Post Lab Report of Electrical Circuits

Lab 01: Introduction to Circuit Elements and Variables

Submitted By: Group 2

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2022-3-60-057
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Table 1. Experimental Datasheet:

Observation number	Set value of ***E*** (V)	Measured value of ***V***(V)	Measured value of ***I***(mA)	Measured Value of ***R*** (kΩ)
1	5	5V	4.8	
2	6	6 V	5.8	
3	7	7V	6.8	~~1.08~~
4	8	8V	7.8	0.992
5	9	9 V	8.8	
6	10	10 V	10	

07/02/24

Post Lab Report

Topic 1: Theoretically calculate the values of I using measured values of V and R. Compare the theoretical values with the measured values and comment on any discrepancy.

Solution:

Measured Voltage(V)	Measured Resistance (kΩ)
5V	0.992Ω
6V	
7V	
8V	
9V	
10V	

We know,

I = V/R So,

For measured voltage 5V current I = 5V / 0.992kΩ = 5.04 mA
For measured voltage 6V current I = 6V / 0.992kΩ = 6.05 mA
For measured voltage 7V current I = 7V / 0.992kΩ = 7.06 mA
For measured voltage 8V current I = 8V / 0.992kΩ = 8.06 mA
For measured voltage 9V current I = 9V / 0.992kΩ = 9.07 mA
For measured voltage 10V current I = 10V / 0.992kΩ = 10.08 mA

Measured Current (mA)	Theoretical Current (mA)	Discrepancy (mA)
4.8	5.04	0.24
5.8	6.05	0.25
6.8	7.06	0.26
7.8	8.06	0.26
8.8	9.07	0.27
10	10.08	0.08

When we compare the theoretically expected values of current (I) to the actual measured values of current (I), it becomes evident that there is some disparity. This variance in observations, which include measurements at 5V, 6V, 7V, 8V, 9V, and 10V, is reasonably anticipated in practical scenarios.

Topic 2: Theoretically calculate the values of R from the measured values of V and I using Ohm's law. Compare the calculated and measure values of R and comment on any discrepancy.

Solution:

Measured Current (mA)	Measured Voltage (V)	R = V / I (Ω)
4.8	5	1.04
5.8	6	1.03
6.8	7	1.03
7.8	8	1.03
8.8	9	1.02
10	10	1.00

Topic 3: Compare the set value of E and the measured value of V and comment on any discrepancy.

Solution:

Supplied Voltage (V)	Measured Voltage (V)	Change
5	5	0
6	6	0
7	7	0
8	8	0
9	9	0

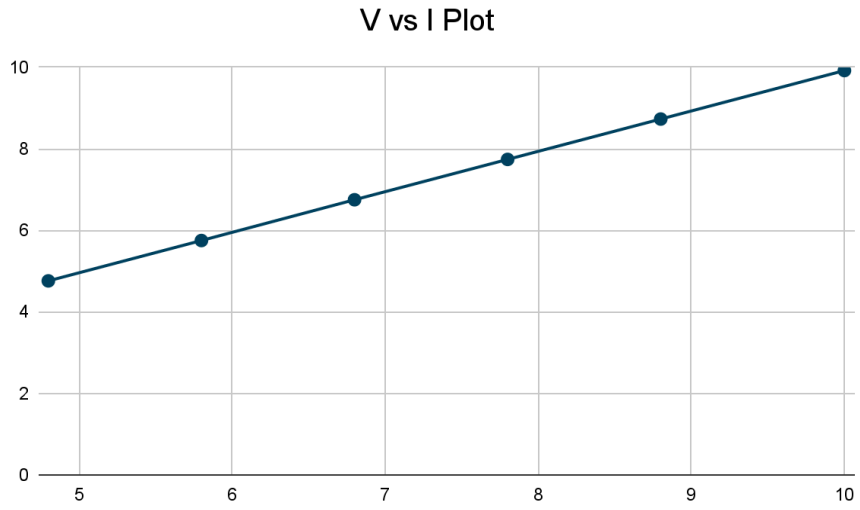
10	10	0

In every observation, the discrepancy is nonexistent (Discrepancy = 0). This indicates that the measured value (V) precisely aligns with the set value (E), resulting in a complete absence of any divergence.
In essence, the measured voltages precisely correspond to the predetermined set values, and there are no variations observed in any of the cases.

Topic 4: Plot V vs. I (taking I as independent variable) and fit a straight-line passing through the origin. From the plot determine the resistance of the supplied resistor using Ohm's law. Compare this value with the measured value and comment on any discrepancy.

Solution:

Measured Current (mA)	Measured Resistance (kΩ)	V = IxR (V)
4.8	0.992	4.76
5.8		5.75
6.8		6.75
7.8		7.74
8.8		8.73
10		9.92



Plot V vs. I (taking I as independent variable)

Topic 5: Discuss how voltage or current is measured using a multi-range meter.

