

LECTURE PLAN
DATA STRUCTURES (CIC-209)

Lecture	Topic		Books
UNIT I			
1. Algorithms			
L1	1.1	Overview of data structure	[T1],[T2],[R1]
	1.2	Basics of Algorithm Analysis including Running Time Calculations	
	1.3	Algorithm Complexity time space tradeoff	
	1.4	Abstract Data Type Definition	
2. Arrays			
L2	2.1	Introduction to Linear arrays	[T2],[R3]
	2.2	Array and pointers	
L3	2.3	Traversing Linear arrays	[T2],[R3]
	2.4	Insertion and Deletion	
L4	2.5	Multidimensional Array representation in memory	[T1],[R3]
	2.6	Memory representation of Sparse array	
L5	3. Lists		
	3.1	Introduction to Single Linked List	[T1],[T2],[R1],[R2]
	3.2	List ADT	
	3.3	Operations on Single Linked List	
L6		3.3.1. Insertion before first node	[T1],[T2],[R1],[R2]
		3.3.2. Insertion at specified position	
		3.3.3. Deletion from beginning, end and at specified position	
L7	3.4	Introduction to Double Linked List	[T1],[T2],[R1],[R3]
	3.5	Operations on Double Linked List	
		3.5.1 Insertion at beginning, end and specified position	
		3.5.2 Deletion from beginning, end and at specified position	
L8	3.6	Introduction to circular link list	[T1],[T2],[R1],[R2]
	3.7	Operations on Circular Linked List	
		3.7.1 Insertion at beginning, end and specified position	
		3.7.2 Deletion from beginning, end and at specified position	
4. Stacks			
L9	4.1	Definition and Concepts of Stack	[T1],[T2],[R1],[R3]
	4.2	Stack ADT	
	4.3	Stack Manipulation	
	4.4	Recursion	

L10	4.5	Introduction to Prefix, Infix, Postfix expressions	[T1],[R1],[R2],[R3]
	4.6	Algorithm for inter conversion of Infix to Postfix using Stack	
L11	4.7	Algorithm for Inter conversion of Infix to Prefix using Stack	[T1],[R1],[R2]
	4.8	Algorithm for Evaluation of postfix expression using Stack	
	5. Queues		
L12	5.1	Definition and Concepts of Queues	[T1],[T2],[R1],[R2]
	5.2	Queue ADT	
	5.3	Queue Manipulation	
UNIT II			
	6. Sparse Matrix		
L13	6.1	Sparse Array Representation	[T2],[R3]
	6.2	Sparse Linked List Representation	
L14	6.3	Arithmetic (addition, subtraction and multiplication)	[T2],[R3],[R4]
	6.4	Polynomials and polynomial arithmetic	
L15	7. Trees		
	7.1	Properties of Trees	[T1],[R1],[R2],[R3]
	7.2	Binary trees	
	7.3	Binary Tree traversal	
L16	7.4	Tree manipulation algorithms	[T2],[R2],[R3],[R4]
	7.5	Expression trees and their usage	
	8. Binary Search Tree		
L17	8.1	Properties of Binary Search Tree	[T1],[R1],[R2],[R3]
	8.2	Algorithm for searching an element in BST	
	8.3	Algorithm for Inserting an element in BST	[T1],[R1],[R2],[R3]
L18	8.4	Algorithm for Deleting an element from BST	
	8.5	Priority Queues	
	9. AVL tree		[T1],[R1],[R1],[R2]
L19	9.1	Properties of AVL tree	
	9.2	Insertion in AVL tree	
	9.3	Deletion in AVL tree	
	10. Heap		[T1],[R1],[R2],[R3]
L20	10.1	Properties of Heap	
	10.2	Insertion and Deletion in Heap	
	11. B-tree		
L21	11.1	Introduction to B tree	[T2][R2]
	11.2	Insertion and deletion to and from B tree	

L22	11.3	B+ tree	[T2][R2]
	11.4	B* tree	
UNIT III			
L23	12. Sorting		[T1].[T2],[R1],[R2]
	12.1	Sorting concept	
		12.1.1 Order	
		12.2.2 Stability	
L24	12.2	Selection Sort with time analysis	[T1].[T2],[R2],[R4]
		12.2.1 Straight Selection	
		12.2.2 Heap Sort	
L25	12.3	Insertion Sort with Complexities	[T1].[T2],[R2],[R4]
		12.3.1. Straight Insertion	
		12.3.2. Shell Sort	
L26	12.4	Selection Sort with time analysis	[T1].[T2],[R2],[R3]
		12.4.1 Straight Selection	
		12.4.2 Heap Sort	
L27	12.5	Exchange Sort with complexities	[T1].[T2],[R2],[R3]
		12.5.1 Bubble Sort	
		12.5.2 Quick Sort	
L28	12.6	(External Sorting)	[T1][T2][R2]
		12.5.3 Natural merge	
		12.5.4 Balanced merge	
		12.5.5 Polyphase merge)	
L29	13. Searching		[T1].[T2],[R1],[R2]
	13.1	Sequential Search	
	13.2	Binary Search	
	14. Hashing		
L30	14.1	Hashing Methods	[T1].[T2],[R1],[R2]
		14.1.1 Direct	
		14.1.2 Subtraction	
		14.1.3 Modulo-Division	
		14.1.4 Midsquare	
		14.1.5 Folding	
		14.1.6 Pseudorandom	
L31	14.2	Collision resolution	[T1].[T2],[R1],[R3]
		14.2.1. linear probe	
		14.2.2. Quadratic probe	
UNIT IV			

L32		15. Sets Representation	[T1][T2]
		15.1 Disjoint sets representation	
		15.2 Union find algorithm	
L33		16. Graphs	[T1].[T2],[R1],[R2]
	16.1	Introduction to Graphs	
	16.2	Graph Representation	
	16.3	Breadth first search	
L34	16.4	Depth first search Depth	[T1].[T2],[R1],[R3]
	16.5	Complexity of Graph Traversal	
L35		17. Minimum Spanning Tree algorithms	[T1].[T2],[R3],[R4]
	17.1	Prim's Algorithm	
	17.2	Kruskal's Algorithm	
L36	17.3	Shortest Path Algorithms	[T2],[R3]
	17.4	Dijkstra Algorithm	
L37	17.5	Floyd Warshal Algorithm	[T2][R3]

Textbook(s):

1. Richard Gilberg , Behrouz A. Forouzan, "Data Structures: A Pseudocode Approach with C, 2nd Edition, Cengage Learning, Oct 2004
2. E. Horowitz, S. Sahni, S. Anderson-Freed, "Fundamentals of Data Structures in C", 2nd Edition, Silicon Press (US), 2007.

References:

1. Mark Allen Weiss, "Data Structures and Algorithm Analysis in C", 2nd Edition, Pearson, September, 1996
2. Robert Kruse, "Data Structures and Program Design in C", 2nd Edition, Pearson, November, 1990
3. Seymour Lipschutz, "Data Structures with C (Schaum's Outline Series)", McGrawhill, 2017
4. A. M. Tenenbaum, "Data structures using C". Pearson Education, India, 1st Edition 2003.
5. Weiss M.A., "Data structures and algorithm analysis in C++", Pearson Education, 2014.