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**PRESIDENCY  
UNIVERSITY**

**BENGALURU**

**School of Information and Science**

**Mid - Term Examinations - November 2024**

**Semester:** III

**Date:** 05-11-2024

**Course Code:** CSA2005

**Time:** 02.00pm to 03.30pm

**Course Name:** Analysis of Algorithms

**Max Marks:** 50

**Program:** BCA, BCD, BCI

**Weightage:** 25%

**Instructions:**

*(i) Read all questions carefully and answer accordingly.*

*(ii) Do not write anything on the question paper other than roll number.*

**Part A**

**Answer ALL the Questions. Each question carries 2marks.**

**5Qx2M=10M**

- |   |   |         |    |     |
|---|---|---------|----|-----|
| 1 | List the various basic asymptotic efficiency classes.                       | 2 Marks | L1 | C01 |
| 2 | Write an algorithm to find the factorial of a given number using recursion. | 2 Marks | L1 | C01 |
| 3 | Define an algorithm. List one of its advantages.                            | 2 Marks | L1 | C01 |
| 4 | What is bubble sort? What is its worst case time complexity?                | 2 Marks | L1 | C02 |
| 5 | List one strength and one weakness of brute force algorithms.               | 2 Marks | L1 | C02 |

**Part B**

**Answer ALL Questions. Each question carries 10 marks.**

**4QX10M=40M**

- |     |   |         |    |     |
|-----|---|---------|----|-----|
| 6a. | Describe the notion of an algorithm.  | 4 Marks | L2 | C01 |
| 6b. | Define average-case and best-case efficiencies.   | 4 Marks | L1 | C01 |
| 6c. | What is the basic operation of an algorithm, and why is it important in analyzing the algorithm's efficiency? | 2 Marks | L1 | C01 |

**Or**

- |   |                                       |          |    |     |
|---|---------------------------------------|----------|----|-----|
| 7 | Briefly explain asymptotic notations. | 10 Marks | L2 | C01 |
|---|---------------------------------------|----------|----|-----|

**8a.** Outline the steps involved in the mathematical analysis of non-recursive algorithms. 4 Marks L1 C01

**8b.** Determine the upper bound of the time complexity for the following iterative functions. 4 Marks L3 C01

**8**

```
A() {
int i,j,k,n;
for(i=1;i<=n;i++) {
for(j=1;j<=i;j++) {
for(k=1;k<=100;k++) {
printf("Presidency"); } } }
```

**8c.** Write any two properties of an algorithm. 2 Marks L1 C01

**or**

**9 9a.** Outline the steps involved in the mathematical analysis of non-recursive algorithms. 4 Marks L1 C01

**9b.** Determine the upper bound of the time complexity for the following recursive functions. 6 Marks L3 C01

$T(n)=1 + 2*T(n-1)$  for  $n>1$   
 $T(n)=1$  for  $n=1$

**10a.** Implement the bubble sort algorithm on the following set of integers: 5,4,3,2,1 4 Marks L3 C02

**10**

**10b.** Write a C program or algorithm to print all distinct (unique) elements in a given array. 6 Marks L3 C02

**or**

**11** Write and explain the selection sort algorithm with an example of your choice. 10 Marks L3 C02

**12** Write an algorithm for a pattern matching algorithm. Demonstrate the same with a suitable example. 10 Marks L3 C02

**or**

**13a.** Define the knapsack problem and apply it to the following set of data with a bag capacity of ( $m = 16$ ) 6 Marks L3 C02

Item	1	2	3	4	5	6	7
Weight	3	4	6	8	2	5	2
Value	11	6	16	8	7	19	4

**13 13b.** Apply exhaustive search technique for the given TSP problem. 4 Marks L3 C02

