K.S. SCHOOL OF ENGINEERING AND MANAGEMENT, BENGALURU - 560109

DEPARTMENT OF ARTIFICIAL INTELLIGENCE AND DATA SCIENCE

SESSION: 2022-2023 (ODD SEMESTER)

LESSON PLAN

NAME OF THE STAFF : **Ms. Madhusmita Mishra**

SUBJECT CODE/TITLE : **21CS32/DATA STRUCTURES AND APPLICATIONS**

SEMESTER/ SEC/ YEAR : **III/II**

Sl. No.	Topic to be covered	Mode of Delivery	Teaching Aid	No. of Periods	Cumulative No. of Periods	Proposed Date	Delivery Date
	MODULE 1						
1	**Introduction:** Data Structures, Classifications (Primitive & Non-Primitive), Data structure Operations.	L+D	BB	1	1	31/10/2022	2/11/22
2	Review of Arrays. Structures: Array of structures, Self-Referential Structures and Unions.	L+ D	BB	1	2	31/10/2022	2/11/22
3	Pointers and Dynamic Memory Allocation Functions.	L+ D	BB	1	3	2/11/2022	3/11/22
4	Representation of Linear Arrays in Memory and Dynamically allocated arrays	L+D	BB	1	4	4/11/2022	4/11/22
5	**Array Operations**: Traversing, inserting, deleting, searching, and sorting. Multidimensional arrays.	L+ D	BB	1	5	7/11/2022	4/11/22
6	Polynomials and Sparse Matrices.	L+D	BB	1	6	9/11/2022	7/11/22
7	**Strings:** Basic Terminology, Storing, Operations	L+ D	BB	1	7	14/11/2022	8/11/22

8	Pattern Matching algorithm, Programming examples.	L+ D	BB	1	8	14/11/2022	9/11/22
9	**Practical:** 1.Design, Develop and Implement a menu driven Program in C for the following Array Operations a. Creating an Array of N Integer Elements b. Display of Array Elements with Suitable Headings c. Exit. 2. Design, Develop and Implement a menu driven Program in C for the following Array operations a. Inserting an Element (ELEM) at a given valid Position (POS) b. Deleting an Element at a given valid Position POS) c. Display of Array Elements d. Exit.	Practical	D	3	3	A3-2/11/2022 A2-3/11/2022 A1-4/11/2022 A3-9/11/2022 A2-10/11/2022 A1-18/11/2022	16/11/22 17/11/22 18/11/22 16/11/22 18/11/22 18/11/22
10	Tutorial	L+ D	BB	2	-	16/11/2022 18/11/2022	10/11/22
	MODULE 2						
11	**Stacks:** Definition, Stack Operations, Array Representation of Stacks	L+D	BB	1	9	21/11/2022	14/11/22
12	Stacks using Dynamic Arrays, Stack Applications: Polish notation, Infix to postfix conversion	L+ D	BB	1	10	21/11/2022	14/11/22
13	Evaluation of postfix expression.	L+ D	BB	1	11	23/11/2022	16/11/22
14	**Recursion** -Factorial, GCD, Fibonacci Sequence, Tower of Hanoi, Ackerman's function	L+D	BB	1	12	25/11/2022	21/11/22
15	**Queues:** Definition, Array Representation, Queue Operations,	L+ D	BB	1	13	26/11/2022	21/11/22
16	Circular Queues.	L+D	BB	1	14	2/12/2022	23/11/22
17	Circular queues using Dynamic arrays	L+ D	BB	1	15	2/12/2022	25/11/22
18	Dequeues, Priority Queues	L+ D	BB	1	16	5/12/2022	26/11/22

19	**Practical:** 1. Design, Develop and Implement a menu driven Program in C for the following operations on STACK of Integers. a. Push an Element on to Stack b. Pop an Element from Stack c. Demonstrate Overflow and Underflow situations on Stack d. Display the status of Stack e. Exit. 2. a. Design, Develop and Implement a Program in C for the following Stack Applications a. Evaluation of Suffix expression with single digit operands and operators: +, -, *, /, %, ^ b. Solving Tower of Hanoi problem with n disks.	Practical	D	3	6	A3-16/11/2022 A2-17/11/2022 A1-25/11/2022 A3-23/11/2022 A2-24/11/2022 A1-2/12/2022	23/11/22 24/11/22 25/11/22 26/11/22 2/12/22 2/12/22
20	Tutorial	L+D	BB	5	-	5/12/2022 7/12/2022 9/12/2022 12/12/2022	28/11/22 29/11/22 30/11/22 2/12/22
	MODULE 3						
21	**Linked Lists:** Definition, Classification of linked lists in Memory. Representation of linked lists in Memory.	L+D	BB	1	17	14/12/2022	9/12/22
22	Linked list operations: Traversing, Searching, Insertion	L+ D	BB	1	18	16/12/2022	12/12/22
23	Deletion, Sorting and Concatenation operations.	L+ D	BB	1	19	19/12/2022	12/12/22
24	Doubly Linked lists,	L+D	BB	1	20	19/12/2022	14/12/22
25	Circular linked lists	L+ D	BB	1	21	21/12/2022	16/12/22
26	Header linked lists, Linked Stacks and Queues.	L+D	BB	1	22	23/12/2022	19/12/22
27	Applications of Linked lists – Polynomials,	L+ D	BB	1	23	24/12/2022	24/12/22

