Final Exam Study Guide – Computer Organization and Design (Session 002,004,006,008)

Exam Information

Course: Computer Organization and Design
Chapters Covered: 2, 3, 4, 5 + Appendix A
Exam Format: (multiple choice（30 points）, Ture/False(30 points), calculations and short answer (40 points), bonus(20 points)
Date & Time: May 1st 2025, 10:45-12:45, in classroom, on paper test.

You can take one cheat-sheet (can be two sides),

print Test_CSC_3210_Appendix, this is the table and algorithms you may use in the test, you can add one page of table or algorithm if you want.

(Remember your session number before you take the exam, we have two TAs in the classroom; submit your test paper to the TA according to the session number)

Chapter 2: Instructions – Language of the Computer

2.5 Representing Instructions:
- RISC-V instruction formats
- Instruction binary encoding

2.7 Making Decisions:
- Conditional branches: beq, bne
- slt, slti instructions

2.8 Supporting Procedures in Hardware:
- jal, jalr instructions and stack usage

2.11 Synchronization:
- Parallelism, fence, lr/sc instructions

2.12 Translating Programs:

- Linkers, loaders, static vs dynamic linking

Appendix A: Basics of Logic Design

- Gates and Truth Tables, and Boolean Algebra
- Combinational Logic: multiplexers, adders

-ROMs
- Sequential (state)Logic

Chapter 3: Arithmetic for Computers

3.1–3.2 Addition and Subtraction:
- 2's complement, overflow detection

3.3 Multiplication:
- multiplication algorithm

3.4 Division:
- division algorithm

3.5 Floating Point:
- IEEE 754, normalized, special values (NaN, ±∞), Multiplication

Chapter 4: The Processor

4.1–4.4 Datapath and Control:
- ALU, registers, control signals, execution cycle

4.6–4.7 Pipelining:
- 5 stages (IF, ID, EX, MEM, WB)
- Pipeline registers

4.8 Data Hazards:
- Forwarding, stalling, load-use

4.10 Exceptions:
- Interrupts and exceptions

Chapter 5: Memory Hierarchy

5.1 Introduction:
- Locality (temporal/spatial), memory hierarchy
5.2 Memory Technologies:
- SRAM, DRAM, Flash, cache/memory/disk comparison

Study Tips

- Review lecture slides and notes
- Practice encoding/decoding instructions
- Understand datapath and control signal flow
- Memorize pipeline stages and hazards
- Know floating-point binary format
- Solve previous quizzes and assignments