

**MCA 3rd Semester Examination, 2018**

**MCA**

*( Design and Analysis of Algorithm )*

PAPER – MCA-304

*Full Marks : 100*

*Time : 3 hours*

**Answer any five questions**

*The figures in the right-hand margin indicate marks*

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

*Illustrate the answers wherever necessary*

1. (a) Define time complexity and space complexity of an algorithm. 2
- (b) What is asymptotic notation? Explain different types of asymptotic notations used in analysis of algorithm. 2 + 4

*( Turn Over )*

- (c) Write down the algorithm of Tower of Hanoi problem and find the time complexity. 4 + 2
2. (a) Explain why a tail recursive function is advantageous over a non-tail recursive function? 3
- (b) Write down the Mergesort algorithm using divide and conquer strategy. 8
- (c) Obtain worst case time complexity of Quicksort. 3
3. (a) Explain greedy programming approach with an example. Describe the differences between greedy programming and dynamic programming approach. 4 + 2
- (b) Write down the algorithm of matrix chain multiplication problem using dynamic programming approach. 8
4. (a) Write down the Depth First Search algorithm for graph traversal. 4

- (b) Explain Fractional Knapsack problem and write down the algorithm. 6
- (c) Describe how all pair shortest path problem is solved using dynamic programming strategy. 4
5. (a) Write down the Kruskal's algorithm for finding the minimum spanning tree of a graph. 4
- (b) Write an algorithm using backtracking for 8 queens problem. 6
- (c) Explain how the 15-puzzle problem is solved using branch and bound strategy. 4
6. (a) Define decision problem and optimization problem. 2
- (b) Explain P and NP class of problems using examples. 6
- (c) What is an NP complete problem ? Explain circuit satisfiability problem. 3 + 3

( 4 )

7. Write short notes on the following :  $3\frac{1}{2} \times 4$
- (a) Lower Bound Theory
  - (b) Disjoint set manipulation
  - (c) Graph Coloring Problem
  - (d) Approximation algorithm.

[ *Internal Assessment* : 30 Marks ]

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