



ADIKAVI NANNAYA UNIVERSITY:: RAJAHMAHENDRAVARAM
B Sc Computer Science Syllabus(w.e.f: 2020-21 A.Y)

B Sc	Semester: II	Credits: 4
Course: 2	DATA STRUCTURES USING C	Hrs/Wk: 4

Aim and objectives of Course:

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

Learning outcomes of Course:

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

- Understand available Data Structures for data storage and processing.
- Comprehend Data Structure and their real-time applications - Stack, Queue, Linked List, Trees and Graph
- Choose a suitable Data Structures for an application
- Develop ability to implement different Sorting and Search methods
- Have knowledge on Data Structures basic operations like insert, delete, search, update and traversal
- Design and develop programs using various data structures
- Implement the applications of algorithms for sorting, pattern matching etc

Detailed Syllabus: (Five units with each unit having 12 hours of class work)

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, Searching – An Introduction, Linear or Sequential Search, Binary Search, Indexed Sequential Search



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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.

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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B Sc	Semester: II	Credits: 1
Course: 2(L)	DATA STRUCTURES USING C Lab	Hrs/Wk: 2

Details of Lab Syllabus: Data Structures Using C Lab

- a. Write a program to read 'N' numbers of elements into an array and also perform the following operation on an array
 - i. Add an element at the beginning of an array
 - ii. Insert an element at given index of array
 - iii. Update an element using a value and index
 - iv. Delete an existing element
- b. Write a program using stacks to convert a given
 - i. postfix expression to prefix
 - ii. prefix expression to postfix
 - iii. infix expression to postfix
- c. Write Programs to implement the Stack operations using an array
- d. Write Programs to implement the Stack operations using Linked List.
- e. Write Programs to implement the Queue operations using an array.
- f. Write Programs to implement the Queue operations using Linked List.
- g. Write a program for arithmetic expression evaluation.
- h. Write a program for Binary Search Tree Traversals
- i. Write a program to implement dequeue using a doubly linked list.
- j. Write a program to search an item in a given list using the following Searching Algorithms
 - i. Linear Search
 - ii. Binary Search.
- k. Write a program for implementation of the following Sorting Algorithms
 - i. Bubble Sort
 - ii. Insertion Sort
 - iii. Quick Sort
- l. Write a program for polynomial addition using single linked list
- m. Write a program to find out shortest path between given Source Node and Destination Node in a given graph using Dijkstra's algorithm.
- n. Write a program to implement Depth First Search graph traversals algorithm
- o. Write a program to implement Breadth First Search graph traversals algorithm



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MODEL QUESTION PAPER (Sem-end. Exam)
B.Sc DEGREE EXAMINATIONS
Semester - II
Course 2: DATA STRUCTURES USING C

Time: 3Hrs

Max.marks:75

Section - A

Answer any FIVE question

5X5 = 25M

1. Explain about Abstract Data Types.
2. Define linear and non-linear data structures.
3. Explain Atomic Linked List.
4. What are the applications of stacks?
5. What is priority queue?
6. Explain about binary search tree.
7. Define sorting. What are the advantages and disadvantages of merge sort?
8. Briefly explain various representations of Graphics.

Section - B

Answer ALL following question

5X10 = 50M

9. a) What are primitive and non-primitive data structures with an example?

(OR)

- b) Explain different approaches to designing an algorithm.

10. a) Explain different types of 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) Write about different tree traveling techniques and write an algorithm for traveling techniques.

(OR)

- b) Explain different applications and properties of binary tree.

13. a) Write about various Graph Travelling techniques.

(OR)

- b) What is searching? Explain Linear Search Algorithm with example.