Physics Department
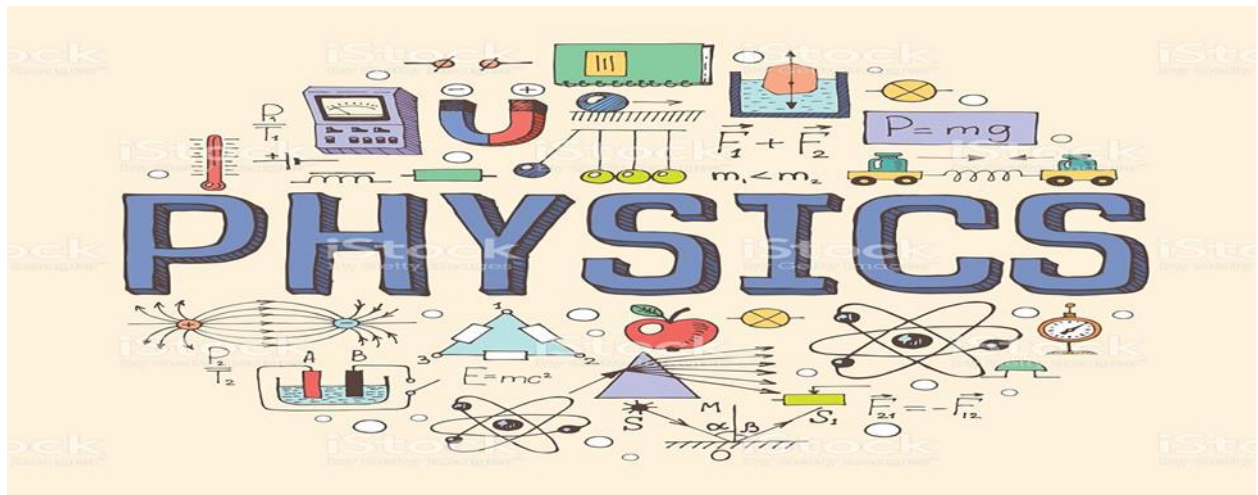
Physics 112

Report 1

Done by :Rayan Ghnimat

"The world is a book and those who do not travel read only one page."
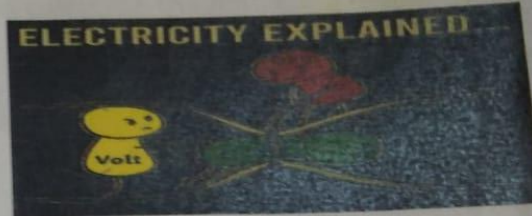
BIRZEIT UNIVERSITY

Birzeit University

Physics Department

Physics 112

Experiment 1:

Linear and Non-Linear Circuit Components

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Section: 6

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ABSTRACT:

The aim of this experiment is to find the resistance of a linear and non linear component (Resistor, Diode, and light)by drawing the I-V gragh .

Method we used: by reading different measurements of current and voltage by Ammeter and Voltmeter then calculate the result.

Main Result: Resistor is a linear component ,but Diode and light are non linear component.

INTRODUCTION:

We need to prove that Ohm's law says that $V = I * R$.

In this experiment ,we tried to discover if the elements (resistor ,light ,and diode) were linear or not .so, we read measurements

Of V-I characteristics for the elements (resistor ,light ,and diode) using low and high current ,After that we plotted them on a gragh to find if they are linear or non.

-Data:

Resistor		Diode		Light (low currents)		Light (high currents)	
V(volts)	I(mA)	V(volts)	I(mA)	V(volts)	I(mA)	V(volts)	I(mA)
0.4	0.8	0.4	.009	0.010	6.93	0.5	83.5
0.8	1.57	0.45	.032	0.02	11.96	1.0	113.3
1.2	2.37	0.50	0.08	0.03	17.48	1.5	139.5
1.6	3.16	0.53	0.18	0.04	24.2	2.0	163.5
2.0	3.94	0.55	0.29	0.05	26.8	2.5	183
2.4	4.74	0.57	0.422	0.06	32.0	3.0	200
2.8	5.52	0.6	1.059				
3.2	6.30	0.62	1.4				
3.6	7.10	0.64	2.2				
4.0	7.89	0.66	3.81				
4.4	8.68	0.68	8.33				
4.8	9.47	0.7	8.31				

Note that significant figures, in the value of the resistance, were ignored in these tables. And that's because the values are taken only to have an idea about the overall relation.

Data Analysis:

The carbon resistor gave a V vs. I graph that is a linear circuit component.
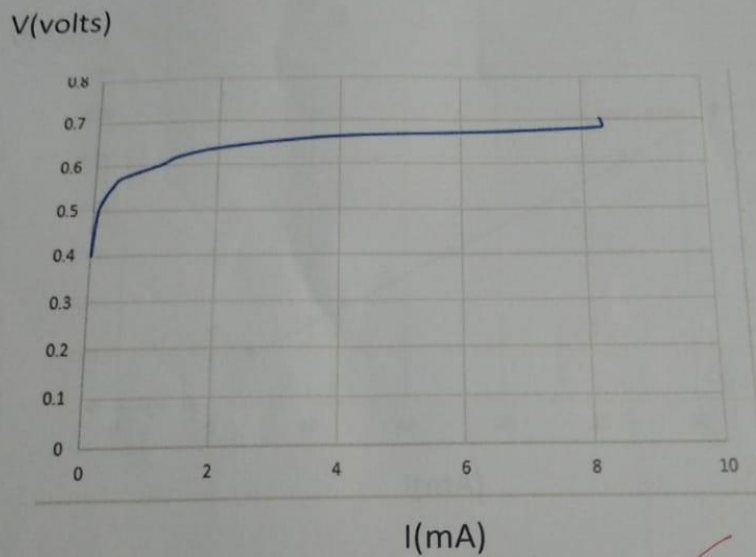
V vs. I (Resistor)

