

## COMPUTER HARDWARE

Digital Logic: Logic functions, Minimization, Design and synthesis of Combinational and Sequential circuits -- Number representation and Computer Arithmetic (fixed and floating point)

Computer Organization: Machine instructions and addressing modes, ALU and Data-path, hardwired and micro-programmed control, Memory interface, I/O interface (Interrupt and DMA mode), Serial communication interface, Instruction pipelining, Cache, main and secondary storage.

## SOFTWARE SYSTEMS

Data structures: Notion of abstract data types, Stack, Queue, List, Set, String, Tree, Binary search tree, Heap, Graph -- Programming Methodology: C programming, Program control (iteration, recursion, Functions), Scope, Binding, Parameter passing, Elementary concepts of Object oriented, Functional and Logic Programming --

Algorithms for problem solving: Tree and graph traversals, Connected components, Spanning trees, Shortest paths -- Hashing, Sorting, Searching -- Design techniques (Greedy, Dynamic Programming, Divide-and-conquer) -- Compiler Design: Lexical analysis, Parsing, Syntax directed translation, Runtime environment, Code generation, Linking (static and dynamic) --

Operating Systems: Classical concepts (concurrency, synchronization, deadlock), Processes, threads and Inter-process communication, CPU scheduling, Memory management, File systems, I/O systems, Protection and security.

Databases: Relational model (ER-model, relational algebra, tuple calculus), Database design (integrity constraints, normal forms), Query languages (SQL), File structures (sequential files, indexing, B+ trees), Transactions and concurrency control --

Computer Networks: ISO/OSI stack, sliding window protocol, LAN Technologies (Ethernet, Token ring), TCP/UDP, IP, Basic concepts of switches, gateways, and routers.