

**Note: Removed Contents are marked in Yellow color and
Added Contents are marked in red color**

SCS1103	DATA STRUCTURES	L	T	P	Credits	Total Marks
		3	0	0		

COURSE OBJECTIVES

- To understand the searching and sorting techniques.
- To familiarize with stacks, queues and linked lists.

UNIT 1 INTRODUCTION 9 Hrs.

Introduction to algorithms - Recursion - Definition - Design Methodology and Implementation of recursive algorithms - Linear and binary recursion - recursive algorithms for factorial function - Fibonacci sequence - Tower of Hanoi - Tail recursion – Data Structures - Need - classification - operations - Array - characteristics - types - storage representations.

UNIT 2 SEARCHING AND SORTING TECHNIQUES 9 Hrs.

Basic concepts - List Searches using Linear Search - Binary Search - Fibonacci Search - Sorting Techniques - Insertion sort - Heap sort - Bubble sort - Quick sort - Merge sort - Analysis of sorting techniques.

UNIT 3 STACKS 9 Hrs

Basic Stack Operations - Representation of a Stack using Arrays - Algorithm for Stack Operations - Stack Applications: Reversing list - Factorial Calculation - Infix to postfix Transformation - Evaluating Arithmetic Expressions.

UNIT 4 QUEUES 9 Hrs

Basic Queue Operations - Representation of a Queue using array - Implementation of Queue Operations using Stack - Applications of Queues - Round robin Algorithm - Enqueue - Dequeue - Circular Queues - Priority Queues.

UNIT 5 LINKED LISTS 9 Hrs

Introduction - Single linked list - Representation of a linked list in memory - Operations on a singly linked list - Merging two singly linked lists into one list - Reversing a singly linked list - Applications of singly linked list to represent polynomial expressions and sparse matrix manipulation - Advantages and disadvantages of singly linked list - Circular linked list - Doubly linked list - Circular Doubly Linked List.

Max. 45 Hours

TEXT / REFERENCE BOOKS

1. Jean-Paul Tremblay, Paul G. Sorenson, 'An Introduction to Data Structures with Application', TMH, 2nd Edition.
2. Naps, Thomas L., and Bhagat Singh, "Introduction to Data Structure with Pascal", West Publishing Co., 1986.
3. Richard F, Gilberg, Forouzan, "Data Structures", Cengage, 2nd Edition.

END SEMESTER EXAM QUESTION PAPER PATTERN

Max Marks : 80

Exam Duration : 3 Hrs.

PART A : 10 questions of 2 marks each- No choice

20 Marks

PART B : 2 questions from each unit of internal choice, each carrying 16 marks -

80 Marks

SCSA1203	DATA STRUCTURES	L	T	P	Credits	Total Marks
		3	*	0	3	100

COURSE OBJECTIVES

- To impart the basic concepts of data structures and algorithms
- To be familiar with writing recursive methods.
- To understand concepts about searching and sorting techniques.
- To implement basic concepts about stacks.
- To apply the concepts of queues and its types..

UNIT-1 INTRODUCTION TO ALGORITHMS

9 Hrs

Introduction Data Structures - Need - classification - operations –Abstract data types (ADT)- **Array - characteristics - types storage representations. Array Order Reversal-Array Counting or Histogram-Finding the maximum Number in a Set, Recursion- Towers of Hanoi-Fibonacci series-Factorial.**

UNIT-2 LINKED LISTS

9 Hrs

Introduction - Singly linked list - Representation of a linked list in memory - Operations on a singly linked list - Merging two singly linked lists into one list - Reversing a singly linked list - Applications of singly linked list to represent polynomial - Advantages and disadvantages of singly linked list - Circular linked list - Doubly linked list - Circular Doubly Linked List

UNIT-3 STACKS

9 Hrs

Basic Stack Operations - Representation of a Stack using Arrays - Algorithm for Stack Operations - Stack Applications: Reversing list - Factorial Calculation - Infix to postfix Transformation - Evaluating Arithmetic Expressions.

