INPUT & OUTPUT CHARACTERISTICS OF A BJT IN COMMON EMITTER (CE) CONFIGURATION

AIM: - To study the input and output characteristics of transistor (BJT) connected in common Emitter configuration.

EQUIPMENTS & COMPONENTS REQUIRED:

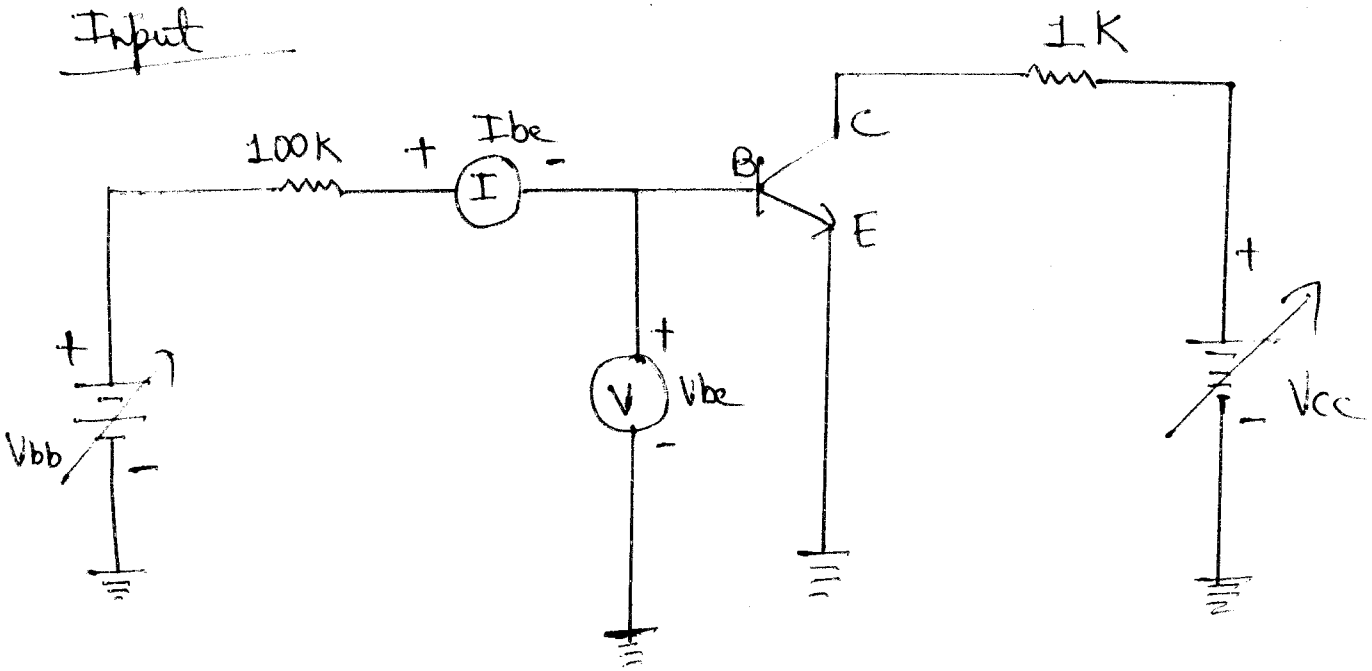
S.No	Device	Range/Rating	Qty
1.	Regulated DC supply voltage(RPS)	0-30V	2
2.	Voltmeter	0-1V or 0-10v,0-20V	1
3.	Ammeter	0-10mA,200mA	1
4.	Connecting wires & bread board		
5	Transistor SL100	NPN	1
6	Resistor	1K,100K	1

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 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 comparedto CB arrangement IB increases less rapidly with VBE . Therefore input resistance of CE circuit is higher than that of CB circuit. The output characteristics are drawn between Ic and VCE at constant IB. the collector current varies with VCE unto few volts only. After this the collector current becomes almost constant, and independent of VCE. The value of VCE up to which the collector current changes with V CE is known as Knee voltage. The transistor always operated inthe region above Knee voltage, IC is always constant and is approximately equal to IB.

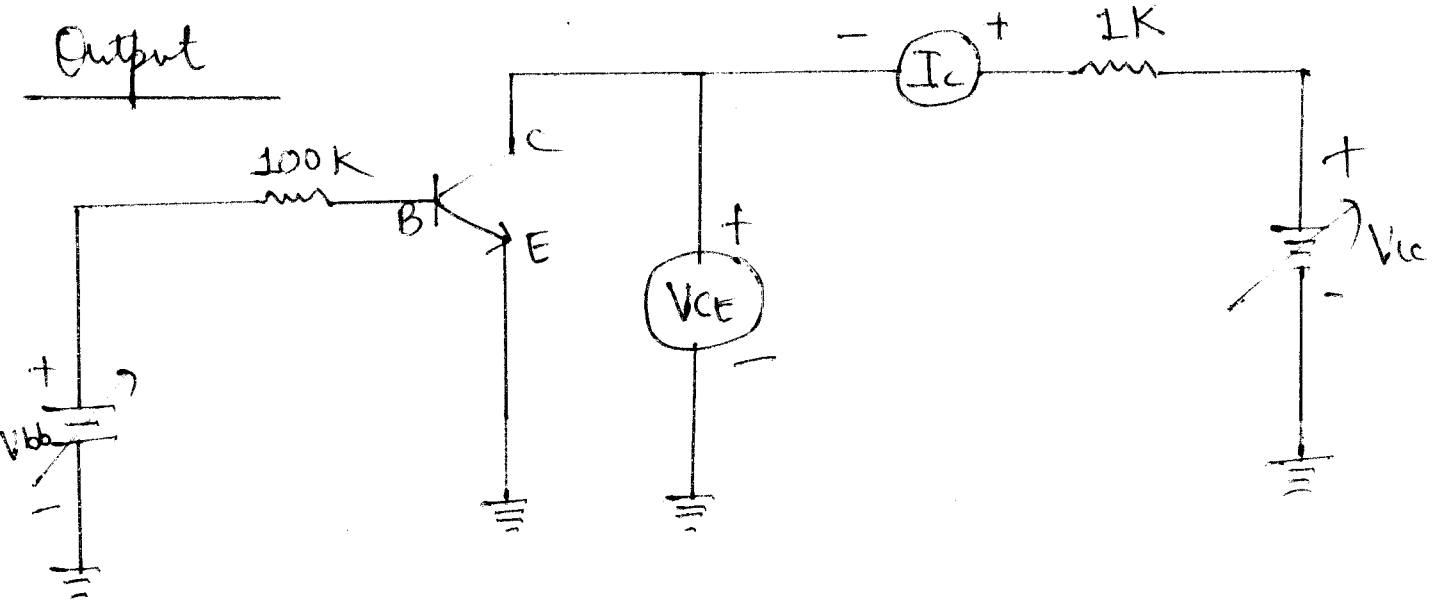
The current amplification factor of CE configuration is given by$\beta = \Delta IC/\Delta IB$.

Input



Vbc	Ibe	When Vcc = 0V, 4V

Output



VCE	Ic	When Vbb = 2V, 4V

PROCEDURE: -

Input characteristics:

1. Connect the circuit according to the circuit diagram of input characteristics.

2. Keep (collector supply voltage) VCC =0V. Initially vary VBB (Base supply Voltage)in steps of 0.1V. Once the current starts increasing vary VBB in steps of 1V up to 12V. Observe IB (Base current) and VBE (Base to Emitter voltage).

3. Repeat the Step 2 for Different (collector supply voltage) VCC i.e. 4V.

4. Tabulate the results in the tabular form and plot the graph.

Output characteristics:

1. Connect the circuit according to the circuit diagram of output characteristic.
2. Keep (Base supply Voltage) VBB =2V. Varying VCC (Collector supply voltage) in steps of 1V up to 12V and note down (Collector current) IC and (Collector ammeter voltage) VCE.

3. Repeat the Step 2 for Different (Base supply Voltage) VBB i.e. 4V.

4. Tabulate the results in the tabular form and plot the graph.

OBSERVATIONS:

INPUT CHARACTERISTICS:

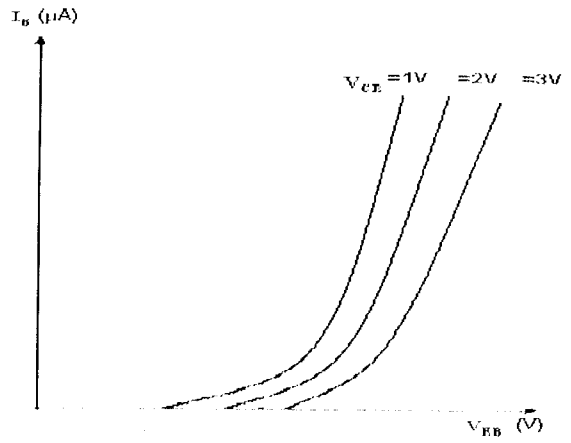
S.NO	VCC = 0V		VCC = 4V	
	V_{BE}(V)	I_B(μA)	V_{BE}(V)	I_B(μA)

OUT PUT CHAREACTARISTICS:

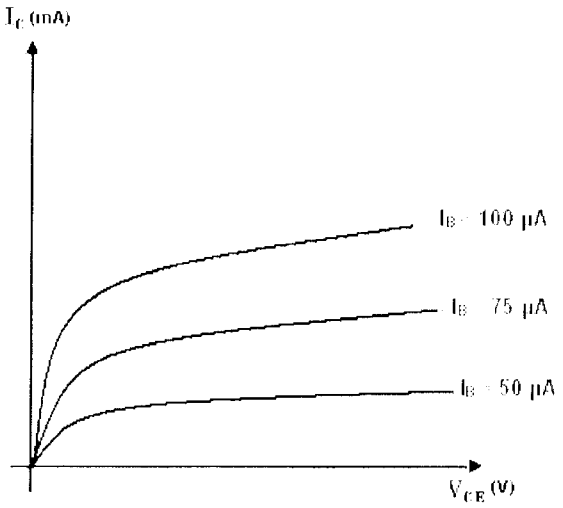
S.NO	VBB = 2V		VBB = 4V	
	V_{CE}(V)	I_C (mA)	V_{CE}(V)	I_C(mA)

MODEL GRAPHS:

INPUT CHARACTERSTICS:



OUTPUT CHARECTERSTICS:



Preacutions:

1. Always keep the supply Voltage Knobs i.e. VCE, VBE positions at minimum position when switching on & off.

2. Never load the meters above its rated range.

3. Avoid loose connections at the junction.

RESULT: -

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?
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20. What are the applications of CE configuration?
21. What is Early Effect?
22. Why the doping of collector is less compared to emitter?
23. What do you mean by "reverse active"?
24. What is the difference between CE and Emitter follower circuit?
25. What are the input and output impedances of CE configuration?
26. Identify various regions in the output characteristics?
27. What is the relation between α, β and γ?
28. Define current gain in CE configuration?
29. Why CE configuration is preferred for amplification?
30. What is the phase relation between input and output?