Must do it for Assembly

From Digital Logic and Design

Basic Number Systems and Conversions

- Binary, Decimal, Octal, Hexadecimal
- Binary to decimal and vice versa
- 1's and 2's complement

Logic Gates and Boolean Algebra

- AND, OR, NOT, NAND, NOR, XOR, XNOR
- Boolean expressions and simplification
- DeMorgan's Laws

Combinational Circuits

- Adders (Half Adder, Full Adder)
- Multiplexers, Demultiplexers
- Encoders, Decoders

Sequential Circuits

- Flip-flops (SR, D, T, JK)
- Registers and Counters
- Synchronous vs. Asynchronous circuits

Memory Basics

- SRAM vs DRAM
- ROM, PROM, EPROM, EEPROM
- Memory hierarchy

From Computer Architecture

Basic Computer Organization

- CPU, memory, input/output devices
- Von Neumann architecture

Instruction Set Architecture (ISA)

- RISC vs. CISC
- Instruction formats and types (arithmetic, logical, control, memory)

Processor and ALU Design

- Control Unit vs. ALU
- Datapath design
- Instruction cycle (fetch-decode-execute)

Memory and Caching

- Cache types (L1, L2, L3)
- Cache mapping (direct, associative, set-associative)
- Cache hit/miss, write policies

Addressing Modes

- Immediate, direct, indirect, indexed
- Effective address calculation

Pipelining Concepts

- Pipeline stages (IF, ID, EX, MEM, WB)
- Hazards: structural, data, control
- Forwarding and hazard resolution

Bus and I/O Basics

- System bus (data, address, control lines)
- I/O mapping and memory-mapped I/O
- Interrupts and polling