

Course Type: - Major

Paper Title: - DATA STRUCTURES USING C

Credit Weightage: - THEORY -04; PRACTICALS- 02

Semester: - 3rd

Paper Code:- CAP322M

Batch: - 2023

Course Objective:

- To understand the need and significance of Data structures as a computer Professional.
- To teach concept and implementation of linear and nonlinear data structures.
- Introduces a variety of data structures such as stack, queue, hash tables, search trees, heaps, graphs.
- To introduce various techniques for representation of the data in the real world.
- Introduces sorting and pattern matching algorithms.

Course Outcomes:

- Ability to select the data structures that efficiently model the information in a problem.
- Ability to assess efficiency trade-offs among different data structure implementations or combinations.
- Design programs using a variety of data structures, including hash tables, binary and general tree structures, search trees, heaps, graphs.
- Implement and know the application of algorithms for sorting and pattern matching.

UNIT – I

[16 Hours]

Introduction to Data Structures, abstract data types (ADT), operations on data structures. Introduction to arrays Operations on arrays: insertion, deletion, searching, sorting. Linear list – singly linked list implementation, insertion, deletion and searching operations on linear list

UNIT – II

[16 Hours]

Stacks- Operations, array and linked representations of stacks, stack applications, Queues- operations, array and linked representations, queue applications. Hash Table Representation: hash functions and collision resolution.

UNIT – III

[16 Hours]

Search Trees: Binary Search Trees, Definition, Implementation, Operations- Searching, Insertion, Deletion and traversal. Heap and heap sort.

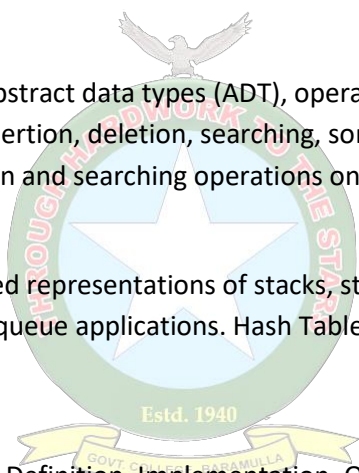
UNIT – IV

[16 Hours]

Graphs: Graph Implementation Methods. Graph Traversal Methods. Shortest path algorithms (Dijkstra's algorithm). Pattern Matching: Pattern matching algorithms -Brute force, the Boyer –Moore algorithm.

TEXT & REFERENCES:

1. Data Structures using C – A. S.Tanenbaum, Y. Langsam, and M.J. Augenstein, PHI/Pearson Education.
2. Data Structures and Algorithms Made Easy, Narasimha Karumanchi, Career Monk.
3. Fundamentals of Data Structures in C, 2nd Edition, E. Horowitz, S. Sahni and Susan Anderson Freed, Universities Press.
4. Data Structures: A Pseudocode Approach with C, 2 nd Edition, R. F. Gilberg and B.A.Forouzan,Cengage Learning.
5. Websites like VisuAlgo(<https://visualgo.net/>) and Data Structure Visualizations (www.cs.usfca.edu/~galles/visualization) provide interactive visualizations of various data structures and algorithms.



LAB WORK - DATA STRUCTURES (CAP322M)

LIST OF DATA STRUCTURE IMPLEMENTATIONS:

1. Write a program that implements stack and its operations using Arrays and Pointers.
2. Write a program that implements queue and its operations using Arrays and Pointers.
3. Write a program that uses functions to perform Creation, Insertion, Deletion and Traversal operations on a singly linked list.
4. Write a Program to implement various Hash table operations.
5. Write a program that uses functions to perform Creation, Insertion, Deletion and Traversal operations on a doubly linked list.
6. Write a program that uses functions to perform Creation, Insertion, Deletion and Traversal operations on a circular linked list.
7. Write a program to implement iterative and recursive tree traversal methods (preorder, inorder, postorder).
8. Write a program to implement Binary Search tree, Tree.
9. Write a program to implement BFS/DFS graph traversal methods.
10. Write a Program to implement Pattern matching algorithms.

