EE301 Exam 3 Topics – Test: Wed. Dec. 10

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

- **Diodes and Transistors**
  - Know how half-wave and full-wave rectifiers work with both LED’s and regular diodes.
  - Be able to do analysis on a simple ideal diode circuit. (HW/quiz)
  - Know the difference between the real diodes curves of LED’s and diodes.
  - Given a plot of $I_B$ and $I_C$, be able to identify when the transistor is in cut-off, active (amplifying) and saturation.
  - 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**
  - Know how to calculate the output voltage for an inverting amplifier
  - Know how to calculate the output voltage for a summing amplifier (inverting).
  - How to find the output of an op-amp circuit (similar to HW problem, quiz)
  - Know when an op-amp saturates
  - Know what current can kill an op-amp.
  - Don’t forget how to sketch sinusoids – it would be a shame to lose points on this.

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