Solution:

Voltage Measurement Procedure:

1. Begin by selecting the Voltage function:
   - Turn the multimeter dial to the voltage (V) function, which may have multiple voltage ranges (e.g., 200mV, 2V, 20V, 200V, 600V).
   - Choose a range higher than the expected voltage for accuracy.

2. Connect the probes:
   - Insert the black probe (common or COM) into the COM socket.
   - Insert the red probe into the VΩ mA socket for voltage measurements.

3. Measure DC Voltage:
   - For direct current (DC) voltage, connect the probes in parallel across the component or circuit to be measured.
   - Read the voltage value displayed on the multimeter screen.

4. Measure AC Voltage:
   - If measuring alternating current (AC) voltage, select the appropriate AC voltage range on the multimeter.
   - Connect the probes across the AC voltage source or component.
   - Read the voltage value displayed on the multimeter screen.

Current Measurement Procedure:

1. Select the Current function:
   - Turn the multimeter dial to the current (I) function, with multiple current ranges (e.g., 200µA, 2mA, 20mA, 200mA, 10A).
   - Choose a range higher than the expected current for accuracy.

2. Connect the probes:
   - Insert the black probe into the COM socket.
   - Insert the red probe into the appropriate socket (usually marked as 10A for currents up to 10A; for lower currents, use the mA/µ A socket).

3. Measure Current:
   - For currents up to the selected range (e.g., 200mA or lower):
     - Break the circuit and insert the multimeter in series with the component or load.
     - Read the current value displayed on the multimeter screen.

   - For currents up to 10A (using the 10A socket):
     - Insert the red probe into the 10A socket.
     - Break the circuit and insert the multimeter in series with the component or load.
     - Read the current value displayed on the multimeter screen.

Pre Labs:

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Pre Lab:

Circuit Diagram:

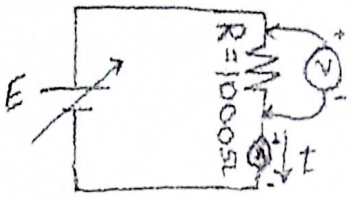

Figure: Circuit for ...

Pre lab:

We know,

$V = IR$ so, $I = \frac{V}{R}$

So, $I_5 = \frac{5V}{1000\Omega} = 5mA$

$I_6 = \frac{6}{1k\Omega} = 6mA$

$I_7 = \frac{7}{1k\Omega} = 7mA$

$I_8 = \frac{8}{1k\Omega} = 8mA$

$I_9 = \frac{9}{1k\Omega} = 9mA$

$I_{10} = \frac{10}{1k\Omega} = 10mA$

Here,
$V = 5V$; $R = 1000\Omega$

Here,
$V = 6V$; $R = 1k\Omega$

Here,
$V = 7V$; $R = 1k\Omega$

Here,
$V = 8V$; $R = 1k\Omega$

Here,
$V = 9V$; $R = 1k\Omega$

Here,
$V = 10V$; $R = 1k\Omega$

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Circuit Diagram:-

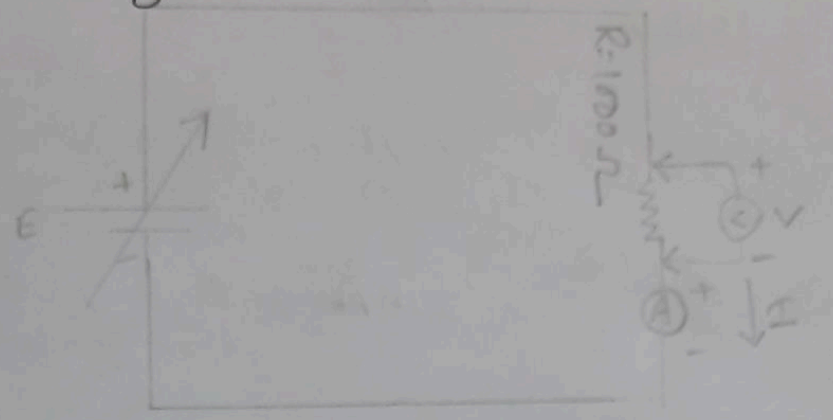

Fig: Circuit for Experiment

Pre-Lab Report Question:-

Theoretically calculate the value of I for this circuit, where E = 5, 6, 7, 8, 9, 10V and R = 1000Ω

Sltn:-

Given that,

$R = 1000\,\Omega$

$E = 5, 6, 7, 8, 9, 10\,V$

We know,

$V = IR$

$\Rightarrow I = \frac{V}{R}$

Now,

$I_5 = \frac{5\,V}{1000\,\Omega} = 5\,mA$

$$I_6 = \frac{6\Omega}{1000V} = 6mA$$

$$I_7 = \frac{7\Omega}{1000V} = 7mA$$

$$I_8 = \frac{8\Omega}{1000V} = 8mA$$

$$I_9 = \frac{9\Omega}{1000V} = 9mA$$

$$I_{10} = \frac{10\Omega}{1000V} = 10mA$$

Momo Bhuiyan
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Subject: CSE-209
Sec: 04

Circuit Diagram:

