DPGU

Dnyaan Prasad Global University

Dr. D. Y. Patil Unitech Society

Syllabus for PET Examination - PhD (Computer Science and Engineering)

Subject Specific

- **Engineering Mathematics-**
  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. Linear Algebra: Matrices, determinants, systems of linear equations, eigenvalues and eigenvectors, LU decomposition. Calculus: Limits, continuity, and differentiability. Maxima and minima. Mean value theorem. Integration. Probability: Random variables. Uniform, normal, exponential, poisson and binomial distributions. Mean, median, mode, and standard deviation. Conditional probability and Bayes theorem. Computer Science and Information Technology

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

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

- **Programming and Data Structures-**
  Programming in C. Recursion. Arrays, stacks, queues, linked lists, trees, binary search trees, binary heaps, graphs.

- **Algorithms-**
  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.

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

- **Operating System**
  Processes, threads, interprocess communication, concurrency and synchronization. Deadlock. CPU scheduling. Memory management and virtual memory. File systems.

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

- **Computer Networks**
  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.