

Lab Report number 3
Series / Parallel Circuits

ENS203 – Electrical Circuits I

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**Lab Report number III - Series / Parallel
Circuits**

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1 Objective

The objective of this lab is to understand Kirchhoff's laws and how they can be applied to series and parallel circuits. We will build three different circuits in this lab and try to show the validity of Kirchhoff's laws.

1.1 Kirchhoff's Laws

- Kirchhoff's Current Law (KCL): The sum of currents entering a node is equal to the sum of currents leaving the node.
- Kirchhoff's Voltage Law (KVL): The sum of voltages around a closed loop is equal to zero.

1.2 Equipment

- Breadboard
- Resistors $1\text{k}\Omega$, $10\text{ k}\Omega$, $100\ \Omega$
- 1 LED
- DC Power supply
- Multimeter

1.2.1 Breadboard

A breadboard is a construction base for prototyping of electronics. A breadboard consists of plastic block holding a matrix of electrical sockets of a size suitable for gripping thin connecting wire, component wires or the pins of transistors and integrated circuits (ICs). The sockets are connected inside the board, usually in rows of five sockets.

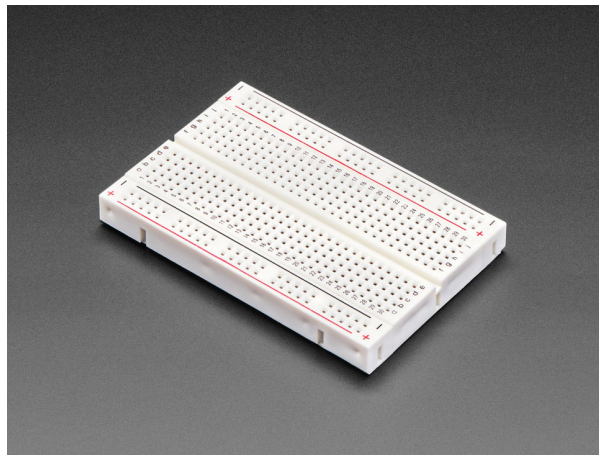


Figure 1: A breadboard

1.2.2 Resistors

As stated before we needed 3 resistors for this lab report so we took 3 resistors with the proper colour code values and then we measured them and marked them.

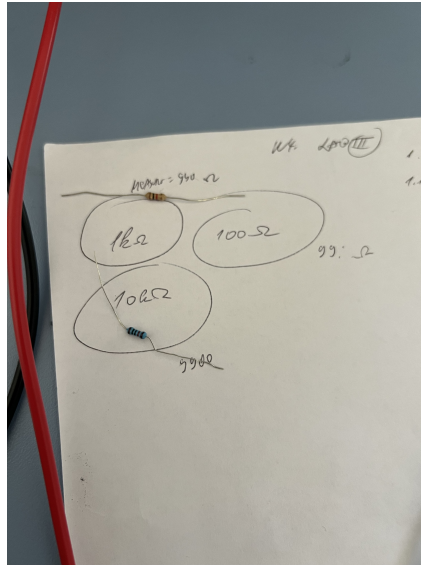


Figure 2: Resistors with their measured values

Resistor	Expected Value (Ω)	Measured Value (Ω)
R1	100	99
R2	1000	990
R3	10000	9900

Table 1: Expected and Measured Resistance Values

1.2.3 LED

An LED (Light Emitting Diode) is a semiconductor device that emits light when an electric current passes through it. LEDs are commonly used in electronic circuits for various purposes, such as indicator lights, displays, and illumination. In this lab, a red LED was used. Red LEDs emit red light with a specific wavelength. They are widely used in applications such as traffic lights, electronic displays, and decorative lighting. Here is an image of a red LED:



Figure 3: Red LED

1.2.4 Multimeter

The multimeter is a versatile tool used for measuring various electrical quantities. In this lab, we will use it to measure the voltage drops across components, the currents through branches and components, and the resistance of resistors. To measure voltage drops, connect the multimeter in parallel across the component of interest. Set the multimeter to the voltage measurement mode and select an appropriate range. To measure currents, connect the multimeter in series with the branch or component. Set the multimeter to the current measurement mode and select an appropriate range. To measure resistance, disconnect the resistor from the circuit. Connect the multimeter probes to the resistor terminals. Set the multimeter to the resistance measurement mode and select an appropriate range.



Figure 4: Multimeter

2 Circuit 1

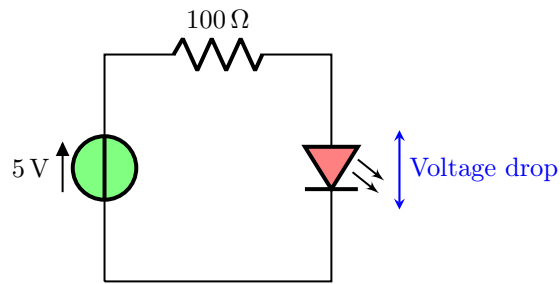


Figure 5: Simple LED circuit with a 5V power supply and a 100 ohm resistor.

2.1 Objectives

- To measure the voltage drop across the LED.
- To measure the voltage drop across the resistor.
- Ensure that the sum of the voltage drops is equal to the voltage of the power supply, hence validating Kirchhoff's Voltage Law.

2.2 Making the circuit