EE 213
Basic Circuit Analysis II
Final Exam Info

The final exam is Monday 12/14. The final is closed book, but you can bring three pages (double sided) of notes and a calculator. Tables 14.3, 15.1-15.2, 18.1-18.2 will be provided with the exam together with the addition from the class notes. There is no relevant example midterm available, but the exam will be based on the homework. In general, you will need to show all your work: how to solve linear equation, how to do partial fraction expansion etc. Numerical computations (real or complex) need not be shown.

The exam is based on the textbook, the class notes on the web*, and the notes on filter design handed out in class.

The following summarizes what is covered by the final exam:

• Steady state sinusoidal analysis (9.1-9.7, 10.1-10.7)
  o Phasors
  o Nodal analysis, mesh analysis, Thevenin, superposition etc.
  o Solving complex linear equations with 2 unknowns.
• Power analysis (11.1-11.4)
• Op-Amps (5.1-5.7, 7.7, 8.8, 10.7)
  o Using the ideal model (only).
  o DC analysis, phasor analysis, Laplace analysis.
• Laplace transform (15.1-15.6, 16.1-16.3)
  o Analyzing Circuits in the Laplace domain
    ▪ Initial conditions.
    ▪ Nodal analysis, mesh analysis, Thevenin, superpostion etc.
    ▪ Solving linear equations (Cramer’s rule, substitution) with 2 unknowns.
  o Solving differential equations using Laplace transform
  o Transfer function and impulse response
    ▪ Differential equations and circuits.
  o Calculating and using Laplace transform
    ▪ Definition.
    ▪ Using properties.
  o Calculating inverse Laplace transform
    ▪ Partial fraction expansion.
    ▪ Residue calculus.
• Convolution (15.5)
  o Direct calculation or using Laplace.
  o Overlap.

• State space (16.5)
  o State variables: always capacity voltages and inductor currents.
  o Deriving state space equations.
  o Finding transfer function from state space equations.
  o Solving state space equations using Laplace transform.
• Stability (16.6)
  o Determine if the transfer function of a circuit is stable using the criterion from the class notes (the textbook is incorrect).
• Frequency response and Bode plots (14.1-14.4)
  o Understand basic behavior of magnitude from poles and zeros (table 14.3).
  o There will be no questions about phase.
  o Being able to propose a transfer function from a Bode sketch (i.e., example 14.6, practice problem 14.6).
  o You will not be asked to draw a Bode plot based on a transfer function.
• Active and Passive filters (14.7-14.8)
• Filter design (notes on filter design, Section 4.4)
  o Understand filter specifications.
  o Understand properties of Chebyshev and Bessel filters.
  o Being able to design a Butterworth lowpass filter from given filter specifications.
• Fourier transform (18.1-18.3)
  o Being able to calculate Fourier transform directly and using simple properties.
  o Relationship between Laplace and Fourier transform.