

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

PAPER ID : 2165

Roll No.

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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

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

$T(n) = 5T(n/4) + n^2$ 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.

- (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.

(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.