

Syllabus for Ph.D. (Computer Science) Entrance Exam Paper -II	
UNIT-1	Theory of Computing
<p>Growth of Functions, Divide-and-Conquer, Probabilistic Analysis and Randomized Algorithms, Heap sort, Quicksort, Sorting in Linear Time, Hash Tables, Binary Search Trees, Red-Black Trees, Dynamic Programming, Greedy Algorithms, B-Trees, Elementary Graph Algorithms, Minimum Spanning Trees, Single-Source Shortest Paths, All-Pairs Shortest Paths, Maximum Flow, Multithreaded Algorithms, Linear Programming, String-matching, NP-Completeness, Finite Automata and Regular Expressions, Properties of Regular Sets, Context Free Grammars, Push down Automata, Properties of Context Free Languages, Turing Machines, Undesirability, Chomsky Hierarchy.</p>	
UNIT-2	Operating System
<p>Introduction to Operating System, Operating-System Structures, Process Management: Processes, Threads, CPU Scheduling, Process Synchronization, Deadlocks, Memory Management: Main Memory, Virtual Memory, And Storage Management: File-System Interface, File-System Implementation, Mass-Storage Structure, I/O Systems, Protection And Security: Protection, Security, Distributed Systems: Distributed System Structures, Distributed File Systems, Distributed Coordination, Special-Purpose Systems: Real-Time Systems, Multimedia Systems, General Overview of the System, Introduction To The Kernel, the Buffer Cache, Internal Representation of Files, System Calls For the Filesystem, the Structure of Processes, Process Control, Process Scheduling and Time, Memory Management Policies, the I/O Subsystem, Interposes Communication, Multiprocessor Systems, Distributed UNIX Systems.</p>	
UNIT-3	Database Systems
<p>Overview of Database Systems, Introduction to Database Design, the Relational Model, Relational Algebra and Calculus, SQL: Queries, Constraints, Triggers, Database Application Development, Internet Applications, Overview of Storage and Indexing, Storing Data: Disks and Files, TreeStructured Indexing, Hash-Based Indexing, Overview Of Query Evaluation, External Sorting, Evaluating Relational Operators, A Typical Relational Query Optimizer, Overview of Transaction Management, Concurrency Control, Crash Recovery, Schema Refinement and Normal Forms, Physical Database Design and Tuning, Security and Authorization, Parallel and Distributed Databases, Object-Database Systems, Deductive Databases, Data Warehousing and Decision Support, Data Mining, Information Retrieval and XML Data, Spatial Data Management.</p>	
UNIT-4	Programming Languages
<p>Overview of the main programming paradigms: imperative vs declarative, structured, object-oriented, concurrent, functional, Structured, imperative programming in C, Syntax, type system, control flow, build/debugging tools, Dynamic memory allocation, pointers, Introduction to Object Oriented programming C++, java, high performance computing, systems/kernel programming, Principles of Design Patterns</p>	
UNIT-5	Artificial Intelligence
<p>Artificial Intelligence , Intelligent Agents- agent, environment, intelligent agents, types of agents, nature and properties of environment, Representations and Mappings, Approaches to Knowledge Representation, Knowledge representation methods, Propositional Logic, rules of inference, Predicate logic, Representing Simple facts in Logic, Resolution, Forward and backward chaining, Game Playing-</p>	

adversarial search, types of games, zero sum game, game tree, Minimax Search algorithm, alpha-beta pruning, Reasoning in AI Artificial neural network- components of ANN, ANN architectures, activation functions, Perceptron learning-Supervised and Unsupervised learning applications of ANN, advantages and disadvantages of ANN

Genetic Algorithm- History and evolution of G.A, Modeling a problem for the application of G.A.— Representation of data in chromosomes, Fitness function, reproduction and convergence, Applications of G.A., advantages of GA, Comparison of ANN and GA

Digital image processing, Image enhancement, Image Restoration and Morphological image processing, Image Segmentation and Object recognition

References:

1. Elaine Rich, Kevin Knight, & Shivashankar B Nair, Artificial Intelligence, McGraw Hill, 3rd ed., 2009
2. Introduction To The Theory Of Computation - Michael Sipser
3. Operating System Concepts, Abraham Silberschatz Peter B. Galvin and Greg Gagne, Wiley, 2016.
4. Digital image processing: Gonzalez and Woods PHI 2. Image Processing
5. Concepts of Programming Languages, Robert W. Sebesta
6. Java, The Complete Reference, Herbert Schildt
7. Database System Concept, Henry F. Korth, Abraham Silberschatz