EE301 Exam 3 Topics – Test: Wed. April 30

Note: Be very careful if you are studying from files – my rule on tests is that you must answer the question on the test you are TAKING – not the one you studied from.

• Transients
  o Know how to determine parameters such as rise time, settling time, time to peak, percent overshoot, and the time constant from a graph.
  o Know what type of response is seen for a first order system and how to determine parameters such as the time constant, rise time and settling time from a graph.

• Filters
  o Low pass, high pass, bandpass, bandstop
    ▪ Know which frequencies are attenuated and which are not.
    ▪ Know the bode diagrams for each (magnitude only)
    ▪ Be able to differentiate between a leading and lagging signal

• Fourier Series and FFT
  o Know how to construct the frequency spectrum from a time domain signal (ask yourself, what frequencies are present in this signal)
  o Know the spectrums based on the Fourier Series Expansions for the square waveform, triangle waveform and sine waveform
  o Know when to expect a term at 0 Hertz in the FFT (DC offset).
  o Know what happened in the frequency domain when the duty cycle was decreased from 50% to 30% to 10%.
  o Know what would happen in the frequency domain if the duty cycle were decreased to an impulse function.

• Diodes and Transistors
  o Know how half-wave and full-wave rectifiers work with both LED’s and regular diodes.
  o Be able to do analysis on a simple ideal diode circuit. (HW/quiz)
  o Know the difference between the real diodes curves of LED’s and diodes.
  o Given a plot of $I_B$ and $I_C$, be able to identify when the transistor is in cut-off, active (amplifying) and saturation.
  o Know the transistor switch circuit (common emitter BJT – like the one in the lab with the motor) including the components and their function.

• Op Amps
  o Know how to calculate the output voltage for an inverting amplifier
  o Know how to calculate the output voltage for a summing amplifier (inverting).
  o How to find the output of an op-amp circuit (similar to HW problem, quiz)
  o Know when an op-amp saturates
  o Know what current can kill an op-amp.
  o Don’t forget how to sketch sinusoids – it would be a shame to lose points on this.

• Digital Logic
  o Know logic for NOT, OR, NOR, AND, NAND gates.
  o Know how to determine the output of multiple cascaded gates using a truth table.
  o Know applications for logic.