

**INFORMATION ABOUT THE FINAL EXAM****Office Hours:**During RRR week:

The TA's will be holding regular office hours in the regular place (the Moore Room). In addition, the lab hours will become office hours, held in the lab (353 Cory).

Prof. Nguyen will be traveling over all days of RRR week except Friday, so cannot hold regular office hours, but will hold office hours on Friday, 5/6, 2:30-4:30 p.m., in 574 Cory.

During Finals week:

Office hours will be as follows:

Travis: Monday, 5/9, 11-12 a.m., Tuesday, 5/10, 9:30-10:30 a.m., in the Moore Room

Yang: Tuesday, 5/10, 2-4 p.m., in the Moore Room

Prof. Nguyen: Wednesday, 5/11, 10:30-12 noon, in 574 Cory

**Review Session:** (given by your TA's)

Monday, May 9, 8-10 p.m., in 521 Cory (i.e., the Hogan Room)

**Date of Exam:**

Thursday, May 12, 3-6 p.m. (sharp)

**Place:**

277 Cory Hall

**General Information:**

The exam will be closed book, but you will be allowed two sheets on which you can write anything you would like, front and back. Bring a calculator to the exam. You will be provided with exam sheets with enough space to put all your work on these sheets. You should show and include all your work on the exam sheets. (This insures that no pages are missed when we grade.) The exam will consist of a few problems, each with a number of parts.

During the exam, make appropriate engineering decisions and approximations in order to simplify your analyses so that you can do the problems quickly and with fewer errors. In other words, the use of inspection analysis (where applicable) is encouraged.

**Material to be Covered:**

Reading in Gray & Meyer, class lecture notes, handouts, and homeworks. The exam is meant to include all material covered so far in the class. You might pay more attention to the following areas:

1. Multiple transistor amplifier circuits, for both BJT and MOS transistors, including cascodes and cascades, either actively or passively loaded. Be able to determine bias points, gain, impedance, and frequency response.
2. Differential pair amplifiers, either actively or passively loaded, including such concepts as biasing, differential-mode gain, common-mode gain, CMRR, half-circuits, and various impedances.
3. Transistor current sources, including ability to determine output current, output resistance, and output swing for a circuit using a given (possibly unfamiliar) current source.
4. Basics of output stage design, including Class A and Class B designs.
5. Derivation of input offset voltages and currents for unfamiliar circuits.
6. Compensation design and techniques, including an understanding of feedback concepts (e.g., closed-loop gain, loop transmission, etc. ...), phase margin, gain margin, narrowbanding, and pole splitting.
7. Slew rate design, including techniques for maximizing slew rate in amplifiers.
8. Design of operational amplifier circuits, in either bipolar or MOS technology (or both), including biasing and all aspects of small-signal and large-signal performance. Be able to determine common-mode input range, power supply rejection ratio, common-mode rejection ratio, slew rate, phase margin, input offset voltage, as well as gain, frequency, and impedances. In addition, be prepared to design an op amp given a constraining set of specifications.
9. Analysis of general feedback circuits, including an understanding of feedback connection types, feedback loading, the four general amplifier types and their ideal characteristics, and biasing via feedback.

Needless to say, although this exam is centered upon the above concepts, you are also responsible for understanding the required prerequisite background, such as small-signal analysis, Bode plots, device models, etc. Work fast on the exam, making reasonable approximations as necessary to simply problems. (Remember, the ability to simplify a difficult problem is one of the keys to successful circuit analysis.)