

# Syllabus for Computer Applications

## **Data Structures and Algorithms**

stacks, queues, linked lists, Searching, sorting, hashing. Asymptotic worst case time and space complexity, trees, binary search trees, binary heaps, graphs. Algorithm design techniques: greedy, dynamic programming and divide-and-conquer. Graph traversals, minimum spanning trees, shortest paths.

**Object Oriented Programming:** Constructors, Abstract Classes, Packages and Interfaces, Multithreaded Programming.

## **Databases**

ER-model. Relational model: relational algebra, SQL. Integrity constraints, normal forms. File organization, indexing (e.g., B and B+ trees). Transactions and concurrency control, serializability.

## **Operating System**

System calls, processes, threads, inter-process communication, concurrency and synchronization. Deadlock. CPU and I/O scheduling. Memory management and virtual memory. File systems. virtualization concepts.

## **Computer Networks**

Concept of layering: OSI and TCP/IP Protocol Stacks; Data link layer: framing, error detection, Medium Access Control, Ethernet bridging; Routing protocols: shortest path, flooding, distance vector and link state routing; Fragmentation and IP addressing, IPv4, Basics of IP support protocols (ARP, DHCP, ICMP); Transport layer: flow control and congestion control, UDP, TCP, sockets; Application layer protocols: DNS, SMTP, HTTP, FTP, Email.

## **Software Engineering**

Perspective and Specialized Process Models, Software Requirements engineering, Architectural Design -Architectural styles, Architectural Design, Architectural Mapping using Data Flow- User Interface Design. Software testing types, Estimation – LOC, FP Based Estimation, COCOMO I & II Model – Software Configuration Management.

## **Compiler Design**

Lexical analysis, parsing, syntax-directed translation. Runtime environments. Intermediate code generation. Local optimization, Data flow analyses: constant propagation, liveness analysis, common subexpression elimination.

## **Advanced technologies**

Cloud computing: Service models, deployment models, cloud service providers; Big Data: Apache Hadoop and map reduce, distributed data processing; Blockchain: Hash Function, Merkle tree, crypto currency, smart contracts; Machine learning: supervised, unsupervised & reinforcement learning.