

Roll No.

MCA (8-9)/D-14
DESIGN AND ANALYSIS OF ALGORITHMS
Paper-MCA-303

10378

Time Allowed : 3 Hours]

[Maximum Marks : 80

Note : Attempt five questions in all, selecting at least one question from each Unit. Question NO. 1 is compulsory. '

Compulsory Question

1. Write in brief the following (3 marks each):
 - (a) Define 'Divide and conquer' strategy.
 - (b) Define 'Backtracking' with an example.
 - (c) Define P and NP problem.
 - (d) Write '3' examples for NP Hard and NP complete problems.
 - (e) Explain various free-traversal methods.
 - (f) Using the basic definition of Θ -notation, prove that $\max(f(n), g(n)) = \Theta(f(n) + g(n))$.
 - (g) Show that the total running time of merge sort is $O(n \log n)$.
 - (h) What is advantage of doubly linked list over singly linked list? 3X8=24

UNIT-I

2. (a) Demonstrate the execution of the dynamic programming algorithm for longest common subsequence on the following example :

$X = \langle A B C D E \rangle$

$Y = \langle C A B E \rangle$.

7

What is the final LCS and its length?

- (b) Write an algorithm to. insert a node in the beginning of the linked list. 7
3. (a) Write an algorithm to implement DFSI. How is DFS different from BFS? 7
- (b) Define Hashing. Discuss any for 'Hashing' functions. 7

UNIT-II

4. (a) Describe any four features of Bottom-up approach to algorithm design. 7
- (b) Define Linear and Quadrative problems using an example. 7
5. (a) Discuss Cook's theorem with an example. 7
- (b) What is the space bound for 'cl' dimensional range trees? 7

UNIT—III

6. (a) What is Spanning tree and Minimum Spanning tree? Write Prim's algorithm With an example. 7
- (b) Discuss the impact of threaded binary tree on the tree traversal procedure. 7
7. (a) Construct an expression tree for the expression $((a/b) + c) - (cl * e)$ and give the pre-order and post-order traversals. 7
- (b) Define Program verification how is useful for designing a Perfect algorithm. 7

UNIT—IV

8. (a) Prove that the Hamiltonian cycle problem is Polynomial time verifiable. 7
- (b) Discuss any technique for algebraic problems in detail. Provide an example for the same. 7
9. Write short notes on any two : 7X2=14
 - (a) Recurrence Relation

- (b) Oracle and Adversary arguments
- (c) Dijkstra's algorithm.