Q. P. Code: 20CSE363 HALL TICKET NO.: \_\_\_\_\_\_\_\_\_\_\_

B.TECH VI SEMESTER (R20)

REGULAR / SUPPLEMENTARY EXAMINATIONS - JUN - 2024

DESIGN AND ANALYSIS OF ALGORITHMS

(Common to CSE, CSM, CAI and CSD)

Time: 3 Hours Max. Marks: 70

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## PART – A

Answer ALL questions. Each question carries 2 marks.

\*\*B. Tech VI Semester (CO: R20 Computer Networks Exam\*\*, BT: -)

\*\*Time:\*\* 3 hours \*\*Max Marks:\*\* 70. (CO: -, BT: -)

\*\*. (CO: 20 Marks\*\*, BT: -)

Answer \*\*ALL\*\* questions. Each question carries 2 marks. (CO: -, BT: -)

1. Explain the difference between Big Oh (CO: O and Omega, BT: -)

2. Write a pseudocode for finding the maximum element in an array. (CO: CO1, BT: BT2)

3. What is the time complexity of a linear search algorithm? (CO: CO1, BT: BT1)

4. Explain the concept of a disjoint set. (CO: CO2, BT: BT1)

5. What is the Master Theorem used for? Briefly explain one of its cases. (CO: CO1, BT: BT2)

6. State the difference between Merge Sort and Quick Sort. (CO: CO2, BT: BT1)

7. Describe the principle behind Dynamic Programming. (CO: CO3, BT: BT1)

8. Explain the 0/1 Knapsack problem. (CO: CO3, BT: BT1)

9. What is the greedy approach in algorithm design? (CO: CO4, BT: BT1)

10. Define NP-Hard and NP-Complete problems. (CO: CO5, BT: BT1)

## PART – B

Answer ONE question from each UNIT – Each question carries 10 marks.

### UNIT - 1: INTRODUCTION\*\*

11. a) Analyze the time and space complexity of the following recursive function: (CO: CO1, BT: BT3)

(OR)

b) Solve the recurrence relation T(n) = 2T(n/2) + n using the Master Theorem. (CO: CO1, BT: BT3)

### UNIT - 2: DISJOINT SETS, DIVIDE AND CONQUER\*\*

13. a) Explain the Union-Find algorithm with an example. (CO: CO2, BT: BT2)

(OR)

b) Describe the steps involved in Strassen's Matrix Multiplication algorithm. What is its time complexity? (CO: CO2, BT: BT3)

### UNIT - 3: DYNAMIC PROGRAMMING\*\*

15. a) Explain how dynamic programming is used to solve the Matrix Chain Multiplication problem. (CO: CO3, BT: BT3)

(OR)

b) Describe the optimal binary search tree problem. (CO: CO3, BT: BT2)

### UNIT - 4: GREEDY METHOD AND BACKTRACKING\*\*

17. a) Explain Kruskal's algorithm for finding the Minimum Cost Spanning Tree. (CO: CO4, BT: BT3)

(OR)

b) Solve the Job Sequencing with Deadlines problem using a greedy approach for the following instance: Deadlines = {4, 1, 1, 3}, Profits = {20, 15, 10, 5}. (CO: CO4, BT: BT3)

### UNIT - 5: BRANCH AND BOUND, NP-HARD AND NP-COMPLETE PROBLEMS\*\*

19. a) Explain the Branch and Bound algorithm and its application in solving the Traveling Salesperson Problem. (CO: CO5, BT: BT3)

(OR)

b) Differentiate between LC Branch and Bound and FIFO Branch and Bound. (CO: CO5, BT: BT2)