North East University Bangladesh

Department Of CSE

Lab Report
Course : CSE-335 (Technical Writing and Presentation)

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Lab Report: Study of Light-Emitting Diodes (LEDs)

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Objective

The objective of this experiment is to study the working principle of Light-Emitting Diodes (LEDs), analyze their electrical characteristics, and understand their applications in different lighting systems.

Theory

A Light-Emitting Diode (LED) is a semiconductor device that emits light when an electric current flows through it. LEDs are widely used in display systems, indicators, and energy-efficient lighting.

Working Principle:

- LEDs operate based on **electroluminescence**, where electrons recombine with holes, releasing energy in the form of photons (light).
- The color of the emitted light depends on the semiconductor material and its bandgap.
- LEDs have a **threshold voltage**, typically around **2V** for red LEDs and higher for blue/white LEDs.

Experimental Setup

Apparatus Required:

1. Light-Emitting Diode (LED)
2. Digital Multimeter (DMM)
3. Power Supply (3V – 12V DC)
4. Resistor (470 Ohm)
5. Breadboard & Connecting Wires

Procedure

Step 1: Forward Bias Testing

- Connect the LED in series with a resistor to limit the current.
- Apply different voltages and measure the brightness.

Step 2: Voltage-Current (V-I) Characteristics

- Measure the current at different applied voltages.
- Observe the threshold voltage where the LED starts glowing.

Step 3: Reverse Bias Test

- Reverse the LED connection and observe if any current flows.

Observations & Data Table

Step	Measurement Name	Measurement
1	LED Type	Red LED
2	Threshold Voltage	2V
3	Forward Current	15mA
4	Reverse Leakage	Negligible

Conclusion

The experiment demonstrates the working of LEDs and their behavior in different conditions. LEDs require a minimum voltage (**threshold voltage**) to operate, and their brightness depends on the current flowing through them. They are highly efficient, consume less power, and are used in various applications such as indicator lights, display screens, and general lighting solutions.