

## **CSE-2422 Computer Algorithms Lab**

### **List of Lab Experiments**

Students are expected to implement the following algorithms for getting familiar with those.

#### **A. Implementation of sorting algorithms**

1. Implementation of Insertion-sort
2. Implementation of Merge-sort
3. Implementation of Quick-sort and its randomized version
4. Implementation of Heap and Heap-sort
5. Implementation of Priority queue using binary heap
6. Implementation of Counting sort
7. Implementation of Radix sort

#### **B. Implementation of dynamic programming algorithms**

8. Solving matrix-chain multiplication problem
9. Solving longest common subsequence problem
10. Solving 0/1 knapsack problem

#### **C. Implementation of greedy algorithms**

11. Solving activity selection problem
12. Implementation of Huffman tree and generating prefix code
13. Solving fractional knapsack problem

#### **D. Implementation of string-matching algorithms**

14. Implementation of Naive string-matching algorithm
15. Implementation of Rabin-Karp algorithm
16. Implementation of Knuth-Morris-Prat algorithm

#### **E. Implementation of basic graph algorithms**

17. Implementation of Breadth First Search
18. Implementation of Depth First Search
19. Finding a topological ordering of the vertices of a graph
20. Finding the strongly connected components of a directed graph

#### **F. Implementation of minimum spanning tree algorithms**

21. Implementation of the Kruskal's Algorithm for finding minimum spanning tree
22. Implementation of the Prim's Algorithm for finding minimum spanning tree

**G. Implementation of shortest path algorithms**

- 23. Implementation of the Dijkstra's algorithm for solving single-source shortest path problem
- 24. Implementation of the Bellman-Ford's algorithm for solving single-source shortest path problem
- 25. Implementation of the Floyd-Warshall's algorithm for solving all-pairs shortest path problem

**H. Implementation of computational geometry algorithms**

- 26. Determining if two line segments intersect
- 27. Finding the convex hull of a set of points using Graham's scan algorithm

**I. Implementation of backtracking algorithms**

- 28. Solving N-Queen Problem
- 29. Generate all permutations of a sequence of letters

**J. Implementation of number theoretic algorithms**

- 30. Implementation of extended Euclid's algorithm for finding GCD
- 31. Implementation of different prime number generation algorithms
- 32. Finding the value of  $X^n \bmod m$  through modular exponentiation