Labs 1-3 Workbook Assignments
BMEN 2151 Introductory Medical Device Prototyping
Prof. Steven S. Saliterman

Name: _________________________________ ID: _____________________

Team #: _________ Session (Morning or Afternoon): _________________

The following are due on Thursday March 5, 2020 for the morning class, and Friday March 6, 2020 for the afternoon class. Place your parts and drawings in the part bag (provided to you with your name on it), and place it in the designated plastic bin near our cabinet in the MDC Brainstorming Room. Complete the answers to the lab questions.

Lab 1: Engineering Drawing, 3D Printing and Laser Cutting

Exercise 1.1:
Attach a picture of your SolidWorks Pressure Plate part. (Save as a JPEG, and print.)
Attach q printout of your Pressure Plate drawing (sheet 8.5 x 11).
Place your 3D FDM part in the part bag.

Exercise 1.2
Attach a picture of your SolidWorks Candlestick part.
Place your 3D FDM part in the part bag.

Exercise 1.3
Attach a picture of your SolidWorks Candlestick part.
Place your 3D FDM part in the part bag.

Exercise 1.4
Attach a picture of your SolidWorks Sheet Metal Box part.
Attach printout of your Sheet Metal Box drawing.

Exercise 1.5
Attach a picture of your finished part showing all blocks.
Were you able to demonstrate the mechanical motion? _________

Exercise 1.6
Place your MDF board and acrylic sheet laser cutting project in the part bag.

Exercise 1.7 (Optional)
Attach a picture of your dimensioned parts.
Lab 2: Machining

Place your *Drill & Tap*, *Lathe* and *Mill* parts in the part bag.

Lab 3: Analog Electronics

3.5.1 Series Resistance: _____________ ohms

3.5.2 Parallel Resistance: _____________ ohms

3.8.1 Measure the voltage across the Zener diode. _____________ VDC

3.8.2 What is the voltage across the resistor? _____________ VDC

3.8.3 If the load resistance were 1.5K ohms (in place of the meter), calculate the current through R1, the Zener diode and the load resistor.

__________________________________________________________________

__________________________________________________________________

3.9.1 What is the input voltage VRMS? ________________

3.9.2 What is the output voltage VDC? ________________

3.9.3 Is this the voltage that you expected? ________________

3.9.4 Try swapping a 22 microfarad capacitor for the 1000 microfarad capacitor.

What do you notice about the DC signal now?

__________________________________________________________________

3.10.1 Measure the output voltage __________

3.11.1 AC gain (show division) __________ / __________ = __________

3.12.1 Breadboard this circuit, and using your oscilloscope measure the voltage gain:

__________
3.13.1 Were you able to observe the above signals on your oscilloscope? _____
(Y/N)

3.14.1 Calculate and measure the following:
   Calculated duration of high voltage each cycle: ____________ ms
   Calculated duration of low voltage each cycle: ____________ ms
   Calculated frequency: ____________ Hz
   Calculated duty cycle: ____________

   Measured duration of high voltage each cycle: ____________ ms
   Measured duration of low voltage each cycle: ____________ ms
   Measured frequency: ____________ Hz
   Measured duty cycle: ____________