

# SHRI GNANAMBICA DEGREE COLLEGE: MADANAPALLE



(AUTONOMOUS)  
COURSE 3: DATA STRUCTURES WITH C  
SEMESTER II  
(W.E.F.2025-26)  
Program: BSC (Computer Science)



Hours per week: 4

Credits: 3

## Course Objectives:

1. Understand the fundamentals of computer programming, Apply structured problem-solving approaches using algorithms, flowcharts, and C programming constructs.
2. Develop efficient logic using decision-making, loop, and jump control statements.
3. Utilize derived data types like arrays and strings for modular program design.
4. Design and implement modular solutions using functions, recursive logic, pointer operations, and dynamic memory management.
5. Handle complex data structures including structures, unions, and text file operations.

## Course Outcomes:

At the End of the Course, The Students will be able to:

1. Understand basic computing concepts, programming paradigms and write structured C programs.
2. Apply control flow statements to solve logical and repetitive tasks in C.
3. Implement arrays and string operations to manage and manipulate data efficiently.
4. Design modular code using functions, recursion, and appropriate parameter passing.
5. Utilize pointers and memory operations for effective data handling. Demonstrate competence in dynamic memory allocation and text file processing.

## Unit I

### Basic Concepts:

Algorithm: Definition and characteristics, Complexity analysis: Space Complexity, Time Complexity, Asymptotic Notations. Introduction to Data structures: Definition, Types of Data structures, Abstract Data Types (ADT), Introduction to Linked Lists, Representation of linked lists in Memory, Comparison between Linked List and Array.

## Unit II

### Linked Lists:

Types of Linked Lists - Singly Linked list, Doubly Linked list, Circularly Singly Linked list, Circularly Doubly Linked list; Implementation of Single Linked List ADT: Creating a List, Traversing a linked list, Searching in linked list, Insertion and deletion into linked list (At first Node, Specified Position, Last node).



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### Unit III

#### Stacks and Queues:

Introduction to stack ADT, Implementation of stacks using array and Linked List, Application of stacks - Polish Notations - Converting Infix to Post Fix Notation - Evaluation of Post Fix Notation. Queues: Introduction to Queue ADT, Implementation of Queues using array and Linked List, Application of Queues Types of Queues- Circular Queues, De-queues, Priority Queue, Heaps.

### Unit IV

#### Searching and Sorting:

Linear or Sequential Search, Binary Search, Hashing and collision resolution. Sorting: Selection Sort, Bubble Sort, Insertion Sort, Quick Sort and Merge Sort

### Unit V

#### Trees and Graphs:

Tree Terminology, Binary Tree Representation, Traversal techniques, Expression Tree, Binary Search Tree- Definition, Operations on a Binary Search Tree: Creation, Search, Insertion & deletion. Graphs: Introduction to Graphs, Terminology, Representation (Adjacency Matrix, Adjacency List), Traversal of Graphs (DFS, BFS), Applications of Graphs, Concept of Shortest Path Problems, Concept of Minimum Cost Spanning Tree

#### References:

1. Data Structures Using C, Balagurusamy E. Tata McGraw Hill
2. Data Structures using C, Reema Thareja, Third Edition, Oxford University Press
3. Data Structures, Lipschutz, Schaum's Outline Series, Tata McGraw-hill
4. Data Structures Using C, Ch. Vijay Kumar, Pen Press International



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# SHRI GNANAMBICA DEGREE COLLEGE: MADANAPALLE



(AUTONOMOUS)  
COURSE 3: DATA STRUCTURES WITH C -PRACTICALS  
SEMESTER IV  
(W.E.F.2025-26)

Program: BSC (Computer Science)



Hours per week: 2

Credits: 1

## List of Experiments

1. Write a program to read 'N' numbers of elements into an array and also perform the following operation on an array
  - a. Add an element at the beginning of an array
  - b. Insert an element at given index of array
  - c. Update an element using a values and index
  - d. Delete an existing element
2. Write a program to implement Single Linked List with insertion, deletion and traversal operations
3. Write a program to implement Doubly Linked List with insertion, deletion and traversal operations
4. Write a program to implement the Stack operations using Arrays and Linked Lists.
5. Write a program to convert a given infix expression to a postfix expression using stacks.
6. Write a program to implement the Queue operations using Arrays and Linked Lists.
7. Write a program to implement the Circular Queue operations using Arrays.
8. Write a program for Binary Search Tree Traversals
9. Write a program to search an item in a given list using the following Searching Algorithms
  - a. Linear Search
  - b. Binary Search.
10. Write a program for implementation of the following Sorting Algorithms
  - a. Bubble Sort
  - b. Insertion Sort
  - c. Quick Sort
  - d. Merge Sort



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(AUTONOMOUS)

COURSE 3: DATA STRUCTURES WITH C

SEMESTER II

(W.E.F.2025-26)

Program: BSC (Computer Science)

QUESTION PAPER BLUE PRINT

Time : 3 Hrs

Max. Marks : 70

## PART - A

Answer any 4 of the 8. Each Question Carries 5 marks. (4 x 5 =20)

1. Question
2. Question
3. Question
4. Question
5. Question
6. Question
7. Question
8. Question

## PART-B

Answer one from each unit. Each Question Carries 10 marks. (5X10=50)

9. Question

UNIT 1

OR

10. Question

UNIT 2

OR

11. Question

12. Question

UNIT 3

OR

13. Question

14. Question

UNIT 4

OR

15. Question

16. Question

UNIT 5

OR

17. Question

18. Question



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