CHARACTERISTICS OF BJT

AIM

To draw the input and output characteristics of transistor connected in Common Emitter (CE) configuration

APPARATUS

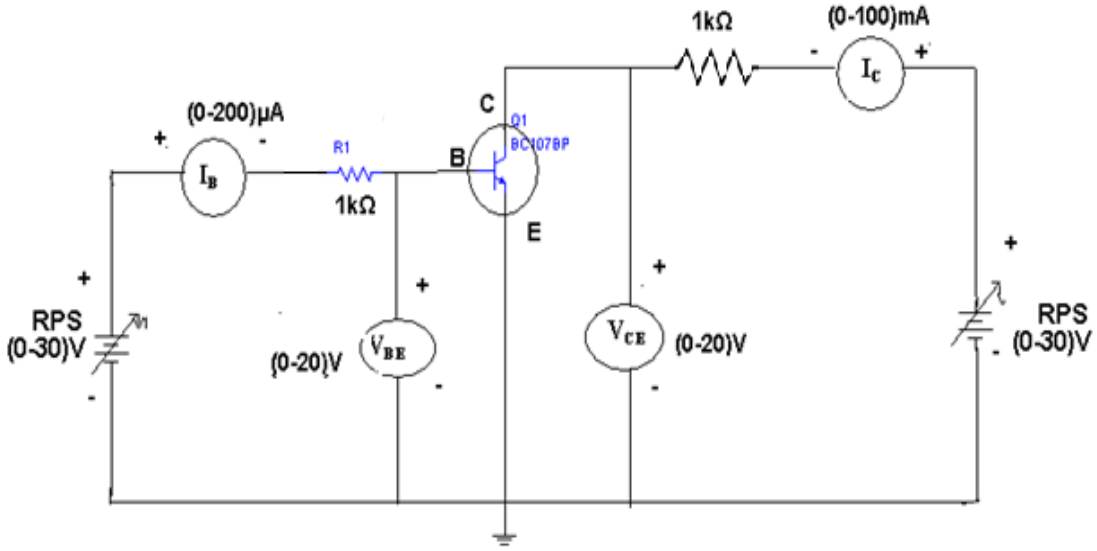
S. No.	COMPONENT	SPECIFICATION	QTY
1.	Transistor	BC 107	1
2.	Regulated Power supply	(0-30)V	2
3.	Resistor	1KΩ	1
4.	Ammeters	(0-500)mA,(0-30)mA	1
5.	Voltmeter	(0-20v)	2
6.	Bread board	-	1
7.	Connecting wires	-	-

THEORY

A transistor is a three terminal device In common emitter configuration, input voltage is applied between base and emitter terminals and output 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.

CIRCUIT DIAGRAM OF COMMON EMITTER CONFIGURATION OF A TRANSISTOR



INPUT CHARACTERISTICS OF COMMON EMITTER TRANSISTOR

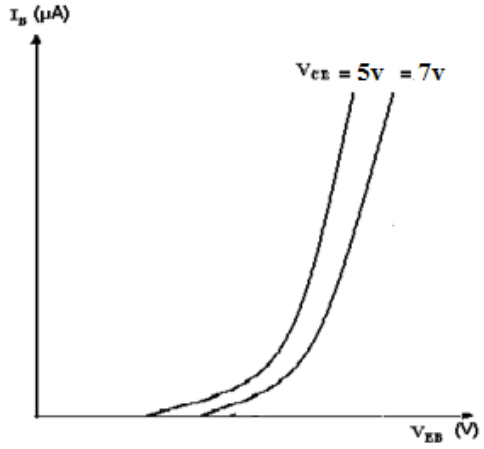
S.NO	**V_{CE} = 5V**		**V_{CE} = 7V**	
	V_{BE}(V)	I_B(μA)	V_{BE}(V)	I_B(μA)

OUTPUT CHARACTERISTICS OF COMMON EMITTER TRANSISTOR

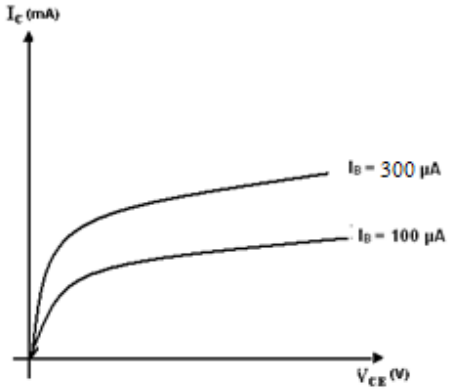
S.NO	**I_B = 100 μA**		**I_B = 300 μA**	
	V_{CE}(V)	I_C(mA)	V_{CE}(V)	I_C (mA)

MODEL GRAPHS

INPUT CHARACTERISTICS OF COMMON EMITTER TRANSISTOR:



OUTPUT CHARACTERISTICS OF COMMON EMITTER TRANSISTOR



PROCEDURE TO FIND

INPUT CHARACTERISTICS OF CE TRANSISTOR

1. Connect the circuit as per the circuit diagram.
2. For plotting the input characteristics the output voltage V_{CE} is kept constant at 3V and for different values of $V_{BE.}$ Note down the values of I_C
3. Repeat the above step by keeping V_{CE} at 7V.
4. Tabulate all the readings.
5. Plot the graph between V_{BE} and I_B for constant V_{CE}

OUTPUT CHARACTERISTICS OF COMMON EMITTER TRANSISTOR

1. Connect the circuit as per the circuit diagram
2. For plotting the output characteristics, the input current I_B is kept constant at 100μA and for different values of V_{CE} note down the values of I_C
3. Repeat the above step by keeping I_B at 300 μA
4. Tabulate all the readings
5. Plot the graph between V_{CE} and I_C for constant I_B

RESULT

Thus the input and output characteristics of a transistor in CE configuration are drawn

8. CHARACTERISTICS OF METAL OXIDE SEMICONDUCTOR FIELD EFFECT TRANSISTORS (MOSFETS)

Objective

To obtain the drain characteristics and transfer characteristics of MOSFET.

