

## II B.Tech II Semester Regular Examinations, July/August 2022

## DESIGN AND ANALYSIS OF ALGORITHMS

(Common to CSE, IT, AIML &amp; DS)

Time: 3 hours

Max Marks: 70

## Instructions:

1. Question paper comprises of Part-A and Part-B
2. Part-A (for 20 marks) must be answered at one place in the answer book.
3. Part-B (for 50 marks) consists of five questions with internal choice, answer all questions.

## PART – A

(Answer ALL questions. All questions carry equal marks)

10 \* 2 = 20 Marks

- a. Using step count finds the time complexity of sum of 'n' natural numbers. [2]
- b. Define time complexity. [2]
- c. Write the control abstraction for divide and conquer. [2]
- d. Write the applications of divide and conquer method. [2]
- e. Define dynamic programming. [2]
- f. What is optimal binary search tree? [2]
- g. Write about activity selection problem. [2]
- h. List the applications of backtracking. [2]
- i. Write the non-deterministic sorting algorithm. [2]
- j. What is branch and bound algorithm? How it is different from backtracking? [2]

## PART – B

(Answer ALL questions. All questions carry equal marks)

5 \* 10 = 50 Marks

2. (a) In what way amortized analysis is used for performance analysis of algorithms? Explain. [10]  
(b) Write the properties of an Algorithm.

OR

3. (a) Explain the role of instance characteristics in finding the time and space complexities with an example. [10]  
(b) Differentiate between Big O and small o notation.

4. (a) Develop algorithms for disjoint set union using weighting rule.  
(b) Develop algorithms for disjoint set find using collapsing rule

OR

5. (a) Apply quick sort algorithm to sort the list. E, X, A, M, P, L, E in alphabetical order.  
(b) Analyze the best, average and worst case complexity of quick sort.

6. Obtain the solution to knapsack problem by Dynamic Programming method  $n=6$ ,  
 $(p_1, p_2, \dots, p_6) \neq (w_1, w_2, \dots, w_6) = (100, 50, 20, 10, 7, 3)$  and  $m=163$  163

$(P_1, P_2, P_3, P_4, P_5, P_6) = (1, 10, 5, 7, 6, 2)$   
OR

7. Write an algorithm for all pairs shortest path problem and obtain all pairs shortest path for

0	4	15
8	0	2
3	$\infty$	0

8. Derive time complexity of job sequencing with deadlines. Obtain the optimal solution when  $n=5$ ,  $(p_1, p_2, \dots) = (20, 15, 10, 5, 1)$  and  $(d_1, d_2, \dots) = (2, 2, 1, 3, 3)$ .

OR

9. (a) What is the role of 'min' cost edge in the graph to find minimum cost spanning tree using Kruskal's algorithm? Give the implementation.  
(b) Describe an algorithm to solve 8-queen problem and Show the state space tree.

10. (a) Define NP Hard and NP complete. What is Satisfiability problem?  
(b) Explain the principles of FIFO.

OR

11. (a) What is LC search?  
(b) Explain how LC-Branch and Bound can be applied to 0-1 Knapsack problem.

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