OBJECTIVES

Your goal is to simulate, design, build, and demonstrate a practical DC power supply that can be used as the power supply of various consumer electronic devices. Your power supply must meet or exceed the following specifications.

DESIGN SPECIFICATIONS

- Your power supply will have an on state indicator (LED)
- Input Voltage: 120V_{RMS} @ 60Hz
- Voltage Output: Two regulated outputs of 12V_{DC} and -12V_{DC}
- Load regulation: < 2%
  1. Assume 100Ω full load (You can connect multiple resistors in parallel so that no resistor dissipates more power than its maximum power limit)
  a. Instead of resistors in parallel, a "power resistor" may be used
  2. Note, GTA may set the load to 10Ω, to allow midterm project to support the load of the final project – 10W_{RMS} Amplifier
  3. An inductor may need to be inserted in design to meet ripple requirements
- Ripple: < 1%

DEMONSTRATION (60%)

You have to demonstrate that your circuit meets all the specifications to your GTA. Look over the grading criteria on the next page to see how the demonstration will be graded.

REPORT (40%)

Write a formal lab report that includes the following:
- Block diagram of major stages
- Circuit diagram
- Multisim simulation
- Circuit theory and operation
- Test results meeting the specifications
Midterm Project Grading Sheet

STUDENT’S NAME: ________________________________

SETUP (45%)
(student must have each item with circuit to show GTA during demonstration)

Schematic and hand calculations must contain:

___(2.5) Schematic
___(5) Ripple calculation, correctly determining size of filter capacitor
___(5) Load resistor calculation, accounting for individual power dissipation of resistor
___(2.5) Load regulation calculation
___(5) LED’s resistor size calculation
___(5) Current draw of each branch calculated, meets regulator spec
___(5) Power dissipation of all components after regulator calculated
___(2.5) Neatness
___(5) Multisim simulation with graphs
___(2.5) Proper calibration of oscilloscope (CH-1 on source voltage, CH-2 on output signal)
___(5) Student is able to explain operation of circuit

CIRCUIT DEMONSTRATION (55%)
(student is to perform all measurements – show to GTA)

___(5) LED indicator lights up
___(5) DMM measures 12V_{DC} across load
___(5) DMM measures -12V_{DC} across load
___(5) Proper output of voltage regulator on scope (12V_{DC} overlaid onto CH-1)
___(2.5) Ripple < 1%
___(2.5) Load Regulation < 2%
___(5) Proper Output of Filter Capacitor on Scope
___(5) Proper Output of Rectifier on Scope (May need to pull filter cap)
___(2.5) Proper Load Resistance = 100Ω (or 16Ω)
___(5) Power Dissipated by load = 1.44W (measure current to show) (or 9W)
___(5) Power dissipated by each load resistor below tolerance limit of resistor (require measurement of current to verify)
___(5) Current flowing in LED branch ~20mA
___(2.5) Voltage across LED < 3V

TOTAL: ______ (100)