LAB # 2 & 3

Objective:

1. **To measure current, voltage, and resistance using a digital multimeter (DMM).**
2. **To verify Ohm's Law by:**
   a) **Keeping the voltage constant.**
   b) **Keeping the resistance constant.**

Equipment:

- Digital Multimeter (DMM)
- DC Power Supply
- Resistors of known values (e.g.,1KΩ, 4.7KΩ,10KΩ)
- Connecting wires
- Breadboard
- Switch

Theory:

Ohm's Law:

Ohm's Law states that the current (I) through a conductor between two points is directly proportional to the voltage (V) across the two points and inversely proportional to the resistance (R) of the conductor. Mathematically, it is represented as:

$$V=I\times R$$

Part 1: Measurement of Current, Voltage, and Resistance

Procedure:

1. **Voltage Measurement:**

- Connect the power supply to the breadboard.
- Connect the DMM probes across the power supply terminals.
- Set the DMM to measure DC voltage.
- Turn on the power supply and record the voltage reading.

2. **Current Measurement:**

- Connect a resistor in series with the power supply.
- Break the circuit at one point and connect the DMM probes in series to measure the current.
- Set the DMM to measure DC current.
- Turn on the power supply and record the current reading.

3. **Resistance Measurement:**

- Ensure the resistor is disconnected from the circuit.
- Connect the DMM probes across the resistor terminals.
- Set the DMM to measure resistance.
- Record the resistance reading.

Part 2: Verification of Ohm's Law:

a) Keeping Voltage Constant.

Procedure:

1. **Setup:**

- Connect the power supply, resistor, and DMM as described in Part 1 for voltage measurement.
- Use a resistor of known value (e.g., 1KΩ).

2. **Measurement:**

- Set the power supply to a constant voltage (e.g., 10V).
- Measure and record the current flowing through the resistor using the DMM.
- Repeat the measurement for different resistors (e.g., 4.7KΩ, 10KΩ).

Data Analysis:

- Calculate the expected current using Ohm's Law: **I=V/R**
- Compare the measured current with the calculated current.

b) Keeping Resistance Constant

Procedure:

1. **Setup:**

- Connect the power supply, variable resistor (potentiometer), and DMM as described in Part 1 for voltage measurement.
- Set the fixed resistance value (e.g., 10KΩ).

2. **Measurement:**

- Vary the power supply voltage (e.g.,5V, 10V, 15V).
- Measure and record the current for each voltage setting.

Data Analysis:

- Calculate the expected current for each voltage setting using Ohm's Law: **I=V/R**
- Compare the measured current with the calculated current.

Observations:

a) By keeping voltage constant

S.NO	SUPPLY VOLTAGE	RESISTANCE	MEASURED CURRENT
1	10V	1K Ω	10 mA
2	10V	4.7KΩ	2.13 mA
3	10V	10KΩ	1 mA

b) By keeping resistance constant

S.NO	SUPPLY VOLTAGE	RESISTANCE	MEASURED CURRENT
1	5V	10K	0.5 mA
2	10V	10K	1 mA
3	15V	10K	1.5 mA

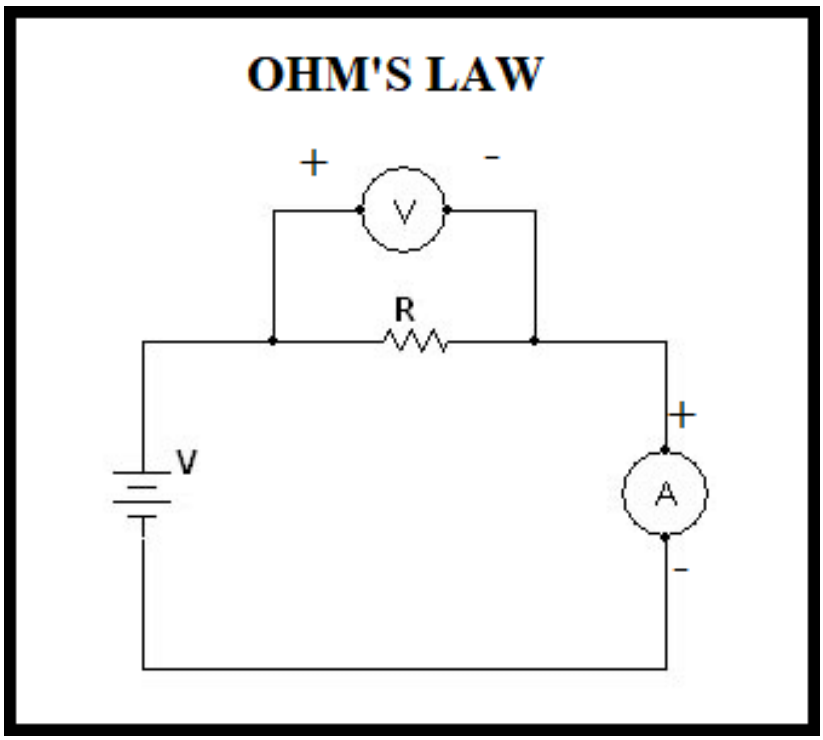
Conclusion:

- Summarize the findings of the experiment.
- Confirm whether Ohm's Law holds under the conditions tested.
- Reflect on the accuracy and precision of the measurements.

Safety Precautions:

- Ensure all connections are secure to avoid short circuits.
- Handle the DMM and power supply according to the manufacturer's instructions.
- Do not exceed the voltage and current ratings of the components used.

Circuit Diagram:



POST LAB:

1) State Ohm's Law?

- Ohm's Law states that the current flowing through a conductor between two points is directly proportional to the voltage across the two points and inversely proportional to the resistance of the conductor.

2) How can Ohm's Law be represented mathematically? Provide the formula.

- Ohm’s Law can be represented mathematically as:
  V=I×RV = I \times RV=I×R where VVV is the voltage, III is the current, and RRR is the resistance.

3) If a resistor has a resistance of 10 ohms and a current of 2 amperes flows through it, what will be the voltage drop across the resistor according to Ohm's Law?

- Using Ohm’s Law:
  V=I×R=2 A×10 Ω=20 VV = I \times R = 2 \, \text{A} \times 10 \, \Omega = 20 \, \text{V}V=I×R=2A×10Ω=20V The voltage drop across the resistor is 20 volts.

RESULT:

Through this lab, we measured current, voltage, and resistance using a digital multimeter and verified Ohm’s Law under two conditions: keeping voltage constant and keeping resistance constant. The results confirmed that Ohm’s Law holds as the measured currents were consistent with the calculated values. This experiment reinforced an understanding of the relationship between voltage, current, and resistance, and demonstrated the accuracy and effectiveness of using Ohm’s Law in practical scenarios.