DEPARTMENT OF INFORMATION TECHNOLOGY & COMPUTER ENGINEERING

LESSON PLAN

SUBJECT: DATA STRUCTURE

BRANCH: 5TH SEM, IT

FACULTY NAME: DR. ANITARANI BRAHMA

LEARNING OUTCOMES:

After completion of the course, the students will be able to:

- Define the basic terminologies and classifications of data structures.
- Explain the representation and operations of linear data structures like stacks, queues, and linked lists.
- Implement algorithms for sorting and searching using appropriate data structures.
- Analyze the time and space complexity of data structure operations and algorithm paradigms like dynamic programming and backtracking.
- Design solutions using advanced data structures for real-world applications, such as shortest path problems or flow-based algorithms.

SUBJECT NAME: DATA STRUCTURE
SUBJECT CODE: TH 3
FACULTY NAME: DR ANITARANI BRAHMA
HOUR: 45 HR (WEEKLY LOAD 3HR)

Sl. No.	Lecture No.	Topic	Subtopic	Methodology to be followed
1	1	Introduction to Data Structures	Basic Terminology	Lecture + PPT
2	2	Introduction to Data Structures	Classification of Data Structures	Lecture + Examples
3	3	Introduction to Data Structures	Operations on Data Structures	Lecture + Board Work
4	4	Introduction to Data Structures	Asymptotic Analysis	Lecture + Chart + Examples
5	5	Introduction to Data Structures	Worst-case Analysis	Board Explanation + Numerical
6	6	Introduction to Data Structures	Complexity Comparison	Group Activity + MCQs
7	7	Stacks	Introduction and Array Representation	Lecture + Demo
8	8	Stacks	Operations on a Stack	Board + Coding Practice
9	9	Stacks	Applications: Infix to Postfix	Problem Solving
10	10	Stacks	Postfix Evaluation	Practical + Discussion
11	11	Queues	Introduction and Array Representation	Lecture + PPT
12	12	Queues	Operations on a Queue	Demonstration + Hands-on
13	13	Queues	Circular Queue	Practical + Board Explanation
14	14	Queues	DeQueue	Code Practice + Examples
15	15	Queues	Applications: Round Robin Algorithm	Case Study
16	16	Linked Lists	Singly Linked List and Memory Representation	Lecture + Diagrams
17	17	Linked Lists	Operations on Singly Linked List	Code + Hands-on
18	18	Linked Lists	Circular Linked List	Lecture + Demo
19	19	Linked Lists	Doubly Linked List	Whiteboard + Coding
20	20	Linked Lists	Linked List Stack Operations	Lab + Assignment
21	21	Linked Lists	Linked List Queue Operations	Lab + Problem Solving
22	22	Trees	Terminologies and Concepts	Lecture + Diagram
23	23	Trees	Binary Tree Representation (Array & Linked)	PPT + Whiteboard
24	24	Trees	Binary Tree Operations	Code + Explanation
25	25	Trees	Types of Binary Trees	Discussion + Visuals
26	26	Graphs	Terminologies	Lecture + Notes
27	27	Graphs	Representations (Set, Linked, Matrix)	Examples + Diagrams

28	28	Graphs	Graph Traversals (BFS & DFS)	Board Work + Practice
29	29	Algorithm Paradigms	Greedy	Lecture + Case Study
30	30	Algorithm Paradigms	Divide and Conquer	Problem Solving
31	31	Algorithm Paradigms	Branch and Bound	Illustration + Examples
32	32	Algorithm Paradigms	Dynamic Programming	Lecture + Board Work
33	33	Algorithm Paradigms	Backtracking	Demo + Coding
34	34	Sorting	Bubble, Selection, Insertion Sort	Lab + Comparison Chart
35	35	Sorting	Merge Sort	Coding + Dry Run
36	36	Sorting	Quick Sort	Step-by-step Coding
37	37	Searching	Binary Search Trees	Lecture + Implementation
38	38	Searching	Balanced Search Trees	PPT + Diagrams
39	39	Searching	Hash Tables	Examples + Use Cases
40	40	Graphs	Directed and Undirected Graphs	Lecture + Examples
41	41	Graphs	Paths, Cycles, Spanning Trees	Diagram + Explanation
42	42	Graphs	Directed Acyclic Graphs (DAG)	Board Work + Real Examples
43	43	Graphs	Topological Sorting	Code Practice
44	44	Graphs	Minimum Spanning Tree Algorithms	Kruskal & Prim Demo
45	45	Graphs	Shortest Path (Dijkstra), Flow Algorithms	Visualization + Code

Signature of faculty **Signature, HOD i/c**