**EECS 211**  
**CAD Assignment 3: Diode Bridge Rectifier**

**Due with Lab Report #3**

**Goal:** To simulate the diode bridge rectifier power supply done in the lab, taking into account the transformer series resistance, the diode series resistance and the diode capacitance. To compare the simulated data with actual lab measurements, and with calculations done by hand using the approximate formulas given in class.

Using DA, enter the schematic of a diode bridge rectifier with your measured values of Rl, C and the 0.5 ohm resistor. As explained in the lab, the transformer has a series resistance of approximately 9–14 ohms at its output terminals. Therefore, this resistance should be included in your schematic so as to accurately model the circuit in Accusim. In your schematic, include a resistance Rs in the series with the input node. Use your measured peak transformer voltage (around 15.5 V) as your input voltage and set the frequency to 60 Hz. The only variable in the circuit is Rs, and therefore it will be impossible to match everything in Accusim to the measured data, especially since the MUR105 diode model in Accusim is quite ideal. In this problem, we will concentrate on matching the peak capacitor current only. Vary Rs such that the peak capacitor current in Accusim matches the measured capacitor peak current in the lab to within a few mA. Once you have the value of Rs, do the following:

1. Give one plot of the schematic with Rs, C, Rl, 0.5 ohm resistor etc.

2. Plot the capacitor current over several cycles and label your charging and discharging times, the peak capacitor current and the load current.

   Give one plot and show two cycles of the capacitor current using the zoom feature and use the cursors to mark the peak current and the points showing the charging and discharging times. The ON time is defined whenever the current is greater than 0.5 mA – 1 mA.

3. Plot the output voltage over several cycles and determine the peak voltage and the ripple voltage.

   Give one plot showing two cycles of the output voltage. Mark the relevant points using cursors.

4. Plot the diode current and determine the peak diode current and the ON and OFF times of the diode.

   Give one plot showing the diode peak current and the on and off times. Mark the relevant points using cursors.
5. Plot the diode voltage and determine the diode turn–on voltage (forward bias voltage) and peak inverse voltage.

Give one plot showing the diode voltage with the turn–on voltage and peak inverse voltage marked using cursors.

6. Make a table with the various parameters of the diode bridge rectifier circuit: diode current, capacitor current, capacitor charging and discharging times, peak output voltage, output voltage ripple etc. with:

   a. Calculated values with Rs=0 as in your lab report problem #1.
   b. Values obtained from modeling the circuit in Accusim for the Rs you obtained.
   c. Measured values in the lab.

Compare these values when applicable and comment on any discrepancies.

You should submit 6 pages (5 plots and 1 table) for this assignment. Any CAD with more than 6 pages will be rejected.