28	Sparse matrix representation. Programming Examples	L+ D	BB	1	24	26/12/2022	29/12/22
29	**Practical:** 1. Singly Linked List (SLL) of Integer Data a. Create a SLL stack of N integer. b. Display of SLL c. Linear search. Create a SLL queue of N Students Data Concatenation of two SLL of integers. 2. Design, Develop and Implement a menu driven Program in C for the following operations on Doubly Linked List (DLL) of Professor Data with the fields: ID, Name, Branch, Area of specialization a. Create a DLL stack of N Professor's Data. b. Create a DLL queue of N Professor's Data. Display the status of DLL and count the number of nodes in it.	Practical	D	3	9	A3-26/11/2022 7/12/2022 A2-1/12/2022 15/12/2022 A1-16/12/2022 23/12/2022 A3-14/12/2022 A2-22/12/2022 A1-30/12/2022	30/11/22 14/12/22 8/12/22 15/12/22 9/12/22 16/12/22 24/12/22 22/12/22 23/12/22
30	Tutorial	L+D	BB	3	-	26/12/2022 28/12/2022 30/12/2022	30/12/22 31/12/22 31/12/22
	MODULE 4						
31	**Trees:** Terminology, Binary Trees, Properties of Binary trees	L+D	BB+LCD	1	25	31/12/2022	4/01/23
32	Array and linked Representation of Binary Trees	L+ D	BB+LCD	1	26	31/12/2022	6/01/23
33	Binary Tree Traversals - Inorder, Postorder, Preorder	L+ D	BB+LCD	1	27	6/1/2023	13/01/23
34	Additional Binary tree operations.	L+D	BB+LCD	1	28	9/1/2023	14/01/23
35	Threaded binary trees	L+ D	BB+LCD	1	29	9/1/2023	16/01/23
36	Binary Search Trees – Definition, Insertion, Deletion Traversal, Searching	L+D	BB+LCD	1	30	11/1/2023	17/01/23
37	Application of Trees-Evaluation of Expression	L+ D	BB+LCD	1	31	13/1/2023	23/01/23

38	Application of Trees-Evaluation of Expression	L+ D	BB+LCD	1	32	13/1/2023	
39	**Practical:** 1. Given an array of elements, construct a complete binary tree from this array in level order fashion. That is, elements from left in the array will be filled in the tree level wise starting from level 0. Ex: Input : arr[] = {1, 2, 3, 4, 5, 6}. 2. Design, Develop and Implement a menu driven Program in C for the following operations on Binary Search Tree (BST) of Integers a. Create a BST of N Integers b. Traverse the BST in Inorder, Preorder and Post Order	Practical	D	3	12	A3-21/12/2022 A2-29/12/2022 A1-06/01/2023 A3-24/12/2022 A2-05/01/2023 A1-13/1/2023	28/12/22 29/12/22 30/12/22 4/01/23 5/01/23 6/01/23
40	Tutorial	L+D	BB	1	-	16/1/2023	25/01/23
	MODULE 5						
41	**Trees 2:** AVL tree, Red-black tree	L+D	BB+LCD	1	33	16/1/2023	27/01/23
42	Splay tree, B-tree.	L+ D	BB+LCD	1	34	18/1/2023	28/01/23
43	**Graphs:** Definitions, Terminologies	L+ D	BB+LCD	1	35	20/1/2023	30/01/23
44	Matrix and Adjacency List Representation of Graphs, Elementary Graph operations	L+D	BB+LCD	1	36	23/1/2023	1/02/23
45	Traversal methods: Breadth First Search and Depth First Search	L+ D	BB+LCD	1	37	23/1/2023	3/02/23
46	**Hashing:** Hash Table organizations,	L+D	BB+LCD	1	38	25/1/2023	6/02/23
47	Hashing Functions	L+ D	BB+LCD	1	39	27/1/2023	8/02/23
48	Static and Dynamic Hashing	L+D	BB+LCD	1	40	28/1/2023	10/02/23
49	**Practical:** 1. Design, Develop and implement a program in C for the following operations on Graph (G) of cities a. Create a Graph of N cities using Adjacency Matrix. b. Print all the nodes reachable from a given starting node in a diagraph using DFS/BFS method.	Practical		3	15	A3-28/12/2022 A2-12/1/2023 A1-20/1/2023 A3-11/1/2023	28/01/23 12/01/23 27/01/23 1/02/23