Lab 7 Grading Standard:

1) *In grading, do not explicitly assign points to the various sections. Rather, take points off for incorrect, incomplete or missing items.*
2) *When you take point off, be sure to write a short comment as to why the points were lost.*
3) *Example: (-1) What is the measured value of the component?*
   (-3) What is the mathematical formula that you are plotting on top of your data?

General Notes:

- The axis of all plots must be labeled. This should include the quantity, the units and numerical values.
- The boxed questions should be answered in the lab book.
- Procedures must have a circuit diagram.
- Measured values of components used should be recorded in the lab book.
- Relevant formulas should be included in the lab book.
- Formulas for computed quantities in tables should be near the table in the book.

Failure to measure a component value when possible (max -1 per occurrence)
Missing units on components, plot axes, tables … (-1 per occurrence).
Missing plot (-4 per occurrence).
Missing axes labels on plots (-1 per label).
Missing column labels on tables (-1 per label).
Missing formula for computed quantity in table (-1 per table)--can be in column title
Missing important formulas (-2 per occurrence)
No fit to linear curves (-2 per occurrence).
No fit values with units (-2 per occurrence).
No comparison of fit values with expectations when possible (-2 per occurrence).
Missing theoretical calculations, including formulas (-3 per occurrence).
Failure to answer questions (-2 per question, maximum of -10)

Pre-lab Signature: 10

Purpose/Introduction 5

There should be a two to five line description of what they are going to do in this lab. This is all or nothing for five points.

DC Emitter Follower:

Procedure: 5

There should be a several line procedure that shows the circuit, indicates where they are going to measure voltages, what the measured values of the components are.

Preparation Work: 8
There should be several circuits and equivalent circuits showing the voltage divider, the emitter follower, and what they look like. There should also be an IV curve on which they need to sketch the expected IV curve of the voltage divider. It should have the correct Vth, IN and slope.

Data: 9
In this section they build the circuit and make a series of voltage measurements. They should indicate what is being measured and the measured voltage. In particular, they are asked to measure the output voltage of the voltage divider both before and after the emitter follower is attached. They should see very little sag with the follower on the circuit.

Analysis: 8
After this, they need to measure the IV curve for the output of the emitter follower and plot it on (hopefully) the same IV curves as above. What is the output impedance of the circuit? Is it as expected?

AC Emitter Follower:

Circuit Design: 10
They need to carry out a calculation to choose reasonable values for the components used in their circuit.

Procedure: 5
The procedure should include circuit diagrams, measured values of components and a description of what they are going to do.

Data: 10
For a 1000-Ohm resistor at 1kHz, how large a voltage can be followed?
There should be data for a Bode plot, which should include v(in), v(out) and frequency. They should also note if the phase deviates significantly from zero.
The do not need to take explicit phase data. Data should be collected for the 1000 Ohm resistor from 10 Hz to 3 MHz with at least 2 points per decade. Data for the 100 Ohm resistor can be more sparse, but if it starts to change, more data are needed.

There should be a computer-plotted Bode plot of their data. (2 Bode plots)

Analysis: 5
There should be some discussion and a measurement of a triangle of square wave. The measurement is probably only a sketch of the wave form.

Low Current Design: 10
They should discuss what needs to change in the circuit to go to a low current design. In principle, this is only RE. They then need to make a series of measurements to see if the

maximum voltage has changed, and if the frequency response has changed and comment on their observations.

Questions	10
Conclusion/Summary	5