C262 Digital Systems
Fall 2012
Study Guide (Exam 2)

In order to do well on this exam, you should be able to do the following:

VHDL

1. Identify the three main sections of a VHDL file.
2. Write an ENTITY section based on Boolean expression or a circuit diagram.
3. Understand how concurrent statements (BOOLEAN, WHEN-ELSE, WITH-SELECT, GENERATE) are used to implement a Boolean expression or a circuit diagram.
4. Understand how concurrent statements (BOOLEAN, WHEN-ELSE, WITH-SELECT) are used to implement an arithmetic logical unit (ALU).
5. Understand how concurrent statements (BOOLEAN, WHEN-ELSE, WITH-SELECT) are used to implement a multiplexer.
6. Understand how concurrent statements (BOOLEAN, WHEN-ELSE, WITH-SELECT) are used to implement a decoder.
7. Understand how concurrent statements (BOOLEAN, WHEN-ELSE, WITH-SELECT) are used to implement an encoder.

Flip Flops

8. Develop state tables and state diagrams for SR, DFF, JKFF and TFF.
9. Recognize symbols of DFF, JKFF, TFF with clock, PRE and CLR signals.
10. Identify if a signal is active low or active high.
11. Identify the frequency, period, duty cycle of a signal.
12. Draw timing diagrams for SR, DFF, JKFF, and TFF (with or without PRE and CLR signals).
13. Develop a state tables and a state diagrams for SR, DFF, JKFF, and TFF

Analysis of Sequential Systems

14. Determine the Boolean expressions to the inputs of the flip flops (DFF, JKFF, or TFF) from a circuit diagram.
15. Determine if a circuit diagram is a Moore model or a Mealy model circuit.
16. Develop a state table and a state diagram from a Moore or a Mealy circuit.
17. Draw a timing diagram for a Moore or a Mealy circuit.

Design of Sequential Systems

18. Design and implement a sequential system using D or JK flip flops. Specifically, you should be able to:
    a. Develop a state diagram (Moore or Mealy) form the problem description.
    b. Encode the inputs, outputs, and states if necessary.
    c. Derive a state table (Moore or Mealy).
    d. Derive next state equations (to the inputs of the DFFs).
    e. Derive next state equations (to the inputs of the JKFFs) using conventional (long) method.
    f. Derive next state equations (to the inputs of the JKFFs) using simplified (short) method.
    g. Derive output equations.
    h. Draw a circuit diagram for the designed sequential system.
19. Compare and contrast design techniques using DFFs or JKFFs.