# SRI A S N M GOVERNMENT COLLEGE, PALAKOL, W.G. DT (Affiliated to Adikavi Nannaya University, Rajahmundry)

(Accredited with NAAC "B" Grade with 2.61 CGPA points)

CBCS/Semester System (W.e.f. 2020-21 Admitted Batch) I YEAR I SEMESTER SYLLABUS

# DATA STRUCTURES USING C

# **COURSE CODE: BSCS22T**

## UNIT – I:

**Introduction to Data Structures:** Introduction to the Theory of Data Structures, Data Representation, Abstract Data Types, Data Types, Primitive Data Types, Data Structure and Structured Type, `Atomic Type, Difference between Abstract Data Types, Data Types, and Data Structures, Refinement Stages

**Principles of Programming and Analysis of Algorithms:** Software Engineering, Program Design, Algorithms, Different Approaches to Designing an Algorithm, Complexity, Big 'O' Notation, Algorithm Analysis, Structured Approach to Programming, Recursion, Tips and Techniques for Writing Programs in 'C'.

### UNIT – II:

**Arrays:** Introduction to Linear and Non- Linear Data Structures, One- Dimensional Arrays, Array Operations, Two- Dimensional arrays, Multidimensional Arrays, Pointers and Arrays, an Overview of Pointers

**Linked Lists:** Introduction to Lists and Linked Lists, Dynamic Memory Allocation, Basic Linked List Operations, Doubly Linked List, Circular Linked List, Atomic Linked List, Linked List in Arrays, Linked List versus Arrays

## UNIT – III:

**Stacks:** Introduction to Stacks, Stack as an Abstract Data Type, Representation of Stacks through Arrays, Representation of Stacks through Linked Lists, Applications of Stacks, Stacks and Recursion

**Queues:** Introduction, Queue as an Abstract data Type, Representation of Queues, Circular Queues, Double Ended Queues- Deques, Priority Queues, Application of Queues

#### UNIT – IV:

**Binary Trees:** Introduction to 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, Counting Number of Binary Trees, Applications of Binary Tree

# UNIT - V:

Searching and sorting: Sorting – An Introduction, Bubble Sort, Insertion Sort, Merge Sort, and Searching

– An Introduction, Linear or Sequential Search, Binary Search, Indexed Sequential Search Graphs: Introduction to Graphs, Terms Associated with Graphs, Sequential Representation of Graphs, Linked Representation of Graphs, Traversal of Graphs, Spanning Trees, Shortest Path, Application of Graphs.

Additional Topic: Time Complexity and Space Complexity

# **TEXT BOOKS:**

- 1. "Data Structures using C", ISRD group Second Edition, TMH
- 2. "Data Structures through C", Yashavant Kanetkar, BPB Publications

# **REFERENCES:**

1. "Data Structures Using C" Balagurusamy E. TMH

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CBCS/Semester System (W.e.f. 2020-21 Admitted Batch) I YEAR I SEMESTER

# DATA STRUCTURES USING C LAB COURSE CODE: BSCS22P

Time: 2 Hours

Max.Marks:50

# **List of Programs:**

- 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 begging of an array
  - b. Insert an element at given index of array
  - c. Update a element using a values and index
  - d. Delete an existing element
- 2. Write a program using stacks to convert a given
  - a. postfix expression to prefix
  - b. prefix expression to postfix
  - c. infix expression to postfix
- 3. Write Programs to implement the Stack operations using an array
- 4. Write Programs to implement the Stack operations using Liked List.
- 5. Write Programs to implement the Queue operations using an array.
- 6. Write Programs to implement the Queue operations using Liked List.
- 7. Write a program for arithmetic expression evaluation.
- 8. Write a program for Binary Search Tree Traversals
- 9. Write a program to implement dequeue using a doubly linked list.
- 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 a program for polynomial addition using single linked list
- 13. Write a program to find out shortest path between given Source Node and Destination. Node in a given graph using Dijkstrar's algorithm.
- 14. Write a program to implement Depth First Search graph traversals algorithm.
- 15. Write a program to implement Breadth First Search graph traversals algorithm

# **Lab Evaluation Procedure**

1. Record:	10 Marks
2. Procedure cum Execution:	30 Marks
3. Viva:	10 Marks

Total

50 Marks

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CBCS/Semester System (W.e.f. 2020-21 Admitted Batch) I YEAR I SEMESTER MODEL PAPER

### DATA STRUCTURE USING C

**Time: 3Hours** 

#### Section-A

#### I. Answer any FIVE questions

- 1. Explain Abstract Data Types.
- 2. Define Linear and Non- Linear Data Structures.
- 3. Define Stack. What are applications of Stacks?
- 4. Explain about Binary Search Tree?
- 5. Write a C Program for Sequential Search.
- 6. What is Big 'O' Notation? Explain.
- 7. Explain binary search procedure to find key element from sorted array with an example?
- 8. Briefly explain various representations of Graphics.

## **II.** Answer any FIVE questions

9. (a) What are the difference between Abstract Data Types and Data Structures?

#### (**OR**)

- (b) What are the different Approaches to Designing an Algorithm?
- 10. (a) Define Array. How to declare two dimensional array. Write a program for addition of two matrices using arrays.

#### (**OR**)

- (b) What is linked list? Explain different types of linked lists in data structures.
- 11. (a) What is stack? Write ADT. Explain various operations of stack.

#### (**OR**)

- (b) What is a Deque? What are the different techniques used to represent Deque? Explain
- 12. (a) What are the Operations of a Binary Search Tree? Explain.

#### (**OR**)

- (b) Explain various Binary Tree Traversal techniques.
- 13.(a) Explain procedure for merge sort. Derive its time complexity

## (**OR**)

(b)Define graph traversal. Explain DFS concept with an example.

# Section-B

#### (5x10=50)

(5x5=25)

Maximum Marks: 75