

## 2/4 B.Tech - FIRST SEMESTER

**IT3T2****CLASSIC DATA STRUCTURES****Credits: 3****Lecture: 3 Periods/week****Internal assessment: 30 marks****Practice/Interaction: 1Period/week****Semester end examination: 70 marks****Objectives:**

- To assess the choice of data structures and algorithm design methods on the performance of programs.
- To focus on various linear data structures and algorithms.
- To learn the systematic way of solving problems through non linear data structures.
- To efficiently exercise different data structures for specific problems.

**Outcomes:**

Students will be able to

- Analyze algorithm efficiency in terms of time and space complexity.
- Implement different sorting and searching techniques.
- Write programs using liner data structures such as stack, queues and list.
- Write programs using nonlinear data structures such as trees, and graphs.

**Prerequisites:**

C programming language, Discrete Mathematics

**Syllabus:****UNIT- I**

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

Sorting and Searching: Searching; Linear and Binary, Sorting; Bubble, Insertion, Selection, Merge, Quick, Radix

**UNIT- II**

Linked list: Single linked lists, Representing chains, operations for chains, operations for circularly linked lists, doubly linked lists, Polynomials Representation, adding polynomials, sparse matrix representation.

**UNIT -III**

STACKS AND QUEUES: Stacks, stacks using dynamic arrays, queues, circular queues using dynamic arrays, evaluation of Expressions, evaluating postfix expression, infix to postfix, linked stacks and queues.

**UNIT -IV**

Trees: Introduction Terminology, representation of trees, binary trees abstract data type, Properties of binary trees, binary tree representation, binary tree traversals In order, preorder, post order, Binary search trees Definition, searching BST, insert into BST, delete from a BST, Height of a BST.

**UNIT- V**

Graphs: The Graph ADT Introduction, definition, graph representation, elementary graph operations BFS, DFS

**Text Book:**

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

**Reference Books:**

1. Data Structures – Revised First Edition, Seymour Lipschutz, Schaum's Outlines Series, Tata Mc. Graw Hill Edition.
2. Data Structures and Algorithm Analysis in C – 2<sup>nd</sup> Edition, Mark Allen Weiss, Pearson
3. Classic Data Structures – 2<sup>nd</sup> Edition, Debasis Samantha, PHI.

**e-Learning Resources:**

1. <http://cse.iitkgp.ac.in/pds/>
2. <http://cmpe.emu.edu.tr/bayram/courses/231/LectureNotesSlides/IQBAL/Lecture%20Notes%20Data%20Structures%20CSC-214.pdf>