2016

MCA 3rd Seme. Examination

DESIGN & 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. 2

(b) What are the different design approaches for developing algorithms. Explain atleast four of them. 6

(c) What is asymptotic notation ? Discuss different types of asymptotic notations. 2+4

2. (a) Explain tail recursion with a suitable example. 4

(b) Discuss how a tail recursive function is different from a non-tail recursive function. 4

(c) Write down the algorithm of Tower of Hanoi problem. Calculate its time complexity. 4+2

3. (a) Explain 'optimal substructure' and 'overlapping subproblem' features of an optimization problem. 4

(b) Write down the matrix chain multiplication algorithm using dynamic programming. 8

(c) Write down the difference between dynamic programming and greedy approach. 2

4. (a) Write an algorithm of Quicksort using divide and conquer strategy. Calculate time complexity of Quicksort. 5+5

(b) Explain why worst case time complexity is different from best case time complexity in Quicksort whereas these are same for Mergesort. 4

5. (a) Explain backtracking algorithm. 2

(b) Write an algorithm using backtracking for N Queens Probelm. 8

(c) Write down the Kruskal's algorithm for finding the minimum spanning tree of a graph using greedy approach. 4

6. (a) What are BFS and DFS algorithm for graph traversal ? 2

(b) Write down the BFS algorithm. 4

(c) Using greedy approach write down the fractional knapsack algorithm. 8

7. (a) Explain different types of complexity classes. 4

(b) List down some important NP-complete problems and explain any one of them. 4

(c) Explain optimization and decision problems. What is reduction ? Explain with an example. 3+3

8. (a) What is the necessity of approximation scheme ? 3

(b) What is performance guarantee ? Explain with an example. 3

(c) Write short notes on :

(i) Branch and Bound approach ;

(ii) Disjoint set manipulation. 4+4

[Internal Assessment : 30]