

Department of Computer Science & Engineering
Indian Institute of Technology Kharagpur
Tutorial – 2
Subject: Analysis and Design of Algorithms (CS60007)
Time: 1 Hour,
September 5, 2024

ANSWER ALL QUESTIONS

1. Consider an acyclic directed graph with unweighted edges having one source node s and one sink node g . Present an algorithm to find the total number of directed paths from s to g . Show the working of the algorithm on an example. Analyze its complexity.
2. Consider the problem of finding the shortest path between two nodes in a weighted undirected graph having negative weight edges. Show that Dijkstra's algorithm may sometimes find the correct solution and may sometime fail to do so. Now present an algorithm that guarantees to find the optimal cost solution in the presence of negative edges. Show the working of the algorithm on an example. Analyze its complexity.
3. Given a set S of n distinct positive integers, and a positive integer X , present an efficient algorithm to find whether there are two elements in S whose sum is exactly X . Show the working of the algorithm on an example. Analyze the complexity of your algorithm.
4. Present the algorithm Quicksort. Prove that the algorithm Quicksort always sorts the elements correctly.