Department of Computer Sciences

University of Kashmir

Entrance Examination Syllabus for M. Tech Degree Programme

Unit 1 [4 Marks]

Verbal Ability: English grammar, sentence completion, verbal analogies, word groups, instructions, critical reasoning and verbal deduction.

Unit 2 [4 Marks]

Numerical Ability: Numerical computation, numerical estimation, numerical reasoning and data interpretation.

Unit 3 [4 Marks]

Discrete Mathematics: Propositional and first order logic. Sets, relations, functions, partial orders and lattices. Groups. Graphs: connectivity, matching, coloring. Combinatorics: counting, recurrence relations, generating functions.

Unit 4

Linear Algebra: [4 Marks]

Matrices, determinants, system of linear equations, eigenvalues and eigenvectors, LU decomposition.

Unit 5

Calculus: [4 Marks]

Limits, continuity and differentiability. Maxima and minima. Mean value theorem. Integration.

Unit 6

Probability: [4 Marks]

Random variables. Uniform, normal, exponential, poisson and binomial distributions. Mean, median, mode and standard deviation. Conditional probability and Bayes theorem.

Unit 7

Digital Logic : [4 Marks]

Boolean algebra. Combinational and sequential circuits. Minimization. Number representations and computer arithmetic (fixed and floating point).

Unit 8

Computer Organization and Architecture: [4 Marks]

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

Unit 9

Programming and Data Structures **[4 Marks]**

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

Unit 10

Algorithms : **[4 Marks]**

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

Unit 11

Theory of Computation : **[4 Marks]**

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

Unit12

Compiler Design: **[4 Marks]**

Lexical analysis, parsing, syntax-directed translation. Runtime environments. Intermediate code generation.

Unit 13

Operating System : **[4 Marks]**

Processes, threads, inter-process communication, concurrency and synchronization. Deadlock. CPU scheduling. Memory management and virtual memory. File systems.

Unit 14

Databases : **[4 Marks]**

ER-model. Relational model: relational algebra, tuple calculus, SQL. Integrity constraints, normal forms. File organization, indexing (e.g., B and B+ trees). Transactions and concurrency control.

Unit 15

Computer Networks: **[4 Marks]**

Concept of layering. LAN technologies (Ethernet). Flow and error control techniques, switching. IPv4/IPv6, routers and routing algorithms (distance vector, link state). TCP/UDP and sockets, congestion control. Application layer protocols (DNS, SMTP, POP, FTP, HTTP). Basics of Wi-Fi. Network security: authentication, basics of public key and private key cryptography, digital signatures and certificates, firewalls.