Printed Pages—3 **ECS502**

(Following Paper ID and Roll No. to be filled in your Answer Book)

PAPER ID : 2165 **Roll No.** | | | | | | | | | | |

B.Tech.

(SEM. V) ODD SEMESTER THEORY EXAMINATION 2013-14

DESIGN AND ANALYSIS OF ALGORITHMS

Time : 3 Hours *Total Marks : 100*

Note :– (1) **All** questions are compulsory.

(2) Each question carries equal marks.

1. Attempt any **four** parts of the following : **(5×4=20)**

(a) Consider the recurrences

$T(n) = 3\,T(n/3) + cn$, and

$T(n) = 5\,T(n/4) + n^2$ where c is constant and n is the number of inputs. Find the asymptotic bounds.

(b) What do you mean by algorithm ? Write the characteristics of algorithm.

(c) Sort the following array using heap-sort techniques : {5, 13, 2, 25, 7, 17, 20, 8, 4}. Discuss its worst case and average case time complexities.

(d) Describe any **one** of the following sorting techniques :

(i) Selection sort

(ii) Insertion sort.

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(e) What do you understand by asymptotic notations ? Describe important types of asymptotic notations.

(f) What is recursion tree ? Describe.

2. Attempt any **two** parts of the following : **(10×2=20)**

(a) Explain red-black tree. Show steps of inserting the keys 41, 38, 31, 12, 19, 8 into initially empty red-black tree.

(b) Write the characteristics of a B-Tree of order m. Create B-Tree of order 5 from the following lists of data items : 20, 30, 35, 85, 10, 55, 60, 25, 5, 65, 70, 75, 15, 40, 50, 80, 45.

(c) What is a binomial heap ? Describe the union of binomial heap.

3. Attempt any **two** parts of the following : **(10×2=20)**

(a) Describe and compare following algorithms to determine the minimum cost spanning tree :

(i) Kruskal's algorithm

(ii) Prim's algorithm.

(b) What is an optimization problem ? How greedy method can be used to solve the optimization problem ?

(c) What is matrix chain multiplication problem ? Describe a solution for matrix chain multiplication problem.

4. Attempt any **two** parts of the following : **(10×2=20)**

(a) Write an algorithm to find shortest path between all pairs of nodes in a given graph.

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(b) Write short notes on the following :

(i) n-Queen problem

(ii) Graph coloring.

(c) What is Travelling Salesman Problem (TSP) ? Discuss at least one approach used to solve the problem.

5. Attempt any **two** parts of the following : **(10×2=20)**

(a) Discuss the problem classes P, NP and NP-complete.

(b) What is FFT (Fast Fourier Transformation) ? How the recursive FFT procedure works ? Explain.

(c) Write short notes on Randomized algorithms.