2017

MCA

3rd Semester Examination

DESIGN & ANALYSIS OF ALGORITHM

PAPER—MCA 304

Subject Code—32

Full Marks : 100

Time : 3 Hours

The figures in the right hand 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. 5×14

1. (a) Describe RAM and TM model of computation. 6

(b) Obtain the time complexity of Binary search algorithm. 4

(c) Define recurrence relation. What is amortized analysis ? 2+2

2. (a) What is a tail recursive function ? What is the advantage of a tail recursive function over a non-tail recursive function ? 4

(b) Write down the Quicksort algorithm using divide and conquer strategy. 6

(c) Obtain time complexity of Mergesort. 4

3. (a) What is dynamic programming approach ? Explain the feature of an optimization problem for which it can be implemented using dynamic programming approach. 3+3

(b) Write down the all pair shortest path algorithm using dynamic programming strategy and obtain the time complexity. 6+2

4. (a) Explain BFS and DFS algorithm for graph traversal. What data structures are associated with these algorithms ? 2+1

(b) Write down the 0-1 Knapsack problem algorithm. 6

(c) Describe how matrix chain multiplication problem is solved using divide and conquer strategy. 5

5. (a) What is optimization problem and decision problem ? 2

(b) What is P and NP class of problems ? Give examples. 2+2

(c) When a problem is a NP Complete problem ? Explain any well known NP Complete problem. 2+3

(d) Explain reduction with an example. 3

6. (a) What is the difference between greedy approach and divide and conquer strategy ? 2

(b) Write an algorithm for fractional Knapsack problem using greedy approach. Obtain time complexity of this algorithm. 6+2

(c) Write down the Prim's algorithm for finding the minimum spanning tree of a graph. 4

7. (a) How backtracking is used to write some algorithm ? 2

(b) Write an algorithm using backtracking for Graph coloring problem. 6

(c) Explain branch and bound strategy using 15-puzzle problem. 6

8. Write short notes on the following : $4 \times 3\frac{1}{2}$

(a) Time complexity and space complexity ;

(b) Tower of Hanoi problem ;

(c) Approximation algorithm ;

(d) Disjoint set manipulation.

[Internal Assessment : 30 Marks]

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