V(volts)

$y = 0.5072x - 0.001$

I(mA)
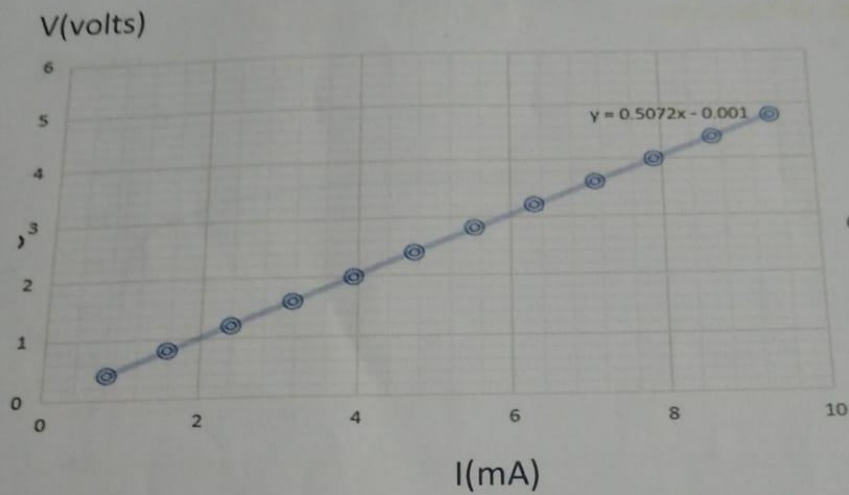
– Calculation for Carbon Resistor:

The Slope (Resistance):

$R = (V2-V1) / (I2-I1) = (4.8 - 0.4) / (9.47 - 0.8) = 0.5.$

The Si Diode gave a V vs. I graph that is a nonlinear circuit component.
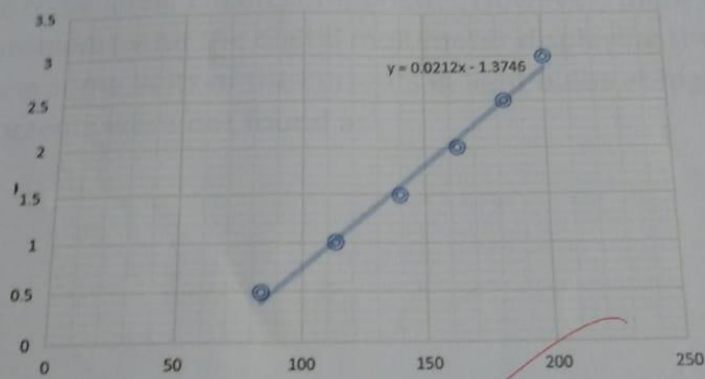
V vs .I(Diode)

V(volts)

I(mA)

Many of the points that do not connect to the line were measured through prediction and not through actual precision and accuracy. However, we were informed by the Assistant that such prediction is acceptable due to the time limit.

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The Light Bulbs (in High Current) gave a V vs. I graph that is a linear circuit component.
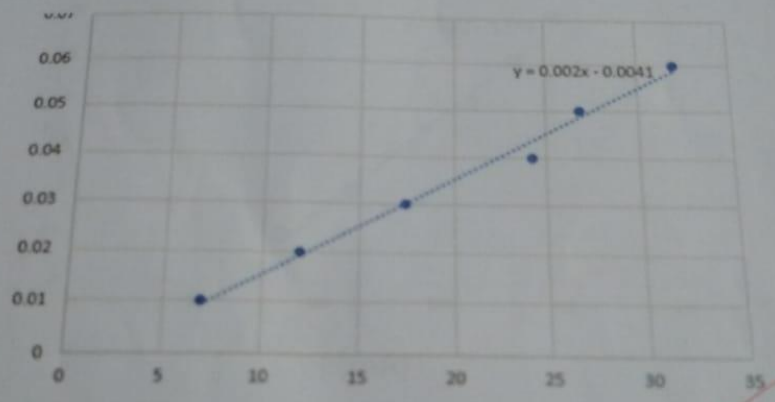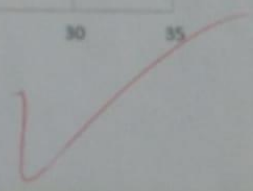
Light(High current)

V(voltage)

$y = 0.0212x - 1.3746$

I (mA)

The Light Bulbs (in Low Current) gave a V vs. I graph that is a linear circuit

component.

Light(low current)

V(volts)

$y = 0.002x - 0.0041$

I(mA)

Conclusion:

After conducting the experiment, it was found that the component Si Diode formed a compressed logarithmic graph making it a nonlinear circuit component. Components such as

Carbon Resistor and Light Bulbs (at high and low currents) were found to be linear circuit components, However, there were a few problems with the digital multimeter displaying the Volt, because some volts of the currents in light bulbs at high and low currents were not found at

all.