

2125

M.E. Computer Science and Engineering (Cyber Security)

First Semester

Core - I CSN-8101: Advance Algorithms

(Common with ME Computer Science CS-8101)

Time allowed: 3 Hours

Max. Marks: 50

NOTE: Attempt five questions in all, including Question No. 1 which is Compulsory and selecting two questions from each Unit.

x-x-x

1. Attempt the following:-

- a) Define the Random Access Machine model.
- b) What is the significance of asymptotic notation in algorithm analysis?
- c) Write the recurrence relation for Merge Sort and solve it using the Master Theorem.
- d) Differentiate between Divide-and-Conquer and Greedy methodologies.
- e) State one real-life example where the Branch-and-Bound technique is effectively applied. (5x2)

UNIT - I

2. Analyze the Strassen's Matrix Multiplication algorithm. Derive its time complexity and compare it with the conventional matrix multiplication. (10)
3. Explain the working of Kruskal's and Prim's algorithms for finding a Minimum Spanning Tree. Compare their performance. (10)
4. Using the Greedy approach, design an algorithm for the Single Source Shortest Path problem. Prove its correctness and analyze its complexity. (10)

UNIT - II

5. Solve the 0-1 Knapsack Problem using Dynamic Programming and analyze its performance. (10)
6. Explain the Floyd-Warshall Algorithm for All-Pairs Shortest Paths. Give its pseudocode and complexity. (10)
7. What are NP-Complete and NP-Hard problems? Discuss with examples and explain the importance of Approximation Algorithms in solving such problems. (10)

x-x-x