CSE205:DATA STRUCTURES AND ALGORITHMS

L:3 T:1 P:0   Credits:4

Course Outcomes: Through this course students should be able to

- use different operations on arrays including traversing insertion, deletion, searching and sorting with their corresponding complexity analysis.

- differentiate arrays and linked list and to perform various operations on single, doubly and header linked list.

- modify structure of arrays and linked list to make it a queue and stack.

- describe how trees arerepresented in memory and used by algorithms.

- construct heap and apply heap sort and create AVL tree with appropriate rotations.

- apply BFS and DFS techniques on graphs and to understand basic concept of hashing.

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., Evaluation and transformation of expressions, Towers of Hanoi, Merge sort

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 : Warshall's algorithm, Shortest path algorithm Floyd Warshall Algorithm(modified warshall algorithm), Graph Traversal: BFS, DFS

Hashing : Hashing Introduction, Hash Functions, Hash Table, Closed hashing (open addressing), Linear Probing, Quadratic Probing, Double Hashing, Open hashing (separate chaining)

Text Books:

1. DATA STRUCTURES by SEYMOUR LIPSCHUTZ, MCGRAW HILL EDUCATION

References:

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