ECE 3100

Fall 2023

PSpice Simulation Project

Due: Dec. 10, Sunday

You are asked to design a dual DC power supply of ±15.0 V. Totally 4 1N4002 diodes and a number of resistors and capacitors are available. A ferromagnetic core and isolated copper wires are available for transformer design and implementation. The DC power supply will be driven by the single-phase residential voltage of 120 V (rms) at 60 Hz.

   a) Draw the schematic of your designed circuit, including a transformer connection.
   b) Using hand calculations, design the step-down transformer turn ratia for the desired circuit specs.
   c) Properly choose the resistors and capacitors to implement a ripple voltage $V_r \leq 50$ mV.
   d) Simulate the entire system using PSpice – Student (LTSpice is also welcome!) Take screen shots to show the output DC voltages (including ripple voltages) satisfy the required. Compare the simulation results with your hand calculated estimates.

   Hints:
   1. *For transformer design, you can use inductors for the primary and secondary windings, along with the K-Linear coupler in PSpice to couple the inductors together, as I demonstrated in the class.*

$$\frac{v_p}{v_s} = \frac{n_p}{n_s} = \frac{L_p}{L_n}$$

   2. *In hand calculation, you may just use the 0.7 V constant voltage drop model for the diodes.*

Requirements and Submission:
   - This is an individual effort. Do it yourself.
   - Zip the documents showing all your calculations, and the simulation folder together, and upload to Moodle. Properly name each document (you will have more practices as such in the future.)