**EEET-211 Special Project Assignment (counts as three quiz grades – none dropped)**

Audio amplifier design project due December 3, 2019.

Use 2N3904 NPN transistors to design an amplifier which will meet the following electrical specifications. Several (typically three) cascaded stages will be necessary.

Amplifier Specifications (at 1 kHz):

Zin = 47kΩ minimum

Zout = 4.7kΩ maximum

Overall voltage gain (no-load) |AVNL| = 1000 minimum

Output voltage swing capability: at least 5 V p-p without visible distortion

Power supply voltage available is VCC = 15 Volts DC.

**Deliverables** (for grading) as paper copies submitted by December 3, 2019:

All design calculations – neat and readable. Show how you arrived at your design and how you decided on the values of all components. Use complete sentences and equations as necessary and appropriate to convey this information.

Schematic diagram from Multisim, including reference designators and parts values. The DC voltages from a bias simulation should appear on the schematic. (This means do a DC bias simulation of all nodes, and then use 'Place Text' to enter the values right onto the schematic at each node.)

A Multisim plot of the input and output voltages when the input to the amplifier is an AC source at 1 kHz with a peak-to-peak amplitude of 5 mV\*. The output voltage should be a clean sine wave with no visible clipping or distortion. The output voltage amplitude should be clearly shown as being at least 5 V peak-to-peak, thereby proving that your gain is at least the required value of |1000|. \**Note that if your gain is greater than |1000| you may need to reduce the input voltage to less than 5 mV p-p to avoid clipping*.

Your Multisim file with your last name as the filename uploaded to the myCourses Dropbox.

**HELPFUL SUGGESTIONS** –

* Use these 2N3904 parameter values for your initial design calculations: β=150, VBE=0.7V, ro=50kΩ.
* The resistor values you choose should be standard values that can actually be bought. A list of standard values is available in Appendix C of the text book, or look at the values available in our labs.

**Student Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**Grading Sheet**

**EEET-211 Special Project Assignment (counts as three quiz grades – none dropped)**

Audio amplifier design project due December 3, 2019.

Use 2N3904 NPN transistors to design an amplifier, which will meet the following electrical specifications.

Specifications (at 1 kHz):

Zin = 47kΩ minimum (10 points)

Zout = 4.7kΩ maximum (10 points)

Voltage gain (no-load) |AVNL| = 1000 minimum (10 points)

Output voltage swing capability at least 5V p-p without visible distortion (10 points)

Deliverables (for grading) as paper copies:

All design calculations – neat and readable. (10 points)

Schematic diagram (from Multisim) including reference designators and part values. The DC voltages from a bias simulation should appear on the schematic. (20 points)

A Multisim plot of the input and output voltage waveforms of your completed amplifier design showing the output is at least 5 Vp-p with no higher than a 5 mV peak-to-peak input. This is to prove that your design has a minimum gain of 1000, **and** is capable of five V p-p output without distorting. (20 points)

Appearance and general impression of project assignment. (10 points)

**Total Grade**