**Queensborough Community College**

The City University of New York

**Department of Engineering Technology**

**ET 110 – Introduction to Circuit Analysis Laboratory**

**Lab#9**

Power in resistive circuits and superposition

**Inspector: Prof. Wu**

**Date 11/3/16**

**Fall 2016**

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**Objective**

* Introduce the power and how it works on the resistive circuits
* Learn and understand the power formula
* Measure the current and voltage in a series-parallel circuit and compare them with the calculate value
* Use the power formula to calculate the power through each element
* Compare the results with the measurement.

**Components’ list**

* Power supply
* DMM
* Protoboard
* Jump wires
* Resistors: 680Ω, 220Ω, and 470Ω

**Experimental**

* **Tables**

|  |  |  |
| --- | --- | --- |
| **Resistor** | **Measured Resistance** | **Percent of difference** |
|  | 696.71Ω | 2.46% |
|  | 229.50Ω | 4.32% |
|  | 487.04Ω | 3.64% |
| Table 9.1- Individual resistance measurement | | |

|  |  |  |  |
| --- | --- | --- | --- |
| **Component** | **Measured Current** | **Calculated Current** | **Percent of difference** |
|  | 10.75mA | 10.85mA | -0.92% |
|  | 7.24mA | 7.39mA | -2.03% |
|  | 3.51mA | 3.45mA | 1.46% |
|  | 10.75mA | 10.85mA | -0.92% |
| Table 9.2- Measured and calculated current of circuit 9.1 | | | |

|  |  |  |  |
| --- | --- | --- | --- |
| **Component** | **Measured Voltage** | **Calculated Voltage** | **Percent of difference** |
|  | 7.36V | 7.38V | -0.27% |
|  | 1.62V | 1.63V | -0.61% |
|  | 1.62V | 1.63V | -0.61% |
|  | 8.98V | 9V | -0.22% |
| Table 9.3- Measured and calculated voltage of circuit 9.1 | | | |

* **Power formula: P=VI**

|  |  |  |  |
| --- | --- | --- | --- |
| **Component** | **Measured Power** | **Calculated Power** | **Percent of difference** |
|  | 79.12mW | 80.07mW | -1.19% |
|  | 11.73mW | 12.05mW | -2.66% |
|  | 5.69mW | 5.64mW | 0.89% |
|  | 96.54mW | 97.65mW | -1.14% |
| Table 9.4- Measured and calculated power dissipation in circuit 9.1 using P=VI | | | |

* **Power formula: P=I2R**

|  |  |  |  |
| --- | --- | --- | --- |
| **Component** | **Measured Power** | **Calculated Power** | **Percent of difference** |
|  | 80.51mW | 80.51mW | 0% |
|  | 12.03mW | 12.01mW | 0.17% |
|  | 6mW | 5.63mW | 6.57% |
|  | 95.90mW | 97.69mW | -1.83% |
| Table 9.5- Measured and calculated power dissipation in circuit 9.1 using P=I2R | | | |

* **Power formula: P=V2/R**

|  |  |  |  |
| --- | --- | --- | --- |
| **Component** | **Measured Power** | **Calculated Power** | **Percent of difference** |
|  | 77.75mW | 80.10mW | -2.93% |
|  | 11.44mW | 12.08mW | -5.30% |
|  | 5.39mW | 5.65mW | -4.60% |
|  | 97.17mW | 97.61mW | -0.45% |
| Table 9.6- Measured and calculated power dissipation in circuit 9.1 using P=V2/R | | | |

**Question**

1. The reason is we are using the approximate numbers to calculate the power source. In other words, the results are slightly different that because the current and voltage values both are the nearest hundredth number.
2. The highest percent of the difference between the measured and the calculated power is by using the power formula P=I2R. The reason is the measurement of current is already a very small number and when square it again that lead the number, even more, smaller than before, and that give us a large difference.

**Conclusion**

In this lab, we are learning the power in resistive circuits. During the lab, we find all of three power formulas, that are able to obtain the power in the network. Base on that, we only need any of two resources of the elements to lead us to calculate the power. Likewise, if we know the power, we also can use these formulas to get resistance, current or voltage through the elements. However, we find the results by using different formulas will give us the slight difference. The reason is we have the approximate numbers to calculate the power. And another thing what I have been noticing is the power formulas using the current sources are have the higher percent of difference with the measurement value. Even so, the results contrast each other are meager unequal, but overall the results are good enough for the answers. In addition, we are an acquisition that power source are equal to sum each individual power in the circuit. Furthermore, when we have a circuit, it is really important to realize what kind of connection between each element. The reason is our calculation is base on the different method with the different of the circuits.