

**VISHNU INSTITUTE OF TECHNOLOGY:: BHIMAVARAM**

**(AUTONOMOUS)**

**Approved by AICTE, Accredited by NAAC-A++, NBA & Affiliated to JNTUK, Kakinada**

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| **Year/Semester** | **II B. Tech/ I Sem** | **L** | **T** | **P** | **C** |
| **Regulation Year** | **2020-21** | **3** | **0** | **-** | **3** |
| **Subject** | **DATA STRUCTURES** | | | | |
| **Branch** | **CSE, IT , AI & DS** | | | | |

**Course Objectives**:

* Understand and apply algorithm analysis for various searching and soring techniques
* Understand the concept of linked lists and be use it in various applications
* Be able to use Stacks and Queues in various applications
* Understand the concept of Trees & Graphs and perform various operations on it
* Understand the concept of Hashing & different types of Hashing Techniques

**UNIT I:**

Algorithms, Performance analysis- time complexity and space complexity, Asymptotic Notation-Big Oh, Omega and Theta notations, Complexity Analysis Examples. Searching and Sorting: Linear and binary search methods. Bubble sort, Insertion sort, Selection Sort, Radix Sort, Comparison of sorting methods.

**UNIT II:**

Data structures-Linear and nonlinear data structures, Linear List, Array representation, Linked representation, singly linked lists -insertion, deletion, search operations, doubly linked lists-insertion, deletion operations, circularLinked lists-insertion, deletion operations, Applications of Linked Lists – Polynomial Representation, Sparse Matrix Representation

**UNIT III:**

Stacks - Representation of Stacks using arrays and linked lists, Applications of stacks -Expression evaluation - Infix to Postfix Conversion, Evaluating Postfix Expressions, Reversing the list

Queues – Representation of Queues using arrays and linked lists, Applications of Queues, Circular queue, Double Ended Queue -insertion, and deletion.

**UNIT IV:**

Trees- Terminology, Properties of Binary trees, Binary tree representations, recursive and non-recursive binary tree traversals, Priority Queues, Heaps-Max Heap, Min Heap.

Search trees- Binary search tree, Operations of Binary Search Trees - insertion, deletion and search, balanced search trees, AVL trees - Definition, operations.

**UNIT V:**

Graphs- Introduction, Definition, Graph Representation, Elementary Graph Operations – Vertex Insertion, Vertex Deletion, Edge Insertion, Edge Deletion etc, Graph Traversals

Hashing: Definition, Hash table, Hash function, Collision, Collision Resolution Techniques-Chaining and Open Addressing.

**TEXT BOOKS:**

1. Fundamentals of Computer Algorithms, Ellis Horowitz, Sartaj Sahni, Sanguthevar Rajasekaran
2. Data Structures, Using C, Second Edition, ReemaThareja, OXFORD Higher Education. .

**REFERENCE BOOKS:**

1. Introduction to Algorithms, Third Edition, Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, Clifford Stien.
2. Data structures and Algorithm Analysis using C, Mark Allen Weiss, Pearson Education. Ltd., Second Edition.
3. Data structures using C and C++, Langsam, Augenstein and Tanenbaum, PHI

**Course Outcomes**:

By the end of the course, the students should be able to:

* Use various searching and sorting techniques, and analyze the complexity of various algorithms
* Perform various operations on Linked Lists, and use them in various applications
* Perform various operations on Stacks and Queues, and use them in various applications
* Perform various operations on Trees and Graphs, and use them in various applications
* Understand different types of Hashing Techniques