Ph.D. Entrance Test Syllabus for Computer Science

COMPUTER FUNDAMENTALS

Type of Computer, Types of Memory, I/O Devices, Language translator (Assembler, Interpreter, Compiler) , Basic logic gates (AND, OR, NOT), Combinational and sequential logic design.

COMPUTER ARCHITECTURE & ORGANIZATION

Combinational Circuit: adder, subtractor, decoder, MUX etc. Sequential Circuit: Flip-flops, Registers, Counters, Machine Instructions and Addressing Modes, ALU & Data path, Memory interface, I/O Interface, Instruction pipeline, Cache, Main and secondary storage.

COMPUTER NETWORKS

ISO/OSI stack, LAN technologies, Flow and error control techniques, IPV4, IPV6, TCP/UDP, Routing algorithms, Congestion control, Application layer protocols, Basic concepts of Switches, Bridges, Gateway & Routers, Basic concepts of Network security: Public and private key cryptography, Firewall, Digital signature etc.

OPERATING SYSTEM

Process, Thread, Inter process Communication, CPU Scheduling, Concurrency control, synchronization, Deadlock, Memory management and Virtual Memory, File system, I/O System Protection and Security.

DATA STRUCTURES

Overview of Programming in C/C++, Recursion, Parameter Passing, Scope, Binding, Array , Stacks, Queues, Link list, Searching & Sorting Techniques ,Lists and their Applications, Trees: Binary Tree, Properties & Representation, ADT Binary Tree, Binary search Trees, AVL Trees & Applications, Graphs: Representations & Properties, Directed and Undirected graphs, Graph search methods, Path finding Algorithms, Asymptotic notations ,Greedy, Dynamic Approach, Branch and Bound techniques.

THEORY OF COMPUTATION AND COMPILER DESIGN

Regular Language and Finite Automata, Context free Grammar, Context sensitive Grammar, push down automata, Turing Machine, Undecidabilty, Lexical Analyzer, Parsing Syntax, Direct translation, Runtime environment, Immediate and Target code generation, Code optimization.

DATABASE MANAGEMENT SYSTEM

Basic concept, ER model, Relationship Model, Relational algebra, Tuple Calculus, Data Base design, Integrity constraint, Normal Forms, Query languages (SQL), File structure, Concurrency Control and Transactions.

Programming in C and C++

Programming in C: Element of C-Tokens, Identifiers, Data types in C, Control structure in C, Sequence selection and iteration, Structured data types in C-arrays, struct, union, string and pointers. O-O Programming concepts: Classes, Object, installation, Inheritance, Polymorphism and overloading. C++ Programming: Element of C++ Tokens, identifiers, Variable and constants, Data types, Operators, Control Statements, Functions parameter passing, Class and objects, Constructors and destructors, overloading inheritance, Templates, Exception handling, File Handling.