CSE205:DATA STRUCTURES AND ALGORITHMS

L:3 T:0 P:0 Credits:3

Course Outcomes: Through this course students should be able to

- Analyze any algorithm to determine time comlexity and Compare alternative implementations of data structures with respect to performance
- Effectively choose the data structure that efficiently model the information in any given problem
- Identify which algorithm of searching and sorting to apply for a particular data set and why.
- Design problem solution with the use of basic data structures such as Arrays, Linked List, Stacks, Queues, Trees and Graphs

Unit I

Introduction : Basic Data Structures, Basic Concepts and Notations, Complexity analysis: time space and trade off, Omega Notation, Theta Notation, Big O notation

Arrays : Linear arrays: memory representation, Traversal, Insertion, Deletion, Searching, Merging and their complexity analysis.

Sorting and Searching : Bubble sort, Insertion sort, Selection sort

Unit II

Linked Lists : Introduction, Memory representation, Allocation, Traversal, Insertion, Deletion, Header linked lists: Grounded and Circular, Two-way lists: operations on two way linked lists

Unit III

Stacks : Introduction: List and Array representations, Operations on stack (traversal, push and pop), Arithmetic expressions: polish notation, evaluation and transformation of expressions., Quick sort, Merge sort, Towers of Hanoi

Queues and Recursion : Array and list representation, operations (traversal, insertion and deletion), Priority Queues, Deques, Function Call, Recursion implementation and Complexity issues.

Unit IV

Trees : Binary trees: introduction (complete and extended binary trees), memory representation (linked, sequential), Pre-order traversal using Stack, In-order traversal using Stack, Post-order traversal using Stack, Binary Search Tree-searching, Binary Search Tree- Insertion, Binary Search Tree- deletion

Unit V

AVL trees and Heaps : AVL trees Introduction, AVL trees Insertion, AVL trees Deletion, Heaps: Insertion, Heaps: Deletion, HeapSort, Huffman algorithm

Unit VI

Graphs : Introduction: sequential and linked representation, searching, insertion and deletion., Warshall's algorithm, Shortest path algorithm Floyd Warshall Algorithm (modified warshall algorithm), Graph Traversal: BFS, DFS, Topological sorting, applications of graphs

Hashing : Hashing introduction: hash functions, hash table, Open hashing (separate chaining), Closed hashing (open addressing), Linear Probing, Quadratic Probing, Double Hashing

Text Books:

1. DATA STRUCTURES by SEYMOUR LIPSCHUTZ, MCGRAW HILL EDUCATION

References:

References: 1. DATA STRUCTURES AND ALGORITHMS by ALFRED V. AHO, JEFFREY D. ULLMAN AND JOHN E. HOPCROFT, PEARSON