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B.Tech.(CSE) (2011 Onwards) (Sem.-5)
DESIGN AND ANALYSIS OF ALGORITHMS
Subject Code : BTCS-503
Paper ID : [A2099]

Max. Marks : 60

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.

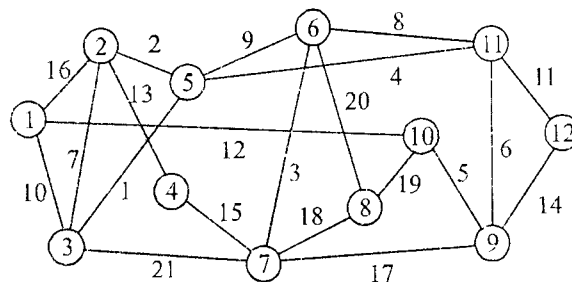
- Define time complexity and space complexity of an algorithm.
- List various applications of BFS and DFS algorithms.
- What is the advantage of using merge-sort algorithm over quick-sort algorithm?
- What would be the running time of radix sort on an array of n integers in the range $0..n^5 - 1$ when base -10 representation is used?
- What do you mean by NP-complete problems?
- What are the average and worst case time complexities of mergesort and quicksort algorithms?
- What do you mean by convex hull?
- What are the applications of Fast Fourier Transform (FFT)?
- Differentiate between graph and a tree.
- 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 $O(n^2)$ when the array A contains distinct elements and is sorted in decreasing order.
9. Describe in detail Knuth-Morris-Pratt string matching algorithm.