EC244 **Experiment #4** **Spring 2012**

Pre-Lab

DC Power Supplies

1. Typically, a DC power supply converts an input AC power source into a DC output. Features that result from design choices are the output DC voltage level, output current capacity, and output voltage ripple.
2. Using the 1N4001 diode introduced in Experiment #3, design both a half-wave and a full-wave rectifier circuit. Assume that you have a 60 Hz AC input voltage source of 15 V_p and that your circuit has a 150 Ω load.
3. For output voltage stability, you have three 100 μF capacitors. Evaluate the ripple voltage, surge current, and peak repetitive current for the diode(s) using first only one capacitor in parallel with the load, then two, and finally all three.
4. Simulate your designs in Multisim to confirm their operation and verify your calculations from step 3.

Laboratory Work

1. Build the half-wave and full-wave circuits that you simulated and experimentally verify their operation.
2. Measure and record the ripple voltage, surge current, and peak repetitive currents.
3. Compare the measurements of step 2 to your calculated and simulated results for these quantities. Comment on any discrepancies.
4. For both half and full wave rectifier circuits with all three capacitors connected, increase the load resistance from 150 Ω to 5 k Ω. Record voltage ripple data for at least 10 data points in this range.
5. Comment on whether or not these circuits are regulated, using your experimental data to back up your assertion. Clearly define the term regulation as it applies to power supplies.