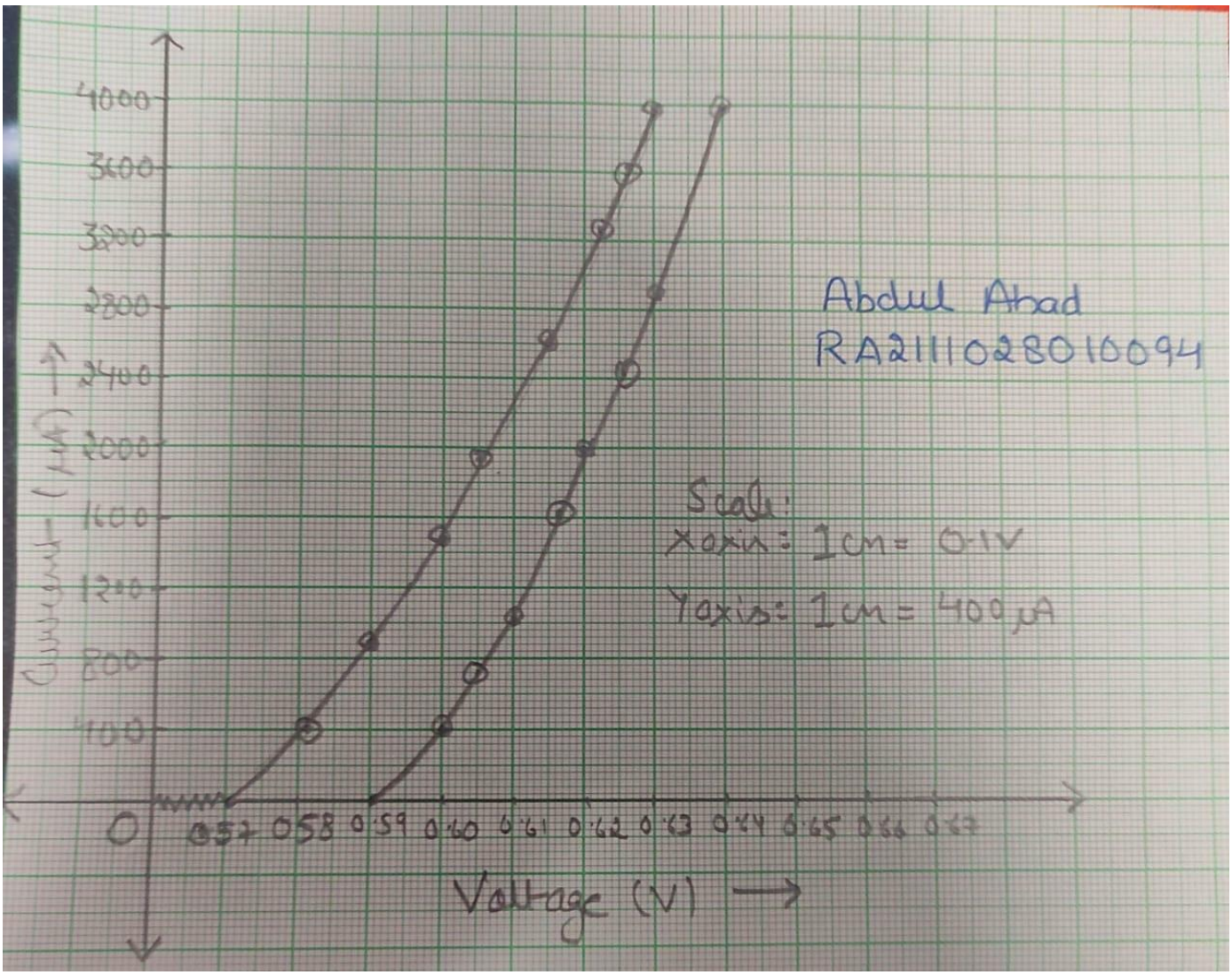
V_{CE} = V		V_{CE} = V	
V_{BE}(V)	I_B(µA)	V_{BE}(V)	I_B(µA)
0.57	440	0.60	440
0.59	940	0.61	940
0.60	1440	0.61	1440
0.60	1940	0.62	1940
0.61	2440	0.62	2440
0.62	2940	0.63	2940
0.62	3440	0.63	3440
0.63	3940	0.63	3940

