DAV UNIVERSITY, JALANDHAR
PhD Entrance Test Syllabus
DEPARTMENT OF COMPUTER SCIENCE AND APPLICATION
Section A (50 questions)

Research Methodology

Scientific Research: Nature and Objectives of research; Methods of research: historical, descriptive and experimental. Study and formulation of research problem. Scope of research and formulation of hypothesis; Feasibility, preparation and presentation of research proposal.

Statistical Analysis: Introduction to statistical analysis: Measures of central tendency and dispersion; mean, median, mode, range, mean deviation and standard deviation. Regression and Correlation Analysis.

Random Variables and Probability Distribution: Probability and probability distributions; Binomial, Poisson, Geometric, Negative binomial, Uniform, Exponential, Normal and Log-normal distribution.

Test of Hypothesis: Basic ideas of testing of hypothesis; Tests of significance based on normal, t and Chi-square distributions. Analysis of variance technique.

Design of Experiments: basic principles, study of completely randomized and randomized block designs. Introduction to Thesis report writing

Presentation: Edition and tabulation of results, presentation of results using figures, tables and text, quoting of references and preparing bibliography.

Section B (50 questions)

Computer Science and Applications

Programming Languages: Programming in C; Functions, Recursion, Parameter passing, Scope, Binding, Classes concepts, File handling, Basic Java Concepts, AWT, Swing, Java Database connectivity, Java RMI, Socket Programming, Introduction to C# programming, ADO.Net Architecture, Introduction to ASP.NET Architecture.

Data Structure and Algorithms: Advanced Sorting Methods, Algorithm Design Paradigms, Complexity of Algorithm, Depth-first and Breadth-first Algorithms, Kinetic Data Structures, Asymptotic notation, Worst and average case analysis; Design: Greedy approach, Dynamic programming, Divide-and conquer; Tree and graph traversals, Connected components, Spanning trees, Shortest paths; Hashing, Sorting, Searching. Asymptotic analysis (best, worst, average cases) of time and space, upper and lower bounds, Basic concepts of complexity classes P, NP, NP-hard, NP-complete.

Theory of Computation: Regular languages and finite automata, Context free languages and Push-down automata, Recursively enumerable sets and Turing machines.

Compiler Design: Lexical analysis, Parsing, Syntax directed translation, Runtime environments, Intermediate and target code generation, Basics of code optimization.

Digital Image Processing: Image Acquisition, Spatial Domain, Frequency Domain, Filters, Image Compression, Restoration, Segmentation, Morphing, Wavelets and Multi-resolution Processing, Object Recognition, Pattern Recognition.

Soft Computing: Genetic Algorithms, Fuzzy Logic, Artificial Neural Network, Supervised and Unsupervised learning.

DAV UNIVERSITY, JALANDHAR

PhD Entrance Test Syllabus

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), File structures (sequential files, indexing, B and B+ trees), Transactions and concurrency control.

Data Mining and Data Warehousing: Concept of Data Mining, Data Warehousing Architecture, Data Mart, OLAP and OLTP Systems.

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 stack, LAN technologies (Ethernet, Token ring), Flow and error control techniques, Routing algorithms, Congestion control, TCP/UDP and sockets, IP(v4), 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.

Computer Graphics: Elementary Drawing Algorithms, Geometric Transformations, Viewing Transformations, Three-dimensional concepts, Hidden line/surface Removal, Surface Rendering techniques.

Web technologies: HTML, XML, basic concepts of client-server computing.

Numerical Methods: Iterative Methods, Solution of simultaneous Linear equation Numeric Differentiation and Integration, Numerical Solution of Ordinary Differential equations, Finite Differences, Numerical Integration, Numerical Solutions of Linear and Non-Linear Algebraic Equations.