Department of Computer Science and Engineering
SGGSWU, Fatehgarh Sahib- 140406

Syllabus for Ph.D Entrance (Computer Science and Engineering)

Paper -II

ENGINEERING MATHEMATICS

Set Theory & Algebra*:* Sets; Relations; Functions; Groups; Partial Orders; Lattice; Boolean Algebra.

Combinatory*:* Permutations; Combinations; Counting; Summation; generating functions; recurrence relations; asymptotics.

Graph Theory*:* Connectivity; spanning trees; Cut vertices & edges; covering; matching; independent sets; Colouring; Planarity; Isomorphism.

Linear Algebra*:* Algebra of matrices, determinants, systems of linear equations, Eigen values and Eigen vectors.

Numerical Methods*:* LU decomposition for systems of linear equations; numerical solutions of non-linear algebraic equations by Secant, Bisection and Newton-Raphson Methods.

COMPUTER SCIENCE AND ENGINEERING

Computer Organization and Architecture: Machine instructions and addressing modes, ALU and data-path, CPU control design, Memory interface, I/O interface (Interrupt and DMA mode), Cache and main memory, Secondary storage.

Programming and Data Structures: Programming in C; Functions, Recursion, Parameter passing, Scope, Binding; Abstract data types, Arrays, Stacks, Queues, Linked Lists, Trees, Binary search trees, Binary heaps.

Algorithms: Analysis, Asymptotic notation, Notions of space and time complexity, Worst and average case analysis; Design: Greedy approach, Dynamic programming, Divide-and-conquer; Tree and graph

Operating System: Processes, Threads, Inter-process communication, Concurrency, Synchronization, Deadlock, CPU scheduling, Memory management and virtual memory, File systems, I/O systems, Protection and security.

Databases: ER-model, Relational model (relational algebra, tuple calculus), Database design (integrity constraints, normal forms), Query languages (SQL).

Software Engineering: information gathering, requirement and feasibility analysis, data flow diagrams, process specifications, input/output design, process life cycle, planning and managing the project, design, coding, testing, implementation, maintenance.

Computer Networks: ISO/OSI, TCP, LAN technologies (Ethernet, Token ring), Flow and error control techniques, Routing algorithms, Congestion control, Application layer protocols (icmp, dns, smtp, pop, ftp, http); Basic concepts of hubs, switches, gateways, and routers.

Network Security: Basic Concepts Of Public Key And Private Key Cryptography, Digital Signature, Firewalls.