

### **Physics Department**

### **Physics 112**

### **Experiment No.1**

### **Linear and non-Linear circuit components**

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***Abstract:***

***The aim of the experiment***: *is to examine the I-V characteristics for different elements (elements that have straight line I-V), and to find out if it where linear or non-linear circuit components.*

***The method used:*** *is by measuring the current that passes through the element and the potential difference (V) between its terminals, and plot these measurements on a graph.*

***The results:***

***R carbon resistance=***  *Ω, the carbon resistance is linear*

***R diode*** *is non-linear*

***R light bulb*** *is non-linear*

***Data:***

*Data for the carbon resistor:*

| ***I (mA)*** | ***V (volt)*** |
| --- | --- |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |

*Data for the forward-biased diode:*

| ***I (mA)*** | ***V (volt)*** |
| --- | --- |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |

*Data read from the light bulb:*

| ***I (mA)*** | ***V (volt)*** |
| --- | --- |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |

*V for the reverse-biased diode is*

*The color code for the carbon resistance is*  ***Ω = ± Ω***

***Calculations:***

*Using the graph of I vs. V for the carbon resistance we can see that the resistance is:*



*Using the graph of* ***I vs. V*** *for the diode we can see that the resistance average is:*

* *R1:*

* *R2:*

* *R3:*

*Using the graph of I vs. V for the light bulb we can see that the average resistance is:*

* *R1:*

* *R2:*

* *R3:*

***Analysis of results:***

*From the graphs of the I vs. V for the carbon resistance, the diode, and the light bulb, we can see that the carbon resistance is linear circuit component while the diode and the light bulb are not.*

*The value of the carbon resistance is Ω which is within the value of the resistance ( ± )using the color code.*

*The result which we can see from the graph of the light bulb, is that the resistance of light bulb changes as the current increases it starts to be Ohmic with certain value of resistance then it changes to a non-Ohmic for a while then it changes back to an Ohmic one but with different value, because the temperature of the light bulb at the beginning remains approximately constant, and the equation () tells us that the resistance of depends on the change in the temperature, and after a few minutes the temperature remains constant so the resistance doesn’t change.*



*Finally we found that the reverse-biased diode blocks almost all the current and allows only a small amount of current to pass and this amount is nearly 1 μA.*