Objective

The objective of this experiment was to build a circuit such that the current flowing through it would not ruin a LED yet would light it.

Introduction

This experiment was based upon the idea that the student knew the incoming voltage but did not know the current going through the system. They were to use Ohm's law to determine what resistance would be needed to create a current that would not ruin the LED. They then would build the circuit they thought would work and compare their findings.

Equipment Used

- •Digital Multi Meter (DMM)
- •LED
- •100Ω Resistor
- •300Ω Resistor
- •Bread Board
- •Power Supply
- •Banana to alligator clip cables

Procedure

- •LED information was looked up
- •Theoretical values were calculated based upon those
- •Circuit was built to specifications to match theoretical specifications
- •Circuit was analyzed with DMM and data was recorded
- •Actual values and Theoretical values were compared and percent error was determined

Calculations

- •V=I*R
- •I = V/R
- •P = IV
- •$V_r = 392*.025$
- •$V_{LED} = V-V_r = 12 - 9.8$
- •$P_r = V_r * I = 9.8 * .025$
- •$P_{LED} = V_{LED} * I = 2.2 * .025$

Results

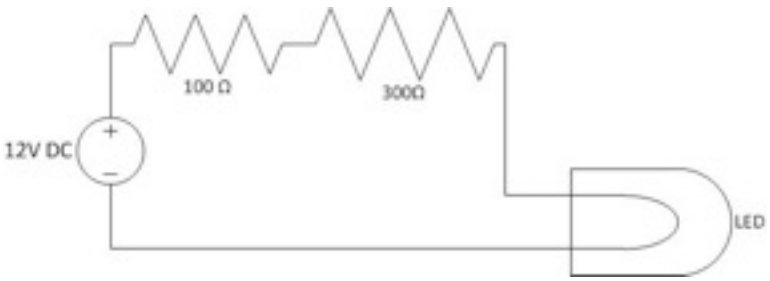

Figure 1. The design of the built circuit

	Theoretical	Actual	% Error
V	12V	12V	0
R	392Ω	396.3	1.1%
I	25mA	32.25mA	29%
V_r	9.8	9.863	0.64%
V_{LED}	2.2	2.23	1.73%
P_r	245mW	318.08mW	29.8%
P_{LED}	55mW	71.92mW	30.76%

Discussions

Most of the data was consistent with the calculated theoretical values. However the current was off by nearly 30% which then set everything else that was dependent on it off by 30% like the power. This was because the data sheet of the LED stated that the LED needed a current of 25mA but could sustain more and could handle a surge of up to 105mA, this allowed the LED to handle a slightly higher current than was expected and continue to work. With the current being off by 30% it directly affected the power which were both off by 30% since P = I*V.

Conclusion

It is interesting how the LED can handle such a wide range of currents, and also how it is able to handle different types of voltage sources DC vs AC according to the data sheet. So that was an interesting thing to learn about. The lab was very straight forward and easy to follow I would not make any changes to it.

Experiment 2
Current Limiter
Monday September 17th , 2012
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