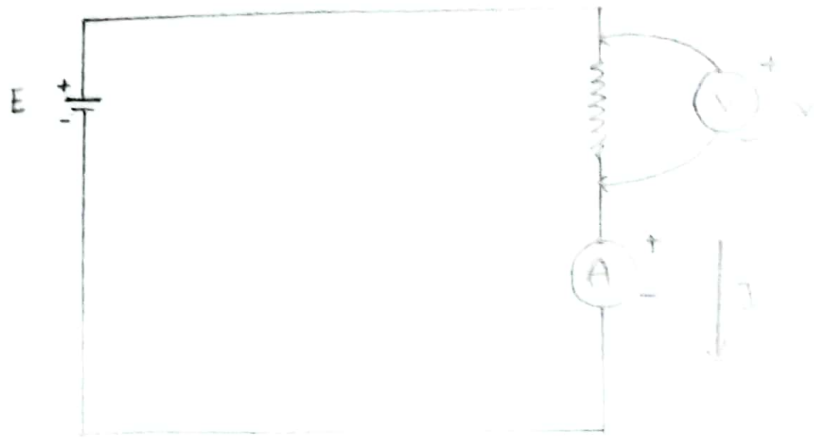

Figure: 3

Solution:

Given,

$R = 1000\,\Omega$ and $E = 5, 6, 7, 8, 9, 10\ V$

We know that,

$$V = IR \Rightarrow I = \frac{V}{R}$$

For, $E = 5V$,

$$I = \frac{5}{1000} = 0.05 \times 1000 = 5\,mA$$

For, $E = 6V$,

$$I = \frac{6}{1000} = 0.006 \times 1000 = 6\,mA$$

For, $E = 7V$,

$$I = \frac{7}{1000} = 0.007 \times 1000 = 7\,mA$$

For, $E = 8V$,

$$I = \frac{8}{1000} = 0.008 \times 1000 = 8\,mA$$

For, $E = 9V$,

$$I = \frac{9}{1000} = 0.009 \times 1000 = 9mA$$

For, $E = 10V$,

$$I = \frac{10}{1000} = 0.01 \times 1000 = 6mA$$

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section: 04
Lab:- 01

Pre-Lab Report Question:- 01

There theoretically calculate the values of I for the circuit of figure-3 for E = 5, 6, 7, 8, 9, 10V and R = 1000Ω.

Circuit Diagram:-

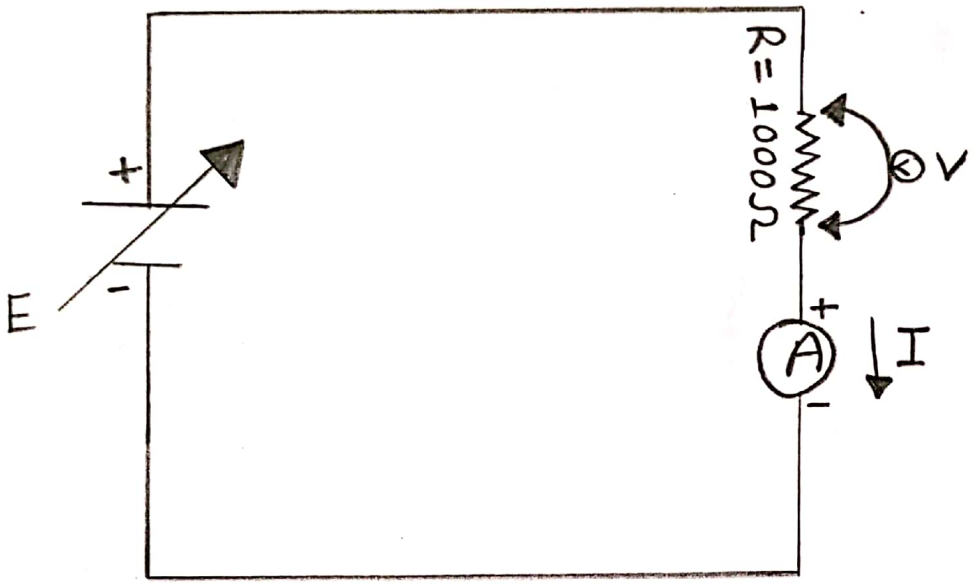

Figure-3 circuit of experiment

solution:-

As it given;

R = 1000Ω & E = 5, 6, 7, 8, 9, 10 V

From equation of ohm's we know;

$$V = IR$$

$$\therefore I = \frac{V}{R}$$

For E = 5V

$$\therefore I = \frac{5}{1000} = 5mA$$

For $E = 6V$

$\therefore I = \frac{6}{1000} = 6\,mA$

For $E = 7\,V$

$\therefore I = \frac{7}{1000} = 7\,mA$

For $E = 8V$

$\therefore I = \frac{8}{1000} = 8\,mA$

For $E = 9\,V$

$\therefore I = \frac{9}{1000} = 9\,mA$

For $E = 10\,V$

$\therefore I = \frac{10}{1000} = 10\,mA$