

YMCA UNIVERSITY OF SCIENCE & TECHNOLOGY, FARIDABAD
B.TECH EXAM Vth SEMESTER (UNDER CBS), DEC 2016
ANALYSIS & DESIGN OF ALGORITHMS CE-307

(71)

Time: 3 hrs

M.Marks:60

Note: Part-I is compulsory.
In Part-II, attempt 4 questions out of 6.

Part-I

Q. No. 1

a. Solve the following recurrence relation:

$$T(n) = T(n^{1/2}) + c \text{ for } n > 1$$

- b. Write the general algorithm for Divide and Conquer method.
- c. Differentiate between upper bound and lower bound of time complexity, discuss with example.
- d. What are the two way in which a graph can be represented, discuss.
- e. Discuss the time complexity of Prim's method.
- f. For which type of problems Backtracking approach is generally used, discuss.
- g. Discuss the time complexity of All Pair Shortest Path problem.
- h. Differentiate between P and NP-problems.
- i. Which approach among Greedy and Dynamic method is better and why?
- j. Compare the time complexity of Single Source Shortest Path problem if solved by dynamic method and Greedy method.

(2*10)

Part-II

Q. No. 2 Discuss Quick Sort technique can be used for sorting a list. How much time is required for the various steps involved in the sort? Analyze the time complexity of algorithm in best, average and worst cases. (10)

Q. No. 3 What is the solution generated by the Job sequencing with deadlines algorithm when $n=7$, $p = (3, 5, 20, 18, 1, 6, 30)$ and $d = (1, 3, 4, 3, 2, 1, 2)$? (10)

Q. No. 4 Write the recursive backtracking algorithm for sum of subset problem and also solve the following:-

$$W = \{5, 7, 10, 12, 15, 18, 20\} \text{ and } m=35$$

If the given set W is arranged in ascending order or descending order then is there any noticeable difference in computing time? (10)

Q.No. 5 Consider five items along with their respective weights and profits :

$$W_i = (5, 10, 20, 30, 40)$$

$$P_i = (30, 20, 100, 90, 160)$$

The Knapsack has capacity, $m = 60$, Find out the solution to the fractional Knapsack problem using Branch and Bound method. (10)

Q. No. 6 Discuss any two of the following problems and analyze them: (2*5=10)

- a. 0/1 Knapsack Problem (using dynamic programming)
- b. Hamiltonian problem (using backtracking)
- c. NP-Hard and NP-Complete

Q. No. 7 Differentiate between Deterministic and Non-Deterministic algorithms. Write a Deterministic algorithm to sort an array and convert the same into a Non-Deterministic algorithm. (10)