

COURSE TITLE	DATA STRUCTURES
COURSE CODE	05DS0201
COURSE CREDITS	6

Course Outcomes: After completion of this course, student will be able to:

- 1 Define the concept of data structure and categories of data structure.
- 2 Describe analysis of algorithm.
- 3 Demonstrate the concept and application of linear data structures like stack, queue and linked list.
- 4 Construct different types of trees and graphs.
- 5 Compare and contrast different searching and sorting techniques and find out better technique by calculating time and space complexity.

Pre-requisite of course: Basic Knowledge of C Programming Language.

Teaching and Examination Scheme

Theory Hours	Tutorial Hours	Practical Hours	ESE	IA	CSE	Viva	Term Work
4	0	4	50	30	20	25	25

Contents : Unit	Topics	Contact Hours
1	Unit-1 Introduction to Data Structures and Algorithms Basic Terminology, Classifications of Data Structure, Operations on Data Structures, Abstract Data Type, Algorithms, Different Approaches to Designing an Algorithm, Control Structures Used in Algorithms, Time and Space Complexity, Asymptotic Notations Big O, Small O, Theta, Asymptotic Notations Omega and Small Omega	10
2	Unit-2 Stack and Queue Introduction to Stacks, Array Representation of Stacks, Operations on a Stack, Linked Representation of Stacks, Operations on a Linked Stack, Stack Applications – infix to postfix conversion, Recursion, Introduction to Queues, Array Representation of Queues, Linked Representation of Queues, Types of Queues – Simple Queue, Circular Queue, Class Test-1	10
3	Unit -3 Linked List Introduction, Array v/s Linked List, Types of Linked List, Singly Linked List, Doubly Linked List, Circular Singly Linked List, Circular Doubly Linked List, Stack using Linked List, Stack using Linked List Example, Queue using Linked List, Queue using Linked List Example, More Examples of Linked List	12

Contents : Unit	Topics	Contact Hours
4	Unit -4 Tree and Graph Introduction, Types of Trees, Creating a Binary Tree from a General Tree, Traversing a Binary Tree, M – ary Tree, Full Binary Tree, Complete Binary Tree, Ordered Tree, Introduction , Graph Terminology, Directed Graphs, Biconnected Components, Representation of Graph, Graph Traversal Algorithms	10
5	Unit -5 Searching and Sorting Introduction to Searching, Linear Search, Binary Search, Introduction, Sorting Techniques, Bubble sort, Insertion sort, Selection sort, Quick sort	8
Total Hours		50

Suggested List of Experiments:

Contents : Unit	Topics	Contact Hours
1	Unit-2 Stack and Queue Write a program which performs following stack operations. ->push () -> pop() -> peep() -> update(), Write a program to find out factorial of number using stack., Write a program to print string in reverse order using stack., Write a tower of Hanoi program., Write a program of dynamic stack., Write a program which performs following operations using simple queue. insert() -> delete() -> display(), Write a program which performs following operations using circular queue. Insert() -> delete() -> display(), Write a program of dynamic queue.	8
2	Unit-3 Linked List Perform following operations : 1] Create, 2] Display, 3] Insert o insert first o insert last o insert desired o insert before desired o insert after desired, 4] Delete o delete first o delete last o delete desired o delete before desired o delete after desired, 5] Search particular element, 6] Sort list in ascending order, 7] Update an element., 8] Count no. of nodes, Write a program to perform above operations using singly linked list, Write a program to perform above operations using doubly linked list, Write a program to perform above operations using circular singly linked list, Write a program to perform above operations using circular doubly linked list	12
3	Unit-4 Tree and Graph 1] Write a program to create a binary tree . Traverse tree in preorder , postorder and inorder., 2] Write a program to represent graph using linked list and implement for DFS and BFS algorithm for traversing	2

Suggested List of Experiments:

Contents : Unit	Topics	Contact Hours
4	Unit-5 Searching and Sorting Enter N elements and arrange the elements using : Selection sort, Enter N elements and arrange the elements using : Bubble sort, Enter N elements and arrange the elements using : Insertion sort, Enter N elements and perform search operations using : Linear search, Enter N elements and perform search operations using : Binary search (with recursion, without recursion), Test	6
Total Hours		28

Suggested Theory Distribution:

The suggested theory distribution as per Bloom's taxonomy is as follows. This distribution serves as guidelines for teachers and students to achieve effective teaching-learning process

Distribution of Theory for course delivery and evaluation					
Remember / Knowledge	Understand	Apply	Analyze	Evaluate	Higher order Thinking