

Syllabus of Ph. D. (COMPUTER SCIENCE & INFORMATION TECHNOLOGY)

Entrance Test

Computer Organization and Architecture: Representations of integers, K-MAP, Machine instructions and addressing modes, ALU and data-path, CPU control design, Memory interface, I/O interface (Interrupt and DMA mode), Instruction pipelining, Cache and main memory, Addressing modes, Architectural classification schemes, multiprocessors.

Programming languages: Programming in C: elements of C-Tokens, identifiers, data types in C. Control structure in C. sequence, selection & iteration(s), structure, union, string, and pointers. C++ Programming: Functions parameter passing, Class and objects, Constructors and destructors, Overloading, inheritance, templates, exception handling, Pointers, Virtual Function Late binding, Friend function, Friend class, Overview of JAVA.

Data Structures: simple and composite structure, Recursion, Parameter passing, Scope, Binding; Abstract data types, Arrays, Stacks, Queues, Linked Lists, Trees, Binary search trees, Binary heaps, Graph theory, Tree and graph traversals, Connected components, Spanning trees, Shortest paths; Hashing, Sorting, Searching.

Theory of Computation: Regular languages and finite automata, DFA, NFA Context free languages and Push-down automata, Recursively enumerable sets and Turing machines, Undesirability. LR parser, construction of SLR and canonical LR parser table, using ambiguous grammar, An automatic parser the generator, YACC, Using YACC with ambiguous grammar, creating YACC lexical analyzer with LEX, Error recovery in YACC, Chomsky hierarchy of languages, CFG.

Operating System: Processes, Threads, Inter-process communication, Concurrency, Synchronization, Deadlock, CPU scheduling, Belady's anomaly, 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.

Computer Networks: ISO/OSI stack, LAN technologies (Ethernet, Token ring), Modulation techniques, Flow and error control techniques (error correcting & detecting, CRC), Routing algorithms, Congestion control, TCP/UDP and sockets, IP (v4), hubs, switches, gateways, and routers. Aloha, S-Aloha Protocols, Network security - basic concepts of public key and private key cryptography, digital signature, firewalls, B-ISDN, ATM.

Mobile communication: Introduction, Cellular system infrastructure, Registration, Handoff Parameters and Underlying support, Roaming Support Using Backbone to Mobile IP, Functions of Mobile IP, Registration, Tunneling, Dynamic Host configuration protocol, Introduction, Characteristics and Applications of Mobile Adhoc Network (MANET) Routing, Routing Classification.

Parallel Computing: Parallelism and its types, classification scheme, Multiprocessor and Micro Computer, Memory Module, Pipelining, collision, RISC, CISC, Calculation of MAL, Multidimensional Array, Dependence Analysis.

Data Warehousing and Data Mining : What is data mining?, Data Mining: On what kind of data?. Data mining functionality, Are all the patterns interesting?, Classification of data mining systems, What is a data warehouse?, A multi-dimensional data model, Data warehouse architecture, Data warehouse implementation, Further development of data cube technology, From data warehousing to data mining. Concept of Transaction, Transactional database, Distributed Database, Commit Protocols.

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Pt. Ravishankar Shukla University, Raipur

Course work for Ph.D. in Computer Science

Sr. No	Paper	Name of Papers
1.	Paper-I	Research Methodology, Communication System and Parallel Computing
2.	Paper-II	Review of Research Paper.

Research Methodology, Communication System and Parallel Computing

Unit- I

Research Methodology and Measurement– Introduction, meaning, motivation, approaches, research proposal, research ethics, research problem, research design, sampling design. Measurement in research, sources of errors, error calculation and handling with examples. Uncertainty analysis, Hypothesis, Performance Metrics and evaluation with examples.

Unit- II

Communication System- Wired and Unwired Networks, Modulation and Multiplexing, OSI and TCP/IP Models, Switches and Switching, ATM, Network Security. Protocols like Aloha, S-Aloha etc. Header Formats. Interconnection Networks.

Unit- III

Parallel Computing- Types of Parallelism, Classification Schemes, Multiprocessor and Multicomputer, Memory Models and Organizations, Cache Coherence, Pipelining, MAL calculation, Hazard and Collision, Dependence Analysis, Data Flow and Vector Computers, DAG, Multi threading, Case Studies.

Unit- IV

Study and Implementation of Algorithms- Complexity, Routing and Congestion Control algorithms, Parallel Algorithms for sorting, matrix handling etc. Table Driven, Source Initiated on Demand and Hybrid Protocols, Code Optimization.

Unit- V

Modelling and Simulation- Introduction to Modelling, Queuing Analysis, Mathematical Modelling of Communication System, Monte-Carlo Simulation Technique, Simulation of Communication System through C Language, Study of different Simulators. Environment setup and Trace File generation in Network Simulator.

Recommended books –

1. System Simulation with Digital Computer by N.Deo, IIT Kanpur, PHI.
2. Computer Architecture & Parallel Processing by Kai Hwang and F.A. Briggs-Mc Graw Hill.
3. Research Methodology C.R. Kothari, New Age international Publishers
4. Advanced Computer Architecture By Kai Hwang –Mc Graw Hill.
5. Parallel Computing Theory and practice by Michael J. Quinn –Tata Mc-Graw Hill.
6. Computer Network by A.S. Tanenbaum, Pearson Education.
7. Data Communications and Networking by B.A. Forouzan, TMH.

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