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**PRESIDENCY UNIVERSITY
BENGALURU**

SET – B

**SCHOOL OF ENGINEERING
END TERM EXAMINATION – MAY/JUNE 2024**

Semester : Semester IV - 2022

Date : June 10, 2024

Course Code : CSE2007

Time : 09.30am to 12.30pm

Course Name : Design and Analysis of Algorithms

Max Marks :100

Program : B.Tech. Computer Science and Engineering

Weightage : 50%

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- Note:** 1. Answer ALL 5 FULL Questions.
2. Each Full Question carries 20 Marks
3. Scientific and non-programmable calculator are permitted.
4. Do not write any information on the question paper other than Roll Number.
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- 1.a. Define Worst-case, Best-case efficiencies [Knowledge] (C01) (04 Marks)
1.b. List down the steps involved in mathematical analysis of Recursive Algorithms [Comprehension] (C01) (06 Marks)
1.c. Explain asymptotic notations in detail [Application] (C01) (10 Marks)

or

- 2.a. List down the steps involved in analyzing an algorithm [Knowledge] (C01) (04 Marks)
2.b. List down the steps involved in mathematical analysis of Non-Recursive Algorithms [Comprehension] (C01) (06 Marks)
2.c. Find the time complexity (upper bound) for the below recursive functions (C01) (10 Marks) [Application]

$$T(n)=n + T(n-1); \quad ;n>1$$

$$T(n)=1 \quad ;n=1$$

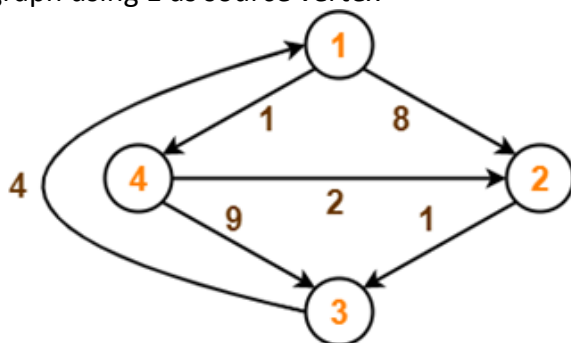
- 3.a. List down the steps involved for bubble sort and apply the same to sort 6 0 3 5 [Knowledge] (C02) (04 Marks)
3.b. Write C Program or algorithm to Print all Distinct (Unique) Elements in given Array [Comprehension] (C02) (06 Marks)
3.c. Demonstrate string matching algorithm with suitable example [Application] (C02) (10 Marks)

or

- 4.c. Explain Master's theorem **[Knowledge]** (C02) (04 Marks)
- 4.b. Write an algorithm to find uniqueness of elements in an array and also give the mathematical analysis of this non recursive algorithm with all steps. **[Comprehension]** (C02) (06 Marks)
- 4.a. Write and apply selection sort algorithm on following set of integers 8,5, 7,3,2. **[Application]** (C02) (10 Marks)
- 5.a. When does the worst case occur in Merge Sort? Give an analysis of merge sort algorithm? What types of Datasets work best for Merge Sort? **[Knowledge]** (C03) (04 Marks)
- 5.b. How does the Divide and Conquer Strategy work with Merge Sort? **[Comprehension]** (C03) (06 Marks)
- 5.c. Write and explain Quick sort algorithm **[Application]** (C03) (10 Marks)

or

- 6.a. List down the advantages and limitations of divide & conquer technique **[Knowledge]** (C03) (04 Marks)
- 6.b. Briefly explain decrease and conquer with two advantages and disadvantages **[Comprehension]** (C03) (06 Marks)
- 6.c. Write and explain binary search algorithm with an example **[Application]** (C03) (10 Marks)
- 7.a. List down any four applications of the greedy strategy **[Knowledge]** (C04) (04 Marks)
- 7.b. Why Dijkstra's Algorithms fails for the Graphs having Negative Edges? **[Comprehension]** (C04) (06 Marks)
- 7.c. Apply all pair shortest path algorithm (Floyd Warshall) for the below graph using 1 as source vertex (C04) (10 Marks)



[Application]

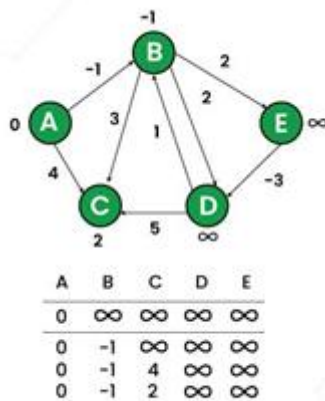
or

- 8.a. Define Dynamic programming and briefly list down three of its properties **[Knowledge]** (C04) (04 Marks)
- 8.b. Briefly explain steps in involved in Floyd algorithm. **[Comprehension]** (C04) (06 Marks)
- 8.c. Write & explain Kruskal's algorithm **[Application]** (C04) (10 Marks)

- 9.a List down the steps involved in back tracking [Knowledge] (C05) (04 Marks)
- 9.b How do I determine the constraints or conditions for backtracking? What happens if there is no valid solution in the search space? [Comprehension] (C05) (06 Marks)
- 9.c Draw state space tree for N queen's problem with 4 *4 chess board having 4 queens Q1, Q2, Q3, Q4. [Application] (C05) (10 Marks)

or

- 10.a When to Use a Backtracking Algorithm? [Knowledge] (C05) (04 Marks)
- 10.b For a given set {3, 34, 4, 12, 5, 2} and the target sum = 9. Define a function and use recursive method to check whether there exists a subset with the given sum or not. [Comprehension] (C05) (06 Marks)
- 10.c Apply bellman ford algorithm for below graph (C05) (10 Marks)



[Application]