SYLLABUS FOR PH.D ENTRANCE EXAMINATION IN INFORMATICS/ COMPUTER SCIENCE

1. Programming and Data Structures:

Problem solving steps, Algorithm, flowchart, C++ Programming Language: Program structure, data types, Control Statements, Functions, Structures, union and files, pointers in C++, Simple and abstract data types, Inheritance and Aggregation, Exceptional Handling . **Data structures:** stacks, queues, linked list, Trees balanced trees, Graphs. Advanced Sorting Concepts - Insertion Sorts, Selection Sorts Exchange Sorts - External Sorts. Algorithm Design Techniques Greedy Algorithms ,Divide and Conquer, Dynamic Programming - Ordering Matrix Multiplications - Backtracking Algorithms

2. Computer Organization and Architecture:

Logic Circuit , Basic structure of Computer , Hardware and Software Functional units, Basic operational concepts, Bus structures, Addressing Methods Processing Methods ,Execution of a Complete Instruction, Hardwired Control, Performance Considerations, Micro Programmed Control, Input output Organization, Interrupts, Processor Examples, Direct Memory Access, I/O Hardware, Standard I/O Interfaces, The Motorola 680X0 Family, The Intel MEMORY-Semiconductor, RAM, ROM, Cache Memories, Performance Considerations, Virtual Memory, Memory Management.

3. Computer Networks:

Evolution of Data Communication and Networks, Transmission fundamentals, signals, media, encoding and modulation, switching techniques Internetworks, OSI Model, Interfaces and modems, multiplexing, Error Detection and Correction, ISDN, networking and Internet Working Devices, Routing Algorithms, TCP/IP, UDP, Encryption/decryption, Authentication, Data Compression. Confidentiality using conventional Encryption, Traffic Confidentiality, Random Number Generation. Cryptography: Principles of Public-Key Cryptosystems, the RSA Algorithm, DiffieHellman Key Exchange, Elliptic Curve Cryptography, Message authentication Functions.

4. Operating Systems:

Process, CPU scheduling, Process synchronization, deadlocks, memory management, file system interface I/o systems Distributed systems communication, synchronization, deadlocks, file systems , shared memory Unix Utilities, Unix Internals, Unix process, Threads and signals and Inter Process Communication.

5. Data Base Management Systems.

File systems, data models, Relational algebra and calculus, Query optimization and evaluation, Database design, Concurrency control and recovery, Storing and Indexing, Distributed data base design, Distributed Transaction Management, Reliability.

6. Software Engineering:

Generic View of Process, Process models, Software requirement engineering, system engineering, Design Engineering, Object-oriented Design, user interface design, software configuration management, Testing Strategies and methods, clean room software design.

7. Data Warehousing and Data Mining

Data Mining Functionalities, Data Mining Task primitives, Integration of a Data Mining System, Major issues in Data Mining, Data preprocessing, Data Warehouse, A Multidimensional Data Model, Data Warehouse Architecture, data Warehouse Implementation, Efficient and scalable Frequent Item set Mining methods, Mining various kinds of Association Rules, from Association Mining to Correlation analysis, constraint-Based Association mining. classification and Prediction, issues regarding Classification and Prediction, Classification by Decision Tree Induction, Bayesian Classification, Rule-Based Classification, Classification by Back propagation, Associative Classification. Cluster analysis, types of data in cluster analysis, major clustering methods, Partitioning methods, Hierarchical methods, Density Based methods, Grid Based methods, Model-Based Clustering methods, clustering high-dimensional data, constraint-based cluster analysis, Outlier analysis.

PH.D ENTRANCE EXAMINATION
Department of Computer Science
Model Question paper
(Question will be covered from all units of prescribe syllabus)

Note: Question paper contains 100 questions and each question carries one mark

1. The order of an internal node in a B+ tree index is the maximum number of children it can have. Suppose that a child pointer takes 6 bytes, the search field value takes 14 bytes, and the block size is 512 bytes. What is the order of the internal node?

   A) 24   B) 25   C) 26   D) 27

   Answer : (C)

2. The Boolean function x, y, + xy + x, y

   A) x, + y,   B) x + y   C) x + y,   D) x, + y

   Answer : (D)

3. Consider the following C function:
   ```c
   int f (int n)
   { static int i = 1;
   if (n >= 5) return n;
   n = n + i;
   i ++;
   return f (n);
   }
   ```
   The value returned by f(1) is

   A) 5   B) 6   C) 7   D) 8

   Answer : (C)

4. The minimum number of page frames that must be allocated to a running process in a virtual memory environment is determined by

   A) the instruction set architecture
   B) page size
   C) physical memory size
   D) number of processes in memory

   Answer : (D)

approved
20/5/22