2016

M.Sc. 1st Semester Examination

COMPUTER SCIENCE

PAPER—COS-101

Full Marks : 50

Time : 2 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.

(Design and Analysis of Algorithm)

Answer Q. No. *1* and any *two* questions.

1. (a) Explain different types of asymptotic notation used in analysis of algorithm.   4

   (b) What is time complexity and space complexity of an algorithm ?   2

(c) Show the complexity of the recurrance relation shown below :

$$T(n) = \begin{cases} a & , \quad \text{if } n = 1 \\ 2T\left(\frac{n}{2}\right) + an & , \quad \text{otherwise} \end{cases}$$ 4

2. (a) Write down the Quick sort algorithm using divide and conquer strategy. Why worst case time complexity of Quick sort is different from its best case time complexity ?

6+3

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

3. (a) What is matrix chain multiplication problem ? Write down the matrix chain multiplication algorithm using dynamic programming strategy. 2+8

(b) How dynamic programming strategy is different from greedy approach ? 2

(c) Explain the features of an optimization problem for which it can be implemented using dynamic programming. 3

4. (a) Explain the situation for which back tracking technique is used. 2

(b) Write an algorithm for N-Queens problem using back tracking technique. Find its time complexity.　　7+3

(c) Write down the DFS algorithm for graph traversal.　3

5. (a) What are the different complexity classes ? What is a NP-complete problem ? Explain any one of them.

　　　　　　　　　　　　　　　　1+2+2

(b) Write down the Prim's Algorithm to find minimum spanning tree of a graph.　　　　　　　　3

(c) What is the necessity for approximation algorithm ? Write an algorithm to solve fractional knapsack problem using greedy approach.　　　　　　　　2+5

Internal Assessment — 10

───────