2019

DESIGN AND ANALYSIS OF ALGORITHM

PAPER —2101

Full Marks : 100

Time : 3 hours

Answer **Q.No. 1** and any **four** from the rest

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. Answer any *five* questions : 2×5

    (*a*) Suppose, I have written few steps to solve a problem. But the solution proposed by me does not terminate. Can it be referred as an "algorithm" ? Justify your answer.

    (*b*) What is tail recursion ?

(c) What is the worst-case time complexity of merge sort algorithm ?

(d) Why do we need to study minimum spanning tree ?

(e) Define time and space complexity.

(f) What do you mean by greedy programming technique ?

(g) Define Big oh(O) notation of complexity.

(h) What type of data structures are used in BFS and DFS ?

2. (a) Write a greedy algorithm for solving 0/1-knapsack problem.

(b) Describe Depth-First search of graph traversal algorithm with example.

(c) What is Tower of Hanoi problem ?   5 + 7 + 3

3. (a) What is NP hard class of problem ?

(b) What do you mean by clique decision problem ? Give an approximation solution for this problem.

(c) What is circuit satisfiability problem ?

$3 + (3 + 5) + 4$

4. (a) Write down the Quicksort algorithm using divide and conquer strategy.

(b) Explain time complexity of Merge sort for different cases.

(c) Explain the advantage of using tail recursive function over non-tail recursive function.

$6 + 5 + 4$

5. (a) Write down the matrix chain multiplication algorithm using dynamic programming.

(b) Explain the difference between dynamic programming approach and greedy approach.

(c) Write down the algorithm of Tower of Hanoi problem.

$8 + 3 + 4$

6. (a) Explain BFS and DFS algorithms for graph traversal with examples.

    (b) Write Prim's algorithm for minimum spanning tree.

    (c) Explain the 15 puzzle problem briefly.

$$(4 + 4) + 4 + 3$$

7. Write short notes on any *three* : 5×3

    (i) Binary search

    (ii) Travelling Salesman problem

    (iii) Circuit Satisfiability Problem

    (iv) Kruskal's Algorithm

    (v) Graph Colouring Problem.

[*Internal Assessment* : 30 Marks]