

Data Structure and Algorithms Lab

Lab Program 8

1. Design and implement a Java program to find the **Minimum Spanning Tree (MST)** of a connected, weighted, undirected graph using **Prim's Algorithm**. The program should allow the user to input the number of vertices and edges along with their weights, construct the graph using an adjacency matrix or adjacency list representation, and then apply Prim's algorithm to determine the edges included in the MST and their corresponding total minimum cost. The program should display the order in which vertices are added to the MST and print the final set of selected edges. After implementation, analyze and find the **time complexity** of Prim's Algorithm.
2. Design and implement a Java program to find the **shortest path** from a given source vertex to all other vertices in a **weighted, connected graph** using **Dijkstra's Algorithm**. The program should allow the user to input the number of vertices, edges, and their respective weights, construct the graph using an adjacency matrix or adjacency list, and compute the minimum distance from the source to every other vertex. The program should display the shortest distance table and the path taken to reach each vertex from the source. After implementation, analyze and find the **time complexity** of Dijkstra's Algorithm.