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PRESIDENCY UNIVERSITY BENGALURU

SCHOOL OF ENGINEERING MID TERM EXAMINATION - MAY 2023

Semester : Semester IV - B.Tech CSE - 2021

Course Code : CSE2007

Course Name : Sem IV - CSE2007 - Design and Analysis of Algorithms

Program : B.Tech. Computer Science and Engineering

Date : 18-MAY-2023

Time : 2.00 PM - 3.30 PM

Max Marks : 50

Weightage : 25%

Instructions:

- (i) Read all questions carefully and answer accordingly.
 - (ii) Question paper consists of 3 parts.
 - (iii) Scientific and non-programmable calculator are permitted.
 - (iv) Do not write any information on the question paper other than Roll Number.
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PART A

ANSWER ALL THE QUESTIONS

(5 X 2 = 10M)

1. Derive the time complexity for the given relation using Master's method
 $T(n) = T(n/3) + 1$ for $n > 1$

(CO1) [Knowledge]

2. Name the algorithm design techniques to solve the following problem.
(i) Insertion Sort
(ii) Mergesort

(CO1) [Knowledge]

3. Find the running time of the following program segment :

```
void main ()
{
    int i,j;
    for (i=1; i<=n;i++)
        for (j=1; j<=n2; j++)
            for (i=1; i<=n3; i++)
                x=y+z;
}
```

(CO1) [Knowledge]

4. What is an Algorithm? Explain the properties of an Algorithm.

(CO1) [Knowledge]

5. Calculate the time complexity for the given recurrence relation using Master's theorem.

$$T(n)=8T(n/2)+n^3$$

(CO1) [Knowledge]

PART B

ANSWER ALL THE QUESTIONS

(4 X 5 = 20M)

6. Write the algorithm for Insