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| **Course Name:** | **EEEEL** | **Semester:** | **I/II** |
| **Date of Performance:** | **/ /20--** | **Batch No:** |  |
| **Student Name:** |  | **Roll No:** |  |
| **Faculty Sign & Date:** |  | **Grade/Marks:** | **/20** |

**Experiment No: 8**

**Title: BJT Common Emitter Characteristics**

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| **Aim and Objective of the Experiment:** |
| * To understand the structure and working of Bipolar Junction Transistor * To plot the Common Emitter characteristics of a BJT |

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| **COs to be achieved:** |
| **CO5:** Understand Bipolar Junction transistor and its applications. |

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| **Requirements:** |
| PC with internet facility |
| **Link for virtual lab:**  <https://be-iitkgp.vlabs.ac.in/exp/common-emitter-characteristics/> |

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| **Theory:** |
| Structure of Bipolar Junction Transistor  A bipolar junction transistor, BJT, is a single piece of silicon with two back-to-back P-N junctions. BJTs can be made either as PNP or as NPN. They have three regions and three terminals, emitter, base, and collector represented by E, B, and C respectively.  **Emitter (E):** It is the region to the left end which supply free charge carriers i.e., electrons in n-p-n or holes in p-n-p transistors. These majority carriers are injected to the middle region i.e. electrons in the p region of n-p-n or holes in the n region of p-n-p transistor. Emitter is a heavily doped region to supply a large number of majority carriers into the base.  Base (B): It is the middle region where either two p-type layers or two n-type layers are sandwiched. The majority carriers from the emitter region are injected into this region. This region is thin and very lightly doped.  **Collector (C):** It is the region to right end where charge carriers are collected. The area of this region is largest compared to emitter and base region. The doping level of this region is intermediate between heavily doped emitter region and lightly doped base region.  **Input Characteristics**  It is the plot of the base current, IB, versus the base-emitter voltage,VBE, for various values of the collector-emitter voltage,VCE for constant VCE  **Output Characteristics**  It is the plot of the collector current, IC, versus the collector-emitter voltage, VCE, for various values of the base current, IB |

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| **Circuit Diagram/ Block Diagram:** |
| BJT Common Emitter - Input Characteristics    BJT Common Emitter - Output Characteristics |

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| **Stepwise-Procedure:** |
| BJT Common Emitter - Input Characteristics   1. Initially set rheostat Rh1 = 1 Ω and rheostat Rh2 = 1 Ω 2. Set the Collector-Emitter Voltage(VCE) to 1 V by adjusting the rheostat Rh2 3. Base Emitter Voltage(VBE) is varied by adjusting the rheostat Rh1. 4. Note the reading of Base current(IB)in micro Ampere. 5. Click on 'Plot' to plot the I-V characteristics of Common-Emitter configuration. A graph is drawn with VBE along X-axis and IB along Y-axis. 6. Click on 'Clear' button to take another sets of readings 7. Now set the Collector-Emitter Voltage(VCE) to 2 V, 3 V, 4 V   **BJT Common Emitter - Output Characteristics**   1. Initially set rheostat Rh1 = 1 Ω and rheostat Rh2 = 1 Ω 2. Set the Base current(IB)15 uA by adjusting the rheostat Rh1 3. Vary the Collector-Emitter Voltage(VCE)is varied by adjusting the rheostat Rh2. 4. Note the reading of Collector current(IC). 5. Click on 'Plot' to plot the I-V characteristics of Common-Emitter configuration. A graph is drawn with VCE along X-axis and IC along Y-axis. 6. Click on 'Clear' button to take another sets of readings 7. Now set the Base Current(IB) to 20 uA |

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| **V-Lab Screen shots** |
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| **Observation Table:**  BJT Common Emitter - Input Characteristics |
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| **Post Lab Subjective/Objective type Questions:** |
| 1. Explain the structute of a BJT and the current relationships of the BJT CE amplifier 2. Draw and explain the various regions of operation of the BJT amplifier |

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| **Conclusion:** |
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| **Signature of faculty in-charge with Date:** |