



INFORMATION TECHNOLOGY
ENGINEERING

IT ENGINEERING SEM III

DATA STRUCTURE AND

ANALYSIS

Programming & development

Course Curriculum



DATA STRUCTURE AND ANALYSIS SEM III

Module 1 : Introduction to Stacks, Queues and Linked Lists

- Introduction to Data Structures
 - Linear and Non Linear Data Structures
 - Static and Dynamic Data Structures
- Concept of Stack and Queue
 - Array Implementation of Stack and Queue
 - Circular Queue
 - Double Ended Queue
 - Priority Queue
- Concept of Linked Lists
 - Singly linked lists
 - doubly linked lists and circular linked lists
 - Insertion, deletion, update and copying operations with Singly linked lists
 - doubly linked lists and circular linked lists
 - Reversing a singly linked list
- Linked List Implementation of Stack
- Linked List implementation of Queue
- Circular Queue
- Double Ended Queue
- Priority Queue

Module 2: Trees

- Introduction to Trees
 - Terminology
 - Types of Binary trees
- Non recursive Preorder
- in-order and post-order traversal
- Creation of binary trees from the traversal of binary trees
- Binary search tree
 - Traversal, searching, insertion and deletion in binary search tree
- Threaded Binary Tree
 - Finding in-order successor and predecessor of a node in threaded tree
 - Insertion and deletion in threaded binary tree



- AVL Tree
 - Searching and traversing in AVL trees
- Tree Rotations
 - Right Rotation, Left Rotation. Insertion and Deletion in an AVL Tree
- B-tree
 - Searching, Insertion, Deletion from leaf node and non-leaf node
- B+ Tree, Digital Search Tree, Game Tree & Decision Tree
- Implementation of AVL and B+ Tree

Module 3: Graphs

- Introduction to Graphs
 - Undirected Graph
 - Directed Graph
 - graph terminology
 - Connectivity in Undirected and Directed Graphs
 - Spanning tree
- Representation of graph
 - adjacency matrix
 - adjacency list
 - Transitive closure of a directed graph and path matrix
- Traversals
 - Breadth First Search
 - Depth First Search
 - Implementation of BFS, DFS

Module 4: Recursion and Storage Management

- Recursion
 - Writing a recursive function
 - Flow of control in recursive functions
 - Winding and unwinding phase
 - Recursive data structures
 - Implementation of recursion
 - Tail recursion
 - Indirect and Direct Recursion
- Storage Management
 - Sequential Fit Methods
 - First Fit



- Best Fit and Worst Fit methods
 - Fragmentation
 - Freeing Memory
 - Boundary Tag Method
 - Buddy Systems
 - Binary Buddy System
 - Fibonacci Buddy System
 - Compaction
 - Garbage Collection
- Implementation of recursion function

Module 5: Searching and Sorting

- Searching
 - Sequential Search
 - Binary Search
- Hashing
 - Hash Functions
 - Truncation
 - Mid-square Method
 - Folding Method
 - Division Method
- Collision Resolution
 - Open Addressing
 - Linear Probing
 - Quadratic Probing
 - Double Hashing
 - Separate Chaining Bucket Hashing
- Analysis of all searching techniques
- Sorting
 - Insertion sort
 - Selection sort
 - Merge sort
 - Quick sort and Radix sort
 - Analysis of all sorting techniques
- Implementation of different sorting techniques and searching

Module 6: Applications of Data Structures



- Applications of Linked Lists
 - Addition of 2 Polynomials and Multiplication of 2 polynomials
- Applications of Stacks
 - Reversal of a String
 - Checking validity of an expression containing nested parenthesis
 - Function calls
- Polish Notation
 - Introduction to infix
 - prefix and postfix expressions and their evaluation and conversions
- Application of Queues
 - Scheduling
 - Round Robin Scheduling
- Applications of Trees
 - Huffman Tree and Heap Sort
- Applications of Graphs
 - Dijkstra's Algorithm
- Minimum Spanning Tree
 - Prim's Algorithm
 - Kruskal's Algorithm
- Implementation of applications for Stack, Queues, Linked List, Trees and Graph

