**SYSC 3203: Fall 2019**

**Lab 2 Report**

Submit this page to the lab instructor. You will have two lab sessions to complete this lab report.

Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Student ID:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Student ID:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**1: Patient Safety**

1.1: Given the fact that the circuits are powered by ±3V, what should be a minimum value for R1, R2, and R3 to ensure safe operation? Explain your calculations for R1, R2 and R3 and what happens if the resistor values are set too high.

**2: Common-Mode Driver**

2.1: The specification for this inverting amplifier is to have a DC gain of -91 and a cut-off frequency of around 160 Hz. Calculate values for R4, R5, R6, R7, and C1 to achieve this specification.

2.2: Sketch the circuit diagram for the common-mode driver.

2.3: Sketch a schematic for the common-mode driver, showing the chip layout for the OP97 op-amp and labeling all of its terminals. Please label the testing points for your circuit.

2.4: Show proper operation of the common-mode driver.

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2.5: Why do we have to limit the frequency response of the common mode driver to lower frequencies?

**3. Instrumentation Amplifier**

3.1: Calculate the value for R8 to achieve a gain of 10.

3.2: Sketch the circuit diagram for the instrumentation amplifier

3.3: Sketch the circuit schematic for the instrumentation amplifier, showing chip layouts for the OP97 op-amp and AD620A instrumentation amplifier and labeling all of their terminals. Please label the testing points.

3.4: Show the proper operation of the instrumentation amplifier circuit i.e. that the gain is +10.

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3.5: What are capacitors C2, C3, and C4 useful for? What kind of filter is produced by these components? What is the cut-off frequency?

**4. EMG signal**

4.1 Show the instructor where you plan to put the electrodes.

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4.2: Show your EMG signal to the instructor.

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4.3: Do you notice any other component on the output signal (DC, 60 Hz, etc.)? Explain where these components come from. Propose some ideas that could be implemented to remove them.