

2/4 B.Tech FIRST SEMESTER

IT3T3

**DATA STRUCTURES
(Common to CSE/IT/ECM)**

Credits: 4

Lecture: 4 Periods/week

Internal assessment: 30 marks

Tutorial: 1 Period /week

Semester end examination: 70 marks

Objectives:

- To allow to assess how the choice of data structures and algorithm design methods impacts the performance of programs
- To choose the appropriate data structure and algorithm design method for a specified application.
- To learn the systematic way of solving problems, various methods of organizing large amounts of data.
- To solve problems using data structures such as linear lists, stacks, queues, binary trees, binary search trees, and graphs and writing programs for these solutions.
- To efficiently implement the different data structures and solutions for specific problems.

Outcomes:

Students will be able to

- Understand the usage of various data structures.
- Understand the operations for maintaining common data structures.
- Write programs using linked structures such as List, trees, and graphs.
- Analyze algorithms and to determine algorithm correctness and time efficiency class.
- Design and apply appropriate data structures for solving computing problems.
- Demonstrate various methods of organizing large amounts of data.
- Implement different sorting techniques.

Syllabus:

UNIT I

INTRODUCTION:

Algorithm specification Introduction, Recursive algorithms, Data Abstraction, Performance Analysis Space complexity, time complexity, asymptotic notation.

UNIT II

STACKS AND QUEUES:

Stacks, stacks using dynamic arrays, queues, circular queues using dynamic arrays, Evaluation of an Expressions, evaluating postfix expression, infix to postfix.

UNIT III

LINKED LISTS:

Single linked lists, Representing chains, operations for chains, operations for circularly linked lists, doubly linked lists

UNIT IV

ADVANCED LINKED LISTS:

Polynomials Representation, adding polynomials, sparse matrix representation, linked stacks and queues.

UNIT V

TREES:

Introduction Terminology, representation of trees, binary trees abstract data type, Properties of binary trees, binary tree representation, binary tree traversals Inorder, preorder, postorder

UNIT VI

ADVANCED TREES:

Binary search trees Definition, searching BST, insert into BST, delete from a BST, Height of a BST, AVL Trees

UNIT VII

GRAPHS:

The Graph ADT Introduction, definition, graph representation, elementary graph operations BFS, DFS, Spanning trees, minimum cost spanning tree Prim's, Kruskal's.

UNIT VIII

SORTINGS:

Insertion sort, quick sort, merge sort, heap sort, radix sort

Text Book:

1. Fundamental of Data Structures in C – 2nd Edition, Horowitz, Sahani, Anderson-Freed, University Press.

Reference Books:

1. Data Structures and Algorithm Analysis in C – 2nd Edition, Mark Allen Weiss, Pearson
2. Classic Data Structures – 2nd Edition, Debasis Samantha, PHI