

**Aim ↗ Introduction to Breadboard and Electronics Components/Equipments.**

### **Equipment Required ↗**

Breadboard, resistors, capacitors, inductors, switches, LEDs, power supply, ammeter, voltmeter, jumper wires, and other basic electronic components.

### **Theory ↗**

A breadboard, also known as a plugboard or protoboard, is a versatile and essential tool for building and testing electronic circuits. It allows users to create temporary circuits without soldering, making it easier to prototype and experiment with design.

### **Structure of a Breadboard ↗**

**Layout:** A standard breadboard consists of a plastic base with a grid of holes arranged in rows and columns. Each hole is designed to accept standard component leads and jumper wires.

**Power Rails:** Most breadboards have horizontal rows along the top and bottom called power rails, which are used to provide power to the circuit. These rails are typically connected vertically and are used for VCC (positive voltage) and GND (ground).

**Terminal Strips:** The main area of the breadboard is divided into terminal strips, which are typically arranged in vertical columns. Each column of holes is connected internally, allowing components to be interconnected easily.

#### **Connections:**

- **Vertical Connections:** In terminal strips, holes in the same column are electrically connected. Typically, 5 holes in each column are grouped together for easier component placement.
- **Horizontal Connections:** In power rails, holes across the same row are connected, providing a common voltage reference.

### **Key Components ↗**

1. **Resistors:** Components that limit the flow of electric current. Their value is measured in ohms ( $\Omega$ ) and is denoted by color bands on the resistor body.
2. **Capacitors:** Devices that store electrical energy temporarily in an electric field. They have a capacitance value measured in farads (F) and are used in filtering and timing applications.

3. **Inductors:** Coils of wire that store energy in a magnetic field when electric current flows through them. They are typically used in filters and energy storage.
4. **LEDs (Light Emitting Diodes):** Diodes that emit light when current flows through them. They are polarized devices, meaning they have a positive (anode) and negative (cathode) terminal.
5. **Power Supply:** Provides the necessary voltage and current for the circuit to operate. It can be a battery or a wall adapter.
6. **Ammeter:** Measures the current flowing through a circuit, usually in amperes (A).
7. **Voltmeter:** Measures the voltage across two points in a circuit, usually in volts (V).
8. **Switches:** Devices that open or close a circuit, controlling the flow of electricity.



Fig. i) Basic Electronics Components

## Procedure ⇄

1. **Setup:** Place the breadboard on a flat surface and connect the power supply.
2. **Insert Components:** Start inserting the electronic components like resistors, capacitors, LEDs, and switches into the breadboard, ensuring correct polarity where applicable.
3. **Wiring:** Use jumper wires to connect the components according to the circuit diagram.

4. **Testing:** Once the circuit is complete, turn on the power supply and use the ammeter and voltmeter to measure current and voltage in various parts of the circuit.
5. **Observation:** Note the behavior of the circuit, such as LED illumination, changes in current, and voltage readings.

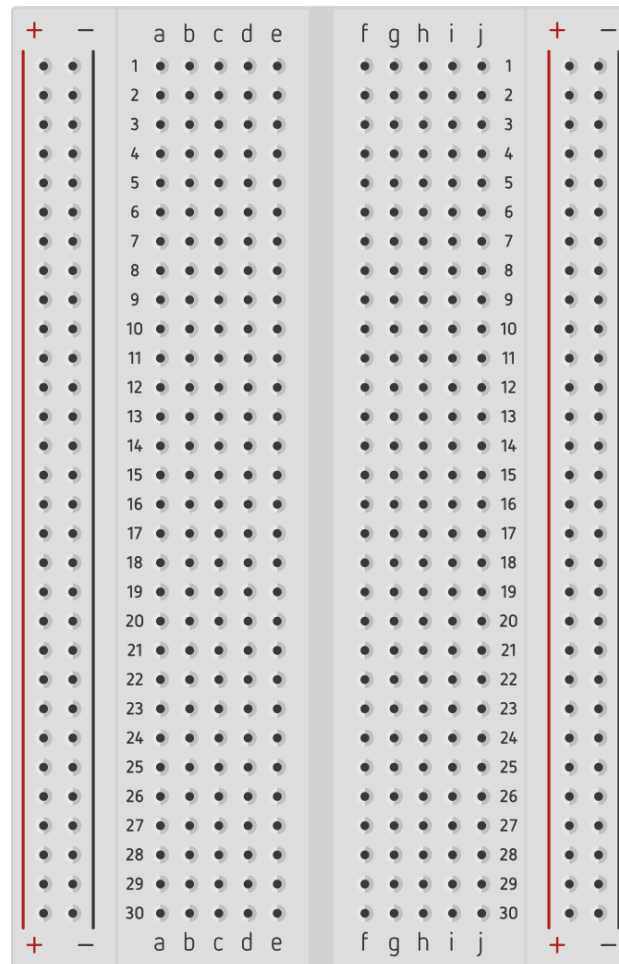


Fig. ii) Breadboard

### Result ⇨

The experiment successfully demonstrated the basic functionalities of electronic components on a breadboard. The observed values matched expected theoretical values, confirming the behavior of resistors, capacitors, LEDs, and the overall circuit design.

### Conclusion ⇨

This experiment provided a fundamental understanding of using breadboards and basic electronic components. It reinforced the principles of circuit design and the role of each component within the circuit.

## **Precautions ↔**

- Ensure all connections are secure before applying power.
- Do not exceed the voltage and current ratings of components.
- Check the polarity of components like LEDs to avoid damage.
- Disconnect the power supply when making changes to the circuit.