Name: \_\_\_poorab gangwani\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Section: \_\_\_\_\_\_\_2B\_\_\_\_\_\_\_\_\_\_

Enrollment #: \_\_\_\_\_cs191092\_\_\_\_\_\_\_\_

**LAB # 3**

**Experimental Verification of Ohm’ s Law and Voltage & Current Measurement**

**Lab Objectives:**

* To learn how to measure voltage
* To learn how to measure current
* To experimentally verify Ohm’s Law.

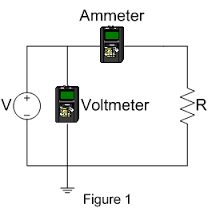
**Apparatus Required:**

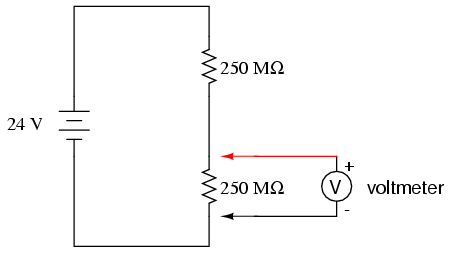
* DC Power Supply
* Digital Multimeter
* Resistors
* Connecting wires
* Bread board

**PRE-LAB:**

**Measuring Voltage:**

Voltage is measured **across** a device by connecting the meter probes on the nodes across (parallel) the device.





*Fig. 3.1: Voltage measurement Fig. 3.2: Current measurement*

**Measuring Current:**

Current is measured **through** a device by connecting the meter inside a circuit (i.e. in series).

**Ohm’s law:**

Ohm’s lawstates that the current (I) flowing through a component is directly proportional to the voltage (V) across it, if resistance (R) of that component is constant. Mathematically this relation is represented as,

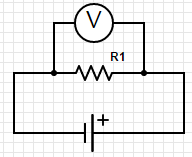
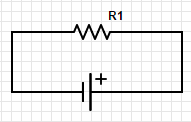
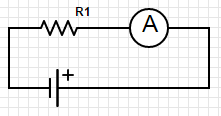
………………………….Eq. 3.1

Electric devices which follow Ohm’s law are said to be Ohmic devices. Resistors fall under the category of Ohmic devices. Each resistor has a certain color code, which tells us about the electrical resistance of that resistor in ohms (Ω).

**IN-LAB:**

**LAB TASK 1: Measuring voltage**

1. Develop the circuit of fig. 3.3 on breadboard and measure the voltage according to fig. 3.4.
2. Set voltage to 5V
3. Take R1=10 KΩ



*Fig. 3.3 Fig. 3.4 Fig. 3.5*

Voltage (V)= \_\_5V\_\_\_\_\_\_\_\_\_\_\_

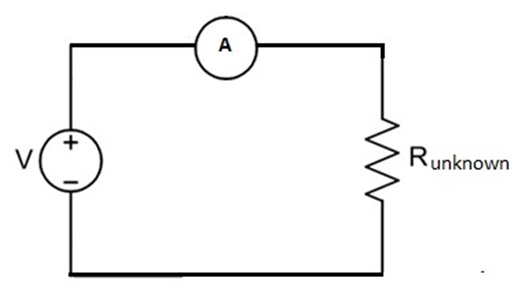
**LAB TASK 2: Measuring current**

1. Now break the circuit and insert the probes of multimeter in between as in fig. 3.5.

Current (I)=\_\_\_\_\_\_500 rA\_\_\_\_\_\_

**LAB TASK 3: Ohm’s law**

1. Develop the circuit shown in Fig 3.6 on a bread board. Use the resistor provided to you by the Lab Assistant.
2. Progressively increase the DC power supply’s voltage from 1V to 10V and record the current using a series connected ammeter.
3. Write your experimental results in table 3.1
4. Plot the experimental values of voltage and current, with voltage (V) on the y-axis and current (I) on the x-axis.



