

Practical Submission Sheet

Term: 2020-1	Submission Date: August 17, 2020
Lecture Date: August 14, 2020.	Practical Number: 2
Course Code: PHY249	Section: G2903
Registration Number: 11912610	Roll No: 03
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Concepts Learnt

Learnt what different types of transistors exist (nnp and pnp transistors) and how to connect them in different configurations (common emitter, base and collector). Gained the operational ability to complete a common emitter transistor circuit.

Key Observations & Insights

For the simulated diode we tested, the plot for V-I characteristics obtained was as expected —the knee and ohmic regions were clearly identifiable. In the case of the transistor, the behavior of current flow was observed.

Application Areas

Diodes are useful for restricting current in one direction. This may be desirable in many electrical circuits. Transistors are used as switches and current amplifiers. They are very common in electronic devices, especially computers.

Report

A diode circuit was made using a $1k\Omega$ resistor and an LED for the purpose of testing, as depicted in circuit_diode.png (see folder). Both the LED and resistor provided resistance in the circuit and consequently were useful in restricting the maximum current that passes through the diode.

The current and voltage profiles of the simulated diode were recorded. The observations are summarised in Table 1.

The corresponding plot with current (mA) on the vertical axis and applied voltage (V) on the horizontal axis is as displayed in Figure 1. The plot was generated using matplotlib (Python).

Voltage (V)		I (mA)	
1.0	5.5	0.001	2.835
1.5	6.0	0.026	3.792
2.0	6.5	0.216	4.274
2.5	7.0	0.572	4.758
3.0	7.5	0.990	5.244
3.5	8.0	1.436	5.731
4.0	8.5	1.895	6.219
4.5	9.0	2.362	6.707
5.0		3.312	

Table 1: Applied voltage and corresponding current across the diode

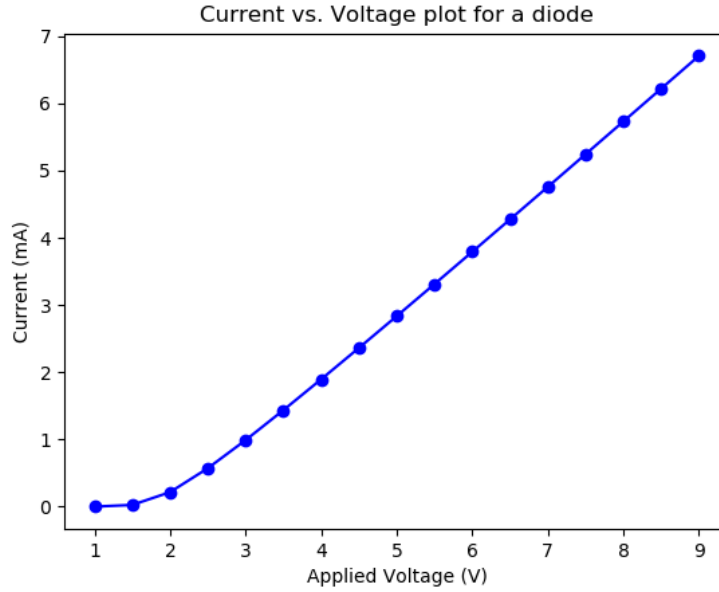


Figure 1: The V-I characteristic of the diode.

An npn transistor was simulated and was connected in common emitter configuration with two 100Ω resistors and two battery sources of $5V$ each. The circuit for the transistor is as reported in *circuit_transistor.png*.

The resulting behavior was as expected for an npn transistor, with a net current flowing into the collector and flowing out of the emitter.