Lab 8 Prelab Grading Sheet

NAME: _____

The prelab is required in order to perform the lab. Complete this before attending the lab and show the completed materials to the TA at the beginning of your lab.

1. Use the examples and information provided in the background section of Lab 8 to design your own low pass, high pass, and cascaded bandpass filters for filtering your instrumentation amplifier. This filter will be used in the Lab to record ECG signal. The ECG signal should range between .5 – 180Hz and a raw signal is about 20mV in amplitude. Take into account the amount of gain your instrumentation amplifier is providing to the biosignal. Decide upon a gain for your low pass filter to cascade with the gain of your instrumentation amplifier. Another factor to keep in mind but not crucial at this point is DC isolation between each gain stage of the circuit.

2. Implement your filter designs into SPICE and print out the frequency response of your design. A circuit diagram with labeled component values and a bode plot are required for the low pass, high pass, and cascaded bandpass filters.

3. Run a SPICE simulation with your bandpass filter connected to your instrumentation amplifier from Lab7. Attach the bode plot.

Note: You will have access to a new OpAmp UA747. The chip contains two identical UA741 amplifiers. Use this IC to form your circuits. The data sheet can be found on the class website. The model for SPICE simulations of the OpAmp is given here.

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* UA741 OPERATIONAL AMPLIFIER "MACROMODEL" SUBCIRCUIT
* CONNECTIONS:   NON-INVERTING INPUT
*           | INVERTING INPUT
*           | | POSITIVE POWER SUPPLY
*           | | | NEGATIVE POWER SUPPLY
*           | | | | OUTPUT
*           | | | | |
.SUBCKT UA741    1 2 3 4 5
*
  C1   11 12 4.664E-12
  C2    6  7 20.00E-12
  DC    5 53 DX
  DE   54  5 DX
  DLP  90 91 DX
  DLN  92 90 DX
  DP    4  3 DX
  EGND 99  0 POLY(2) (3,0) (4,0) 0 .5 .5
  FB    7 99 POLY(5) VB VC VE VLP VLN 0 10.61E6 -10E6 10E6 10E6 -10E6
  GA 6  0 11 12 137.7E-6
  GCM 0  6 10 99 2.574E-9
  IEE  10  4 DC 10.16E-6
  HLIM 90  0 VLIM 1K
  Q1   11  2 13 QX
```

```
 Q2   12  1 14 QX
 R2    6  9 100.0E3
 RC1   3 11 7.957E3
 RC2   3 12 7.957E3
 RE1  13 10 2.740E3
 RE2  14 10 2.740E3
 REE  10 99 19.69E6
 RO1   8  5 150
 RO2   7 99 150
 RP    3  4 18.11E3
 VB    9  0 DC 0
 VC 3 53 DC 2.600
 VE   54  4 DC 2.600
 VLIM  7  8 DC 0
 VLP  91  0 DC 25
 VLN   0 92 DC 25
.MODEL DX D(IS=800.0E-18)
.MODEL QX NPN(IS=800.0E-18 BF=62.50)
.ENDS
```