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

EMPOWERING THROUGH INNOVATIONS
MLRS

COURSE CONTENT

DATA STRUCTURES LAB

III Semester: CSD / CSE / CSM / ECE / EEE

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
2530574	Core	0	0	2	1	40	60	100
Contact Classes: Nil	Tutorial Classes: Nil	Practical Classes: 30			Total Classes: 30			
Prerequisites: Programming for Problem Solving Lab								

Course Overview:

This Data Structures Laboratory provides hands-on experience in implementing linear and non-linear data structures using structured programming. Students learn to perform core operations on linked lists, stacks, queues, trees, graphs, and hashing techniques. The course emphasizes algorithm design, traversal methods, sorting techniques, and performance analysis through practical experiments.

Course Objectives: Students will 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

1. Design and implement linear data structures including singly, doubly, and circular linked lists with standard operations using functions.

2. Implement stack and queue data structures using arrays and abstract data type models demonstrating proper data access mechanisms.

3. Apply advanced sorting algorithms such as radix, heap, shell, and tree sort for organizing data efficiently.

4. Construct and traverse tree and graph data structures using recursive and non-recursive techniques across various balanced and multiway trees.

5. Develop hashing techniques using multiple hash functions and collision-handling strategies for efficient data storage and retrieval.

List of Experiments

1. Write a program that uses functions to perform the following operations on singly linked list.:
   i) Creation   ii) Insertion   iii) Deletion   iv) Traversal

2. Write a program that uses functions to perform the following operations on doubly linked list.:
   i) Creation   ii) Insertion   iii) Deletion   iv) Traversal

3. Write a program that uses functions to perform the following operations on circular linked list.:
   i) Creation   ii) Insertion   iii) Deletion   iv) Traversal

4. Write a program that implement stack (its operations) using
   i) Arrays   ii) ADT

5. Write a program that implement Queue (its operations) using

i) Arrays   ii) ADT

6. Write a program that implements the following sorting methods to sort a given list of integers in ascending order

i) Radix Sort, ii) Heap sort, iii) Shell Sort, iv) Tree Sort

7. Write a program to implement the tree traversal methods (Recursive and Non-Recursive).

8. Write a program to implement

i) Binary Search tree   ii) B Trees   iii) B+ Trees   iv) AVL trees   v) Red - Black trees

9. Write a program to implement the graph traversal methods.

10. Write a program to implement the following Hash Functions: i) Division Method, ii) Multiplication Method, iii) Mid-square Method, iv) Folding Method

TEXT BOOKS:

1. Fundamentals of Data Structures , 2nd Edition, E. Horowitz, S. Sahni and Susan Anderson Freed, Universities Press.
2. Data Structures – A. S. Tanenbaum, Y. Langsam, and M. J. Augenstein, PHI/Pearson Education.

REFERENCE BOOKS:

1. Data Structures: A Pseudocode Approach with C, 2nd Edition, R. F. Gilberg and B. A. Forouzan, Cengage Learning.

ELECTRONIC RESOURCES:

1. https://ds1-iiith.vlabs.ac.in/exp/linked-list/singly-linked-list/sllpractice.html
2. https://ds1-iiith.vlabs.ac.in/exp/linked-list/doubly-linked-list/dllpractice.html
3. https://ds1-iiith.vlabs.ac.in/exp/stacks-queues/stacks/stackarrays.html
4. https://ds1-iiith.vlabs.ac.in/exp/stacks-queues/queues/queuesarrays.html
5. https://ds1-iiith.vlabs.ac.in/exp/tree-traversal/depth-first-traversal/dft-practice.html

MATERIALS ONLINE:

1. Lab Manual
2. Open-ended experiments