*Fig 3.6: lab task 3*

*Table 3.1: lab task 3*

|  |  |
| --- | --- |
| **DC Supply Voltage (V)** | **Current (I)** |
| 1V | 100mA |
| 2V | 200mA |
| 3V | 300mA |
| 4V | 400mA |
| 5V | 500mA |
| 6V | 600mA |
| 7V | 700mA |
| 8V | 800mA |
| 9V | 900mA |
| 10V | 1A |

This part was told to be skipped as informed by madam sidra

Q.1) What type of graph do you get?

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Q.2) How would you describe the relationship between voltage and current?

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Q.3) Calculate the slope of the plot and show your calculations in the space provided.

Slope: \_\_\_\_\_\_\_\_\_\_\_\_\_\_

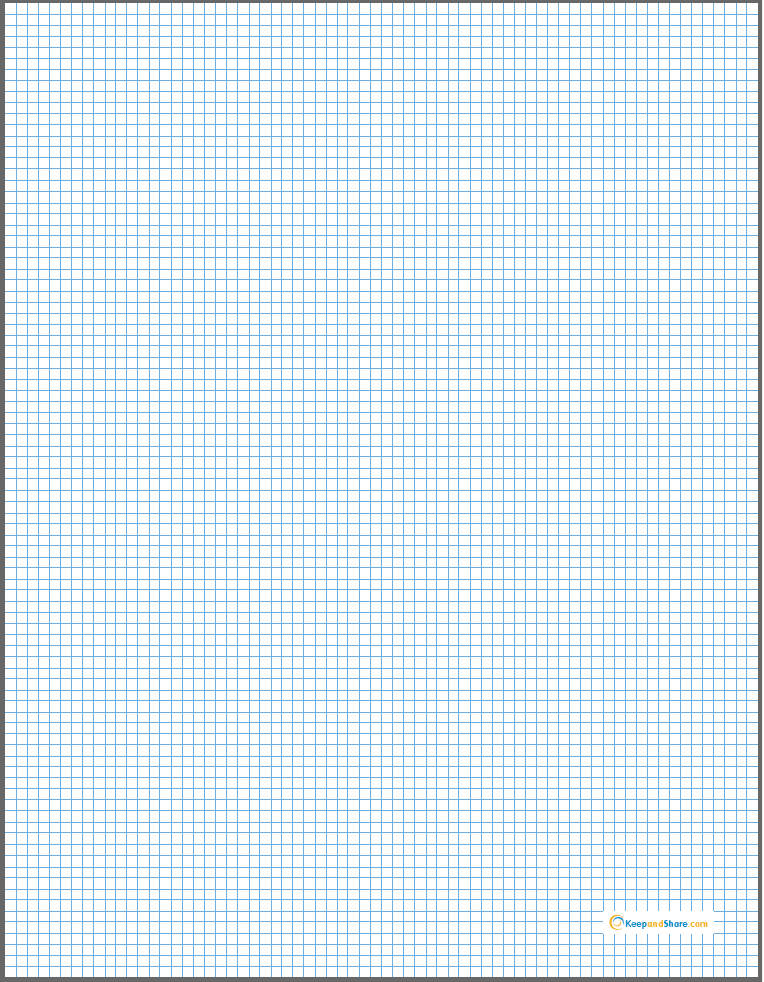
Unknown = \_\_\_\_\_\_\_\_\_\_ Ω

**Conclusion:**

**\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

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Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Enrollment #: \_\_\_\_\_\_\_\_\_\_\_\_\_

**POST-LAB ASSIGNMENT# 3**

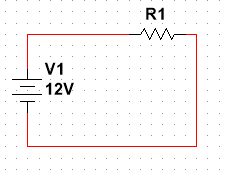
Q.1) How would you describe the voltage-current relationship of an Ohmic device?

**current flowing through a conductor is directly proportional to the potential difference across it’s ends if the temperature and physical conditions remain the same.**

Q.2) Is ohm’s law applicable to non-linear devices?

\_\_\_\_\_\_\_NO\_\_\_\_\_\_\_\_\_\_\_\_

Q.3) Determine the values of R1 if a current of 3A is flowing in the circuit.

 R1 = ?

V1=12V

I1=3A

V=IR

V1 = I1 x R1

R1=V1/ I1

R1= 12/3

R1=4