LAB NO: 01

ANALYSIS OF A DC CIRCUIT USING OHM'S LAW

OBJECTIVE:

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THEORY:

RESISTOR:

A resistor is a passive two-terminal electrical component that implements electrical resistance as a circuit element. Resistors act to reduce current flow, and, at the same time, act to lower voltage levels within circuits. In electronic circuits, resistors are used to limit current flow, to adjust signal levels. Like the other components resistors are not manufactured to perfection. That is there will always be the variance in the true value of the component compared to nameplate.

Figure 1.1: Resistor's Symbol

MEASUREMENT OF RESISTANCE BY DMM:

Measurement of resistance by DMM is very straight forward method. Simply set the DMM to resistance function and choose the first scale higher than the expected value. Clip the leads to the resistors and record the value.

MEASUREMENT OF RESISTANCE BY RESISTOR COLOR CODE METHOD:

The resistor color code method uses 4 color bands. First two bands indicate the precision value, while the third band indicates the power of ten applied (i-e number of zeros to add). The fourth band indicated the tolerance.
It is important to note the size of resistor basically shows its power dissipation not the numeric value.

For first, second and third band, resistor color cod is represented as;

Color	Digit
Black	0
Brown	1
Red	2
Orange	3
Yellow	4
Green	5
Blue	6
Violet	7
Gray	8
White	9

In order to learn these color codes you can use the mnemonics as;

"**B**lack **B**ears **R**obbed **O**ur **Y**ummy **G**oodies **B**eating **V**arious **G**ray **W**olves"

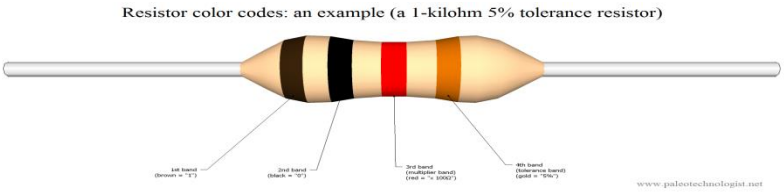

Figure 1.2: Resistor's Colour Code

Tolerance:

Tolerance basically shows how much the resistor is accurate. Greater the tolerance less is the precision.

Tolerance band can be represented as;

Color	Tolerance
Silver	5%
Gold	10%
None/black	20%

OHM'S LAW:

Ohm's law states that the current through a conductor between two points is directly proportional to the voltage across the two points. Introducing the constant of proportionality, the resistance one arrives at the usual mathematical equation that describes this relationship:

$$V = I \times R$$

Where I is the current through the conductor in units of amperes, **V** is the voltage measured *across* the conductor in units of volts, and **R** is the resistance of the conductor in units of ohms. For a given current an increase in the resistance results in greater voltage. For given voltage, an increase in resistance will produce decrease in current. As this is the first order linear equation, plotting voltage versus current for fixed resistance would produce a straight line graph. The slope of this line is conductance and it is the reciprocal of resistance.

GRAPH:

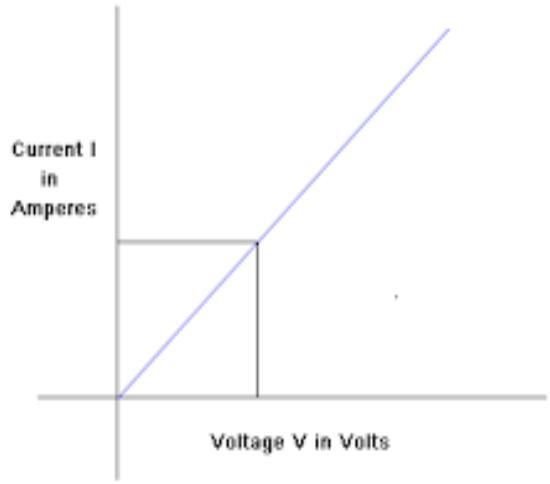

Figure 1.3: Linear Graph of Ohm's Law

APPARATUS:

- Digital multi-meter
- DC power supply
- Resistors
- Connecting Wires

SCHEMATIC DIAGRAM

Figure 1.4: Simple DC Circuit

PROCEDURE:

CALCULATIONS:

For Resistor Value:

S.No	Color	Nominal value	Tolerance value	Minimum value	Maximum value	Measured value
1.						
2.						
3.						
4.						
5.						

Table 1.1

For _____ kΩ Resistor Value:

S.No	V (Volts)	I Theoretical	I Measured
1.			
2.			
3.			
4.			
5.			

Table 1.2

For _____ kΩ Resistor Value:

S.No	V (Volts)	I Theoretical	I Measured
1.			
2.			
3.			
4.			
5.			

Table 1.3

CONCLUSION:

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POST LAB QUESTIONS:

1. Briefly define Ohmic and non Ohmic devices with examples.

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2. Does Ohm's Law appear to hold in this exercise?

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3. Is there a linear relationship between current and voltage?

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Teacher Remarks:

Obtained Marks: _____ / 10