



MARRI LAXMAN REDDY INSTITUTE OF TECHNOLOGY AND MANAGEMENT

(AN AUTONOMOUS INSTITUTION)

(Approved by AICTE, New Delhi & Affiliated to JNTUH, Hyderabad)

Accredited by NAAC with 'A' Grade & Recognized Under Section 2(f) & 12(B) of the UGC act, 1956

COURSE CONTENT

DATA STRUCTURES								
III Semester: CE / CSD / CSE / CSM / ECE / EEE / ME								
Course Code	Category	Hours / Week			Credits	Maximum Marks		
2430507	Engineering Science	L	T	P	C	CIA	SEE	Total
		3	0	0	3	40	60	100
Contact Classes: 45	Tutorial Classes: Nil	Practical Classes: Nil			Total Classes: 45			
Prerequisites: Problem Solving using C and C++								

Course Overview:

Data structures are the fundamental building blocks of computer programming. They define how data is organized, stored, and manipulated within a program. Understanding data structures is very important for developing efficient and effective algorithms. In this Course, student will explore the most commonly used data structures, including **linked lists, stacks, queues, trees, and Hashing**.

Course Objectives:

The students will try to learn

- Various linear and non-linear data structures.
- How to perform operations on data structures.
- Priority Queues and Heaps
- Various searching and sorting techniques.
- Different hashing techniques

Course Outcomes: After completion of the Course, students should be able to

- Implement linear data structures such as singly, doubly, and circular linked lists and apply them for solving real-world problems.
- Design stack and queue data structures using arrays and linked lists, and apply them in practical applications such as expression evaluation and scheduling.
- Construct and manipulate tree-based data structures including binary trees, binary search trees, AVL trees, B-trees, and heaps, and apply them in searching and priority queue applications.
- Apply appropriate searching and sorting algorithms, analyze their time and space complexities, and select suitable techniques for different problem scenarios.
- Design efficient hashing techniques using suitable hash functions and collision resolution strategies to optimize data retrieval and storage operations.

Module -I: Linked Lists

[9]

Introduction to Data Structures, Linear list – singly linked list, Doubly linked list, Circular linked list - operations and its applications.

Module-II: Stack and Queue

[8]

Stacks- Introduction, Operations, array and linked representations of stacks, stack applications (Infix to postfix conversion and postfix evaluation),

Queues- Introduction, operations, array and linked representations of queues and its applications.

Module-III: Trees**[10]**

Trees: General Trees, Binary Trees, Implementing Trees, Tree traversals

Search Trees: Binary Search Trees, Balanced search trees- AVL trees, B- trees

Priority Queue and Heaps: Priority queue ADT, Priority queue, Applications, Heap Trees, implementing a priority queue with a Heap, Heap Sort.

Module-IV: Searching and Sorting**[9]**

Searching: Linear Search and Binary Search and its applications.

Sorting: Bubble sort, Selection sort, Insertion sort, Merge sort, Quick sort and its applications.

Module – V: Hashing**[8]**

Introduction, Hash Functions-Modulo, Middle of Square, Folding, Collision Resolution Techniques- Separate Chaining, Open addressing,- Linear Probing, Quadratic Probing, Double Hashing.

TEXTBOOKS:

1. Fundamentals of data structures in C, E.Horowitz, S.Sahni and Susan Anderson Freed, 2nd Edition, Universities Press.
2. Data structures using C, A.S.Tanenbaum, Y. Langsam, and M.J. Augenstein, PHI/pearson education.

REFERENCES:

1. Data structures: A Pseudocode Approach with C, R.F.Gilberg And B.A.Forouzan, 2nd Edition, Cengage Learning.
2. Introduction to data structures in C, Ashok Kamthane, 1st Edition, PEARSON.

ELECTRONIC RESOURCES:

1. <https://www.geeksforgeeks.org/data-structures/>
2. <https://www.studytonight.com/data-structures/>
3. <https://erudix.com/topic/data-structures>
4. <https://hackr.io/tutorial/data-structures-tutorial>
5. <https://www.edx.org/learn/data-structures>
6. <https://www.coursera.org/learn/data-structures>

MATERIALS ONLINE:

1. Course template
2. Tutorial question bank
3. Tech talk and Concept Video topics
4. Open-ended experiments
5. Definitions and terminology
6. Assignments
7. Model question paper – I
8. Model question paper – II
9. Lecture notes
10. E-Learning Readiness Videos