SHRI GNANAMBICA DEGREE COLLEGE: MADANAPALLE

(AUTONOMOUS)

Course 6: Data Structures Using C (MAJOR)

SEMESTER III

(W.E.F.2024-25)

Program: BSC (CS)

Hours per week: 4 **Credits: 3**

Course Objectives:

To introduce the fundamental concept of data structures and to emphasize the importance of various data structures in developing and implementing efficient algorithms.

Course Outcomes:

Upon successful completion of the course, a student will be able to:

1. Understand various Data Structures for data storage and processing.
2. Realize Linked List Data Structure for various operations
3. Analyze step by step and develop algorithms to solve real world problems by implementing Stacks, Queues data structures.
4. Understand and implement various searching & sorting techniques.
5. Understand the Non-Linear Data Structures such as Binary Trees and Graphs.

UNIT-I

Basic Concepts: Algorithm-Definition and characteristics, Algorithm Analysis-Introduction to Data structures: Definition, Types of Data structures, Data Types, and Data Structures, Pointers and dynamic memory allocation

Arrays : Operations (searching, traversing, inserting, deleting) on arrays with Algorithms

UNIT-II

Linked List: Concept of Linked Lists, Representation of linked lists in Memory, Comparison between Linked List and Array, Types of Linked Lists- Singly Linked list, Doubly Linked list, Circularly Singly Linked list, Circularly Doubly Linked list and operations, Application of linked lists.

UNIT-III

Stacks: Introduction to stack, Representation of stacks with array and Linked List, Implementation of stacks, Application of stacks-Polish Notations- Converting Infix to Post Fix Notation - Evaluation of Post Fix Notation-Tower of Hanoi, Recursion: Concept and Comparison between recursion and Iteration

Queues: Introduction to Queue, Representation of Queues with array and Linked List, Implementation of Queues, Application of Queues Types of Queues- Circular Queues.

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UNIT-IV

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

UNIT-V

Binary Trees: Concept of Non-Linear Data Structures, Introduction Binary Trees, Types of Trees, Basic Definition of Binary Trees, Properties of Binary Trees, Representation of Binary Trees, Operations on a Binary Search Tree, Binary Tree Traversal, Applications of Binary Tree.
Graphs: Introduction to Graphs, Terms Associated with Graphs, Sequential Representation of Graphs, Linked Representation of Graphs, Traversal of Graph (DFS,BFS),Application of Graphs.

Reference Books

1. "Data Structures through C", Yashavant Kanetkar, BPB Publications
2. Rajesh K.Shukla, "Data Structure Using C and C++"Wiley Dream tech Publication.
3. Lipschutz, "Data Structures" Schaum's Outline Series, Tata Mc graw-hill Education (India) Pvt. Ltd .
4. Michael T. Goodrich, Roberto Tamassia, David M. Mount "Data Structures and Algorithms in C++", Wiley India.
5. Horowitz and Sahani, "Fundamentals of Data Structures", Galgoti Publications Pvt Ltd Delhi India.
6. A.K.Sharma, Data Structure Using C, Pearson Education India. "Data Structures Using C" BalagurusamyE.TMH

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Course 6: Data Structures Using C (MAJOR)- Practicals

SEMESTER III

(W.E.F.2024-25)

Program: BSC (CS)

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 Program to implement Single Linked List with insertion, deletion and traversal operations
3. Write Program to implement Circular doubly Linked List with insertion, deletion and traversal operations
4. Write Programs to implement the Stack operations using an array
5. Write a program using stacks to convert a given in fix expression to postfix
6. Write Programs to implement the Stack operations using Liked List.
7. Write Programs to implement the Queue operations using an array.
8. Write Programs to implement the Queue operations using Liked List.
9. Write a program for Binary Search Tree Traversals
10. Write a program to search an item in a given list using the following Searching Algorithms
    a. Linear Search
    b. Binary Search.
11. Write a program for implementation of the following Sorting Algorithms
    a. Bubble Sort
    b. Insertion Sort
    c. Quick Sort
12. Write program to implement BFS(Breadth First Search)
13. Write a program to implement DFS (Depth First Search)

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Course 6: Data Structures Using C (MAJOR)

SEMESTER III

(W.E.F.2024-25)

Program: BSC (CS)

Question Paper – Blue Print

Time : 3 Hrs **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)

UNIT 1

9. Question

OR

10. Question

UNIT 2

11. Question

OR

12. Question

UNIT 3

13. Question

OR

14. Question

UNIT 4

15. Question

OR

16. Question

UNIT 5

17. Question

OR

18. Question

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