

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
Industry Certified Value Added Course
on

Data Structures and Algorithm using JAVA
14.02.2025, 15.02.2025 & 19.02.2025-22.02.2025

Total hours: 45

Course Objectives:

To enable the students to

- Understand the basic concepts of recursion.
- Understand the basic concepts of linear data structures
- Gain knowledge about linear data structures like stack, queue and its applications.
- Be familiar with binary tree concepts and its applications.
- Gain knowledge about graph traversal methods and application of graphs.

UNIT-1- RECURSION

9

Introduction-Application of recursion-Recursion output practice-Print n to 1 using recursion-Print 1 to n using recursion-Tail recursion-Writing base cases in recursion-Natural numbers sum using recursion-Palindrome check using recursion-Sum of digits using recursion-Rope cutting problem-Generate subsets-Tower of Hanoi-Josephus problem-Printing all permutations.

UNIT-2- LINKED LIST

9

Introduction-Simple linked list implementation in java-Application of linked list-Traversing a linked list-Recursive traversal of singly linked list-Insert at begin of SLL-Insert at end of SLL-Insert at given position in SLL-Delete first node of SLL-Delete last node of SLL-Search in a SLL(Iterative & Recursive)-DLL-insert at beginning of DLL-insert at the end of DLL-insert at the end of DLL-Reverse a DLL-Delete head of DLL-Delete last node of DLL-Sorted insert in a SLL-Middle of a linked list-Nth node from end of linked list-Reverse a linked list iterative-Recursive reverse a linked list-Remove duplicate from a sorted SLL-Reverse a linked list in groups of size k-Detect loop-Detect loop using Floyd cycle detection-detect and remove loop in linked list-delete node with only pointer given to iterative-Segregate even and odd nodes-Intersection point of two linked list-Pairwise swap nodes of linked list in java-clone a linked list with a random pointer in java-LRU cache design-merge two sorted linked list-palindrome linked list

UNIT-3- STACK, QUEUE

9

Stack data structure-Array implementation using stack-Linked list implementation using stack-Application of stack-Stack in java collection-Balanced paranthesis-Implement two stack in array-stock span problem-Previous greater problem-Next greater element-Largest rectangular area in histogram-largest rectangle with all 1's-Stack with get min() in O(1)-Infix prefix and postfix introduction-Infix to postfix(simple solution)-Infix to postfix(Efficient solution)-Evaluation of postfix-Infix to prefix(simple solution)-Infix to prefix(Efficient solution)- Introduction-Application of queue-Implementation of queue using array-Implementation of queue using linked list-Queue in java-Implementation of stack using queue-Reversing a queue-generate numbers with given digits

UNIT-4- TREE

9

Introduction to tree-Application of tree-Binary tree-Tree traversal-Implementation of inorder traversal-Implementation of preorder traversal-Implementation of postorder traversal-Height of binary tree-print

UNIT-5- GRAPH

9

COURSE OUTCOMES (COs):

CO. No.	CO Statements	Knowledge Level
CO1	Implement recursion in solving computational problems.	K3 - Apply
CO2	Use the basic concepts of linear data structures to solve real-world problems.	K3 - Apply
CO3	Apply stacks and queues in program design to handle data efficiently.	K3 - Apply
CO4	Demonstrate the applications of tree data structures in various scenarios.	K3 - Apply
CO5	Utilize different graph traversal methods to solve problems involving network structures.	K3 - Apply

CO. No.	POs												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	H	M	L	-	-	-	-	-	-	-	-	L	M	L
CO2	H	M	L	-	-	-	-	-	-	-	-	L	M	L
CO3	H	M	L	-	-	-	-	-	-	-	-	L	M	L
CO4	H	M	L	-	-	-	-	-	-	-	-	L	M	L
CO5	H	M	L	-	-	-	-	-	-	-	-	L	M	L