Roll No. | | | | | | | | | | | | | Total No. of Pages : 02

Total No. of Questions : 09

B.Tech.(CSE) (2011 Onwards) (Sem.–5)

DESIGN AND ANALYSIS OF ALGORITHMS

Subject Code : BTCS-503

Paper ID : [A2099]

Time : 3 Hrs. Max. Marks : 60

INSTRUCTION TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students has to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students has to attempt any TWO questions.

SECTION-A

1. Write briefly :

a. Define time complexity and space complexity of an algorithm.

b. List various applications of BFS and DFS algorithms.

c. What is the advantage of using merge-sort algorithm over quick-sort algorithm?

d. What would be the running time of radix sort on an array of n integers in the range $0..n^5 - 1$ when base –10 representation is used?

e. What do you mean by NP-complete problems?

f. What are the average and worst case time complexities of mergesort and quicksort algorithms?

g. What do you mean by convex hull?

h. What are the applications of Fast Fourier Transform (FFT)?

i. Differentiate between graph and a tree.

j. Define Algorithm Validation.

SECTION-B

2. What are asymptotic notations? Describe with the help of examples various commonly used asymptotic notations.

3. Write an algorithm based on divide-and-conquer strategy to search an element in a given list. Assume that the elements of list are in sorted order.

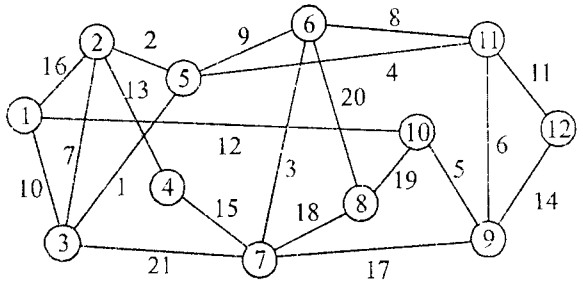
4. Describe an algorithm that can perform selection in worst case linear time.

5. Describe Bellman-Ford algorithm to solve single-source shortest path problem. What is its time complexity?

6. Describe how polynomial-time reductions are used to prove that a problem is NP-complete.

SECTION-C

7. Define spanning tree. Write Kruskal's algorithm for finding minimum spanning tree. Using Kruskal's algorithm, find minimum spanning tree for the graph given below :



8. Describe how an array of elements can be sorted using Quick Sort algorithm. Show that the running time of Quick Sort is $0(n^2)$ when the array A contains distinct elements and is sorted in decreasing order.

9. Describe in detail Knuth-Morris-Pratt string matching algorithm.