Department of Computer Science & Engineering
Indian Institute of Technology Kharagpur
Tutorial – I
Subject: Analysis and Design of Algorithms (CS60007)
Time: 1 Hour,
August 19, 2024

ANSWER ALL QUESTIONS

1. Prove in details whether Θ (Theta Function for measuring asymptotic complexity) is symmetric and/or transitive, or not.

2. A set of n independent tasks, each having integer execution times, are to be executed using three identical processors. A task can be executed in any of the three processors. Develop a sequential algorithm to find minimal total execution time for scheduling all the tasks. For this develop an initial recursive definition, indicate the properties of the unfolded recursion tree and develop a final algorithm. Show the working of your algorithm on a task set having the following execution times = {5, 7, 6, 9, 11, 17} using processors P1, P2 and P3. Analyze the time and space complexity of your initial and final algorithms.

3. Prove that any fractional split in Merge-Sort produces an O(n log n) algorithm but half-half split uses minimum number of comparisons in the worst case, compared to any other split.

4. Consider the Longest Common Subsequence problem of two strings. Is there a way to incorporate pruning in the Dynamic Programming Algorithm? If so, how? Present the algorithm with this feature.