Lab 4 Explore many types of diodes

The diode curve

1. Build the circuit your designed in *Homework 4 problem iii*. Get two DMMs, label one for voltage measurements, one for current measurements. DO NOT MIX THESE TWO!
2. Forward bias the diode, measure the diode voltage and current at source voltages: 0, 0.1V, 0.2V, 0.3V, 0.4V, 0.5V, 0.6V, 0.7V, 0.8V, 0.9V, 1V, 2V, 4V, 6V, 8V, 10V and 15V. Use the stand-alone power supply for this measurement. Ask your TA/professor to check your setup before your turn anything on.
3. Reverse bias the diode, measure the diode voltage and current at source voltages: -1V, -5V, -10V and -15V. (Flip the diode, NOT the source polarity!)
4. Plot the diode curve with measured data. Indicate the knee voltage on the plot.

Bridge rectifier

1. Measure our transformer's output voltage and determine the primary to secondary ratio. Adjust your simulation's transformer to match this ratio and run the simulation again. Build the bridge rectifier you designed in *Homework 4 problem iv*. Measure the output peak voltage and frequency. Compare your result to your calculation and your simulation. Take a screen shot with cursors on the screen showing your measurement values. Tape it to your lab book.
2. Build a bridge rectifier with a capacitor input filter you designed in *Homework 4 problem v*. Measure the output dc voltage and the ripple's peak-to-peak value. Compare your result to your calculation and your simulation. Take a screen shot with cursors on the screen showing your measurement values. Tape it to your lab book. This is basically an ac-to-dc power adaptor. EXTRA CAREFUL WITH CAPACITOR POLARITY.

The Zener diode

- Build the circuit you designed in *Homework 4 problem vi*. Measure the Zener voltage of three Zener diodes: 1N752, 1N751 and 1N749. You should measure the Vz at various input voltages. Compare your measurements with the datasheet value. Do they match? Do your data make sense?

LED

1. Build the circuit you designed in *Homework 4 problem vii a*. Adjust the input voltage slowly until the LED turns on. Record the LED's On voltage. Keep increasing the input voltage, your LED will be brighter and brighter. Keep track of the voltage applied to the LED. Does this voltage V_{LED} change with V_{in}? Figure out a way to calculate the current I_{LED} when the LED is off, just on, medium bright and very bright. Hint: we can measure V_{in}, V_{LED} and the series resistor R.
2. Build the circuit you designed in *Homework 4 problem vii b*. Show your success to your TA/professor.