ELEC2141 Digital Circuits Design

Final Exam Guide

T1 2020

Exam format

- Online exam – instructions like the midterm exam will be provided shortly
- 2 hours
- 4 questions – 25 marks each
- Similar to the midterm exam
- Topics covered
    i. Combinational circuits
    ii. Sequential circuits
    iii. HDL Verilog
    iv. Arithmetic circuits
    v. Digital integrated circuits
    vi. Computer design fundamentals

Combinational circuits

- Algebraic simplification
- Simplification by K-maps
- SOP, POS form
- NAND, NOR implementation
- Implementation using decoders/MUXs
- GIC

Sequential circuits

- State diagram
- Mealy, Moore state machines
- State table
- State minimisation
- Implementation via flip-flops (JK/D/T)

HDL Verilog

- Describe what code does
- Explain specific parts of the code
- From code to schematic
- Identify errors in code
- Add/modify lines of code

Arithmetic circuits

- Half and full adder
- Binary ripple carry and carry lookahead adders
- 1’s and 2’s complement
- Unsigned and signed binary addition and subtraction
- Overflow and status flags

Digital integrated circuit

- BJT logic families – understand how they operate
- Fan-out, power dissipation, propagation delay, noise margin, cost
- CMOS implementation of logic functions

Computer design fundamentals

- Registers
- Shifters – serial, parallel , bi-directional
- Datapaths
- Arithmetic Logic Unit
- Logic/Shifter Unit
- Datapath representation