

School of Electrical Sciences (Computer Science and Engineering)

Q-Exam subject & Syllabus

Subject Name: C Programming and Data Structure

Syllabus: Programming in C. Recursion. Arrays, stacks, queues, linked lists, trees, binary search trees, binary heaps, graphs.

Reference Books:

1. Gottfried, "*Schaum's Programming with C*," Tata McGraw-Hill.
2. Kanetkar, "*Let us C*," BPB Publications.

Subject Name: Design & Analysis of Algorithms

Syllabus: Searching, sorting, hashing. Asymptotic worst case time and space complexity. Algorithm design techniques: greedy, dynamic programming and divide-and-conquer. Graph traversals, minimum spanning trees, shortest paths

Reference Books:

1. Thomas H. Cormen, Charles E. Leiserson, R.L. Rivest. *Introduction to Algorithms*, Prentice Hall of India Publications, 3rd Edition 2015.
2. J. Kleinberg and E. Tardos. *Algorithm Design*, Pearson 2006

Subject Name: Formal Languages and Automata Theory

Syllabus: Regular expressions and finite automata. Context-free grammars and push-down automata. Regular and context-free languages, pumping lemma. Turing machines and undecidability.

Reference Books:

1. Michael Sipser: *Introduction to the Theory of Computation*, 3rd edition, PWS Publishing Company, 2012.
2. E. Hopcroft, R. Motwani and J. D. Ullman: *Introduction to Automata Theory, Languages and Computation*. Low priced paperback edition, published by Pearson Education, 2007.

Subject Name: Computer Organization and Architecture

Syllabus: Machine instructions and addressing modes. ALU, data-path and control unit. Instruction pipelining, pipeline hazards. Memory hierarchy: cache, main memory and secondary storage; I/O interface (interrupt and DMA mode).

Reference Books:

1. *Computer Organization and Architecture – Designing for Performance* by W Stallings – Pearson.
2. *Computer Organization and Design – The Hardware/Software Interface (ARM Edition)* by D A Patterson and J L Hennessy – Morgan Kaufmann.

Subject Name: Operating Systems

Syllabus: System calls, processes, threads, inter-process communication, concurrency and synchronization. Deadlock. CPU and I/O scheduling. Memory management and virtual memory. File systems.

Reference Books:

1. A. Silberschatz, P. B. Galvin and G. Gagne, “*Operating System Principles*,” John Wiley & Sons.
2. Stallings, “*Operating Systems– Internals & Design Principles*,” Pearson Education.

Subject Name: Computer Networks

Syllabus: Concept of layering: OSI and TCP/IP Protocol Stacks; Basics of packet, circuit and virtual circuit-switching; Data link layer: framing, error detection, Medium Access Control, Ethernet bridging; Routing protocols: shortest path, flooding, distance vector and link state routing; Fragmentation and IP addressing, IPv4, CIDR notation, Basics of IP support protocols (ARP, DHCP, ICMP), Network Address Translation (NAT); Transport layer: flow control and congestion control, UDP, TCP, sockets; Application layer protocols: DNS, SMTP, HTTP, FTP, Email.

Reference Books:

1. W. Stallings. *Data and Computer Communications*, 7th Edition, Prentice Hall, 2004.
2. A. S. Tanenbaum. *Computer Networks*, 3rd Edition, Prentice Hall PTR, 1996.