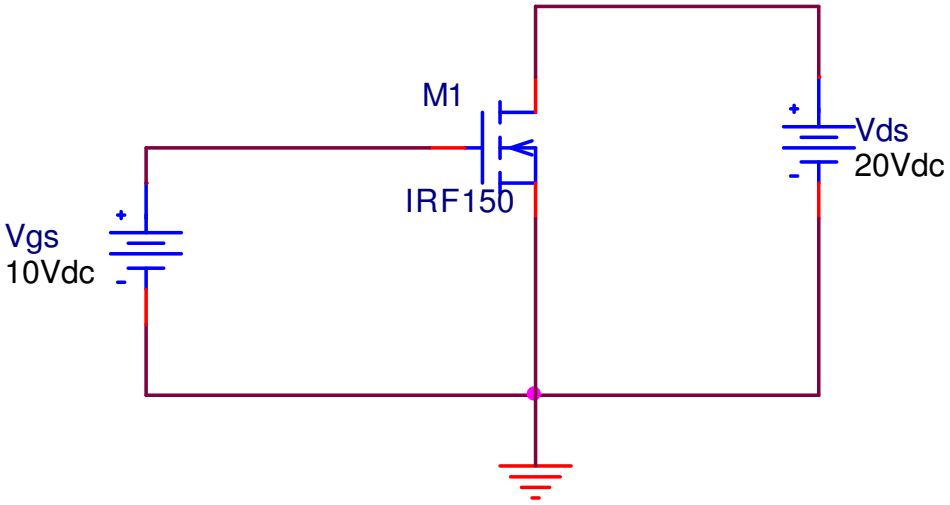
Apparatus / Components Required

S. No	Apparatus	Type	Range	Quantity
1	MOSFET	IRF150		1
2	Resistor		500 Ω , 1K Ω	1 each
3	DC power source		5 V	1 each
4	Connecting wire			

Theory

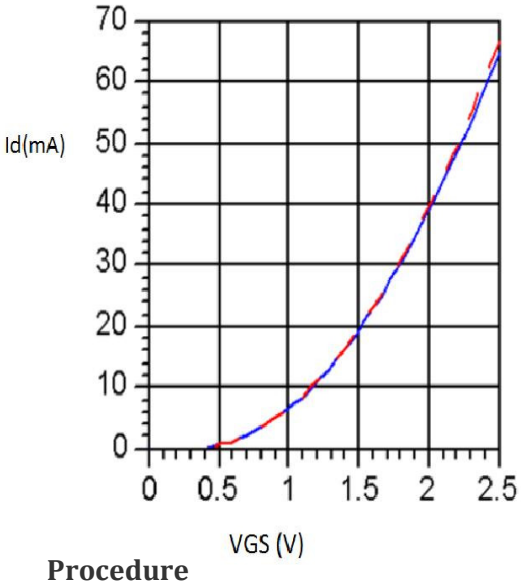
In a MOSFET, current flows from the drain terminal to the source terminal through a semiconductor channel. The resistance of the channel, and therefore its ability to conduct current, is controlled by a voltage applied to a third terminal denoted as the gate.MOSFETs can be either an n-channel type or a p-channel type. In a n-channel MOSFET a positive voltage is applied to the drain terminal for operation while in a p-channel MOSFET a negative voltage is applied to the drain terminal for operation. An n-channel and p-channel type MOSFET may be one of two modes; enhancement mode or depletion mode. The enhancement mode MOSFET is normally “off” (in cutoff and conducting no current) when no voltage is applied to the gate and is “on” (in saturation and conducting current) when a voltage greater than the gate-to-source threshold is applied to the gate. The depletion mode MOSFET is normally “on” (in saturation and conducting current) when no voltage is applied to the gate and is “off” (in cutoff and not conducting current) when a voltage more negative than the gate-to-source threshold is applied to the gate.

MOSFET Characteristics Circuit Diagram

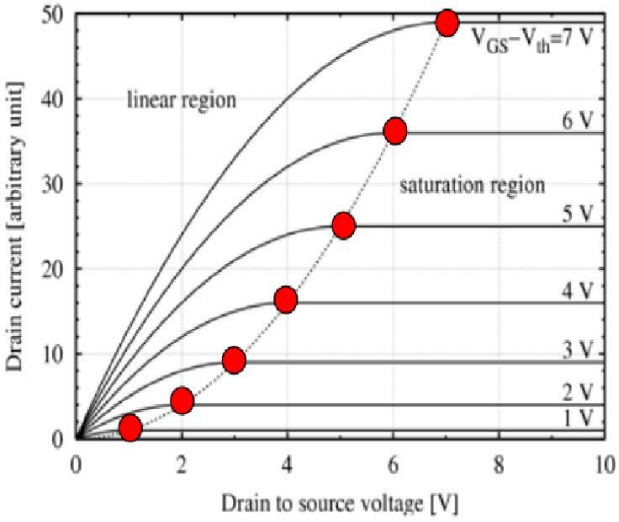


Model Graph

Transfer Characteristics:



Drain Characteristics:



Procedure

Transfer characteristics

1. Connect the MOSFET as per the circuit diagram
2. Keep the VGS =10 V, VDS =20 V
3. Set in the DC sweep primary and secondary values.
4. Place the voltage probe at source of MOSFET and verify the circuit.

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Result

The drain Characteristics and Transfer Characteristics of MOSFET was verified