Total Pages: 3

301404

May, 2019

B.TECH. (CE/CSE/IT) - IV SEMESTER Design & Analysis of Algorithms (PCC-CS-404)

Time: 3 Hours]

[Max. Marks: 75

Instructions:

- 1. It is compulsory to answer all the questions (1.5 marks each) of Part-A in short.
- 2. Answer any four questions from Part-B in detail.
- 3. Different sub-parts of a question are to be attempted adjacent to each other.

PART-A

1. (a) Solve the following recurrence relation:

$$T(n) = T(n^{1/2}) + c.$$
 (1.5)

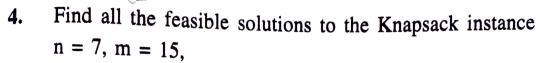
- (b) Differentiate between O-notation and Omega-notation with the help of appropriate example. (1.5)
- (c) How arrays can be used to store a tree? Discuss with example. (1.5)
- (d) For which type of problems Divide & Conquer approach is generally used, discuss. (1.5)

- (e) Differentiate between Depth First Search and Breadth First Search. (1.5)
- (f) What is Transitive Closure of a graph? (1.5)
- (g) What do you mean by reducibility? (1.5)
- (h) Which approach among Backtracking and Branch & Bound is better and why? (1.5)
- (i) Discuss the time complexity of Kruskal's algorithm. (1.5)
- (j) Why Randomized algorithms are used? Discuss with example. (1.5)

PART-B

- 2. Design a divide and conquer algorithm to find the maximum and minimum of an array A of n elements, and prove that the algorithm makes at most 3n/2 element-to-element comparisons. (15)
- 3. (a) Differentiate between Deterministic and Non-Deterministic algorithms. Write a Deterministic algorithm to search an element in the array and convert the same into a Non-Deterministic algorithm. (7)
 - (b) Differentiate between Greedy and Dynamic method to solve the problems. Write and explain All Pair Shortest Path algorithm to find the Shortest Paths in a graph with example and derive its time complexity.

(8)



$$(P_i) = (10, 5, 15, 7, 6, 18, 3)$$

 $(W_i) = (2, 3, 5, 7, 1, 4, 1).$

Find the optimal solution for the same by using Greedy method. (15)

- 5. (a) What do you mean by Network Flow? Write Ford-Fulkerson algorithm with suitable example. (5)
 - (b) Differentiate between Backtracking and Branch & Bound with the help of suitable examples. Discuss the Hamiltonian Cycle problem and write its algorithm.

 (10)
- 6. (a) Why Topological sorting is used for Directed Acyclic Graph (DAG), justify with suitable example. (7)
 - (b) What are approximation algorithm and why they are used? Solve Travelling Salesman Problem by using approximation algorithm. (5)
- 7. (a) Discuss P, NP, NP-Complete and NP-Hard Problems with suitable examples. (10)
 - (b) What is Satisfibility? Discuss CNF-Satisfibility. (5)