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CS623 DATA STRUCTURES AND ALGORITHMS LAB

Objective of the Course :

In this laboratory after completing experiments student has to learn how to analyze a problem & design the solution for the problem. In addition to that, solution must be optimum, i.e., time complexity & memory usage of the solution must be very low.

1. Code the List ADT operations using array, single linked list, double linked list.

2. Write a program that reads two lists of elements, prints them, reverses them, prints the reverse list, sort the lists, print the sorted lists, merges the list, prints merge list.

3. Implement a polynomial ADT and write a program to read two polynomials and print them, adds the polynomials, prints the sum, multiply the polynomials and print the product.

4. Implement stack ADT and write a program that reads an infix arithmetic expression of variables, constants, operators (+, -, *, /) and converts it into the corresponding postfix form. Extend the program to handle parenthesized expression also.

5. Implement Queue ADT and write a program that performs Radix sort on a given set of elements.

6. Implement the following sorting operations:-
   a) Merge Sort b) Quick Sort

7. Implement AVL Tree ADT and Write a program that interactively allows
   a) Insertion b) Deletion c) Find_min d) Find_max

8. Write a C++ program to find optimal ordering of matrix multiplication. (Note: Use Dynamic programming method).

9 Consider the problem of eight queens on an (8x8) chessboard. Two queens are said to attack each other if they are on the same row, column, or diagonal. Write a C++ program that implements backtracking algorithm to solve the problem i.e. place eight non-attacking queens on the board.

10. Write a C++ program to find the strongly connected components in a digraph.

11. Write a C++ program to implement dynamic programming algorithm to solve all pairs shortest path problem.

12. Write a C++ program to solve 0/1 knapsack problem using the following:
    a) Greedy algorithm.
    b) Dynamic programming algorithm.
    c) Branch and bound algorithm.

13. Write a C++ program that uses dynamic programming algorithm to solve the optimal binary search tree problem.

14. Write a C++ program for solving traveling sales persons problem using the following:
    a) **Dynamic programming algorithm.**
    b) **The back tracking algorithm.**
    c) **Branch and Bound.**

TEXT BOOKS :

1. *Richard F.Gilberg, Behrouz A.Forouzan, Thomson*, "Data Structures, A Pseudocode Approach with C++", 1st ed., Business Information Press, 2007.
2. *D.S.Malik, Thomson*, "Data Structures Using C++", 1st ed., Cengage Learning, 2007.
3. *Ellis Horowitz, Satraj Sahni* and *Rajasekharam*, "Fundamentals of Computer Algorithms", 2nd ed., Galgotia publications pvt. Ltd, 2006.