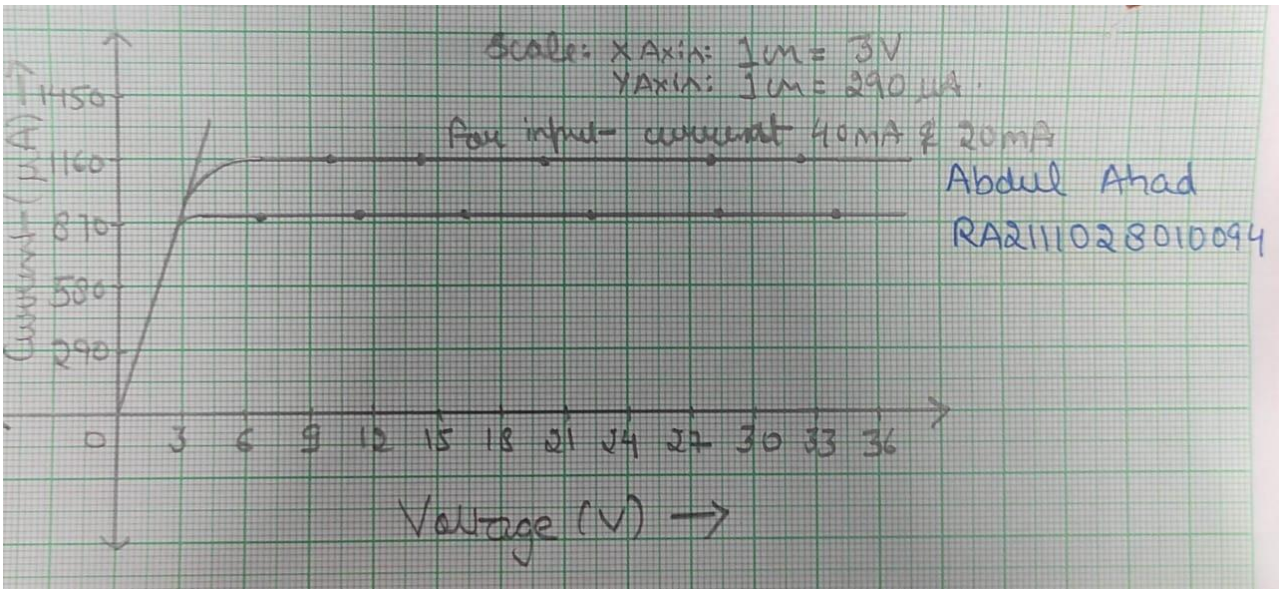
Output Characteristics

I_B= µA		I_B= µA	
1.5 * 10^-4	1.5 * 10^-4	1.8 * 10^-4	1.8 *10^-4
3.84	1160	1.91	3.09
8.84	1160	6.91	3.09
13.84	1160	11.91	3.09
18.84	1160	16.91	3.09
23.84	1160	21.91	3.09
28.84	1160	26.91	3.09
33.84	1160	31.91	3.09

Graph:

Input Characteristics of BJT and Output Characteristics of BJT respectively are:





Result

Hence the characteristics of BJT was verified .

POST LAB QUESTIONS

1 What is Punch through voltage?

The reverse-bias voltage applied to the drain terminal that results in significant drain-to-source current even though the transistor is biased in its off state.

2 What is early effect?

The Early effect, named after its discoverer James M. Early, is the variation in the effective width of the base in a bipolar junction transistor (BJT) due to a variation in the applied base-to-collector voltage.

3 State maximum rating of transistor.

The rating for maximum collector-emitter voltage VC E can be thought of as the maximum voltage it can withstand while in cutoff mode (no base current). This rating is of particular importance when using a bipolar transistor as a switch. A typical value for a small signal transistor is 60 to 80 V.

4. What is leakage current and mention its range?

Leakage current is the current that flows through the protective ground conductor to ground. In the absence of a grounding connection, it is the current that could flow from any conductive part or the surface of non-conductive parts to ground if a conductive path was available (such as a human body).

5. What is base – width modulation?

Early effect or base width modulation is the early effect which is the variation in the width of the base in a bipolar transistor due to a variation in the applied base-to-collector voltage. For example, a greater reverse bias across the collector- base junction increases the collector-base depletion width.