

2015

MCA

3rd SEMESTER EXAMINATION

DESIGN AND ANALYSIS OF ALGORITHM

PAPER—MCA-304

Full Marks : 100

Time : 3 Hours

The figures in the margin indicate full marks.

Candidates are required to give their answers in their own words as far as practicable.

Illustrate the answers wherever necessary.

Answer any five questions.

1. (a) Define time and space complexity of an algorithm. 3
- (b) Explain RAM and TM. 4

(Turn Over)

- (c) What are the different design approaches for developing algorithms? 3
- (d) Discuss different asymptotic notations used in analysis of algorithm. 4
2. (a) How recursion works? What are the limitations of recursion? 2+2
- (b) Explain tail recursion with a suitable example. 4
- (c) Write down the algorithm of Tower of Hanoi problem and calculate its time complexity. 6
3. (a) Explain the strategy behind divide and conquer algorithms. 2
- (b) Write an algorithm of Mergesort technique using divide and conquer strategy. Calculate time complexity of Mergesort. 5+5
- (c) When worst case occurs in quicksort algorithm? 2
4. (a) Explain the features of an optimization problem for which it can be implemented using dynamic programming. 4

- (b) What is memoization and how it is different from an usual dynamic programming strategy? 3
- (c) Write down the matrix chain multiplication algorithm using dynamic programming with the algorithm for printing parenthesis. 7
5. (a) What is Greedy algorithm? What are the differences of greedy and dynamic programming approach? 2+2
- (b) Write down the algorithm for fractional knapsack problem using greedy approach. 6
- (c) Write down the Prim's algorithm for finding the minimum spanning tree of a graph. 4
6. (i) Define 'decision tree' with example of insertion sort on three elements.
- (ii) Prove 'Any decision tree that sorts n elements has height $\Omega(n \log n)$.' 6+8
7. Illustrate the operation of counting sort on the array $A = \{7, 1, 3, 1, 2, 4, 5, 7, 2, 4, 3\}$. Calculate its complexity. 14

8. (i) How do you define polynomial time algorithm ?
- (ii) Define NP complete problems.
- (iii) Define with example : weighted graph, dense graph, sparse graph, adjacency matrix.

3+3+(4×2)

Internal Assessment — 30
