

OMTCE/D-21
ADVANCES IN ALGORITHMS
Paper–MT-CSE-14-11

24181

Time Allowed : 3 Hours]

[Maximum Marks : 100

Note : Attempt **five** questions in all, selecting **one** question from each Unit.
Question No. **1** is compulsory. All questions carry equal marks.

Compulsory Question

1. (i) Why algorithms are necessary for computing problems?
- (ii) What is meant by randomized algorithm?
- (iii) Comment on the complexity of bubble sort.
- (iv) Why K-d tree is named as K-d tree?
- (v) What is dynamic programming?
- (vi) What is a bipartite graph?
- (vii) What are various types of Knapsack problems?
- (viii) What is NP-completeness? 8×2½=20

UNIT-I

2. (a) What is asymptotic notation? What are their significance in algorithms? Discuss the various type of asymptotic notation. 10
- (b) Solve the following recurrence relation and express this in asymptotic form. $T(n) = T(n-1) + 1/n$. 10
3. State and prove the master theorem for solving recurrences. 20

UNIT-II

4. (a) Write an algorithm to perform sorting using heapsort and analyze. 12
- (b) What is a bucket sort? Why it is used? Explain in detail. 8
5. What is a Splay tree? How can you perform insertions, deletions and searching in a Splay tree? Explain in detail. 20

UNIT-III

6. (a) Suppose you are given with six matrices having dimensions (30×35) , (35×15) , (15×5) , (5×10) , (10×20) , (20×25) . Find the minimum number of scalar multiplications to multiply these matrices using matrix-chain-multiplication. 10
- (b) Write down the algorithm for constructing Huffman's code and explain with an example. 10
7. Describe various ways to store the graphs in computer memory. How can you traverse a graph? Explain all the possible ways to traverse a graph in detail. 20

UNIT-IV

8. What are the various types of string matching? Explain any two string matching algorithms using suitable examples. 20
9. (a) What is meant by reducibility? Explain using suitable example. 10
- (b) What is a convex hull? What are the various methods to find convex hull? Explain any one method in detail. 10