UNIT-4 QUEUES

9 Hrs

Basic Queue Operations - Representation of a Queue using array - Applications of Queues - Round robin Algorithm - Enqueue - Dequeue - Circular Queues - Priority Queues.

UNIT-5 SEARCHING AND SORTING TECHNIQUES

9 Hrs.

Basic concepts - List Searches using Linear Search - Binary Search - Fibonacci Search - Sorting Techniques - Insertion sort - Heap sort - Bubble sort - Quick sort - Merge sort - Analysis of sorting techniques.

Max.45Hours

COURSE OUTCOMES:

On completion of the course, student will be able to:

- CO1: Understand the concept of recursive algorithms.
- CO2: Demonstrate the different types of data structures.
- CO3: Able to understand the operations on linear data structures.
- CO4: Summarize searching and sorting techniques.
- CO5: Choose appropriate data structure as applied to specified problem definition.
- CO6: Understand and implement the applications of linear data structures

TEXT / REFERENCE BOOKS:

1. Jean-Paul Tremblay, Paul G. Sorenson, 'An Introduction to Data Structures with Application',TMH, 2017.
2. Richard F, Gilberg, Forouzan, "Data Structures", Cengage, 2004, 2nd Edition.
3. Larry R. Nyhoff, ADTs, Data Structures, and Problem Solving with C++, Prentice Hall Editin, 2004.
4. Thomas H. Cormen, Charles E. Leiserson, "Introduction to Algorithms", 3rd Edition, 2010.

END SEMESTER EXAM QUESTION PAPER PATTERN

Max. Marks: 100

Exam Duration:3 Hrs.

Part A: 10 questions carrying 2 marks each – No choice

20 marks

Part B: 2 questions from each unit of internal choice, each carrying 16 marks

80 marks

SCS4102	DATA STRUCTURES LAB	L	T	P	Credits	Total Marks
		0	0	4	2	100

SUGGESTED LIST OF EXPERIMENTS

1. Program to insert and delete an element from an array.
2. Program to sort the elements using insertion sort.
3. Program to sort the elements using quick sort.
4. Program to sort the elements using merge sort.
5. Program to implement operations on a Singly linked list.
6. Program to implement operations on a doubly linked list.
7. Program to implement a Stack using an array.
8. Program to implement a Stack using a Linked list.
9. Program to implement Queue using an array.
10. Program to implement Queue using a Linked list.
11. Program to convert an infix expression to postfix expression.
12. Program to implement display elements of a queue according to their priority.

SCSA2201	DATA STRUCTURES LAB	L	T	P	Credits	Total Marks
		0	0	4	2	100

COURSE OBJECTIVES:

- To implement linear and non-linear data structures.
- To understand the different operations of search trees.
- To implement graph traversal algorithms.
- To get familiarized to sorting algorithms.
- To implement linear search and binary Search.

LIST OF EXPERIMENTS:

1. Program to insert and delete an element in an array.
2. Program to implement operations on a Singly linked list.
3. Program to implement operations on a doubly linked list.
4. Program to sort the elements using insertion sort.
5. Program to sort the elements using quick sort.
6. Program to sort the elements using merge sort.
7. Program to implement a Stack using an array and Linked list.
8. Program to implement Queue using an array and Linked list.
9. Program to implement Circular Queue.
10. Program to convert an infix expression to postfix expression.
11. Program to implement display elements of a queue according to their priority

COURSE OUTCOMES:

On completion of the course, student will be able to-

- CO1: Remembering the concept of data structures through ADT including List, Stack and Queues
CO2: Understand basic concepts about stacks, queues, lists, trees and graphs
CO3: Able to apply and implement various tree traversal algorithms and ensure their correctness
CO4: Ability to analyze algorithms and develop algorithms through step by step approach in solving problems with the help of fundamental data structures.
CO5: Compare and contrast Array based and Link based applications of typical data structures such As Stacks and Queues.
CO6: Design applications and justify use of specific linear data structures for various applications