Project 2

Objective

Design and build an energy efficient lamp.

Replace the incandescent bulb in a lamp with LED(s) that produce the same light output. You will need to demonstrate that your modified lamp produces the same (or greater) light and uses less power than the unmodified lamp. You can assume a 40 W (or appropriate) incandescent light bulb.

The (optional) advanced part of the project is to have at least two different modes (high and low). Other advanced lab options are possible but must be approved by the instructor.

Project Design

Due: October 31

- Schematic diagram of proposed circuit.
- Detailed analysis of the proposed circuit.
    - LED operation point (theoretical – based on I vs V graph)
    - Rectifier design
    - Power consumption
    - Light output (theoretical – based on Lux vs I graph)
- Discussion concerning your design that addresses
    - Max power dissipation for LED and other circuit components – a good design limits the circuit to 80% of any component maximum
    - Transformer identification – use DigiKey to specify components
    - Optimization – Why choose parallel or series connection for your LEDs?

Completed Project

Due: November 7

Your report will include your (modified) project design information and the following.

- Characterization curves for the actual LEDs used. If you have manufacturer graphs you just need to verify these graphs.
    - I vs V graph
    - Lux vs I graph
- Characterization information for the modified lamp
    - Power consumption
    - Light output
- Working energy efficient lamp
    - The lamp must pass the "reading chair" test – ie the ability to read a book sitting next to it in a dark room.
- Actual power consumption and anticipated lifetime.

Advanced Components

- Schematic diagrams of proposed circuit(s)

- Detailed analysis of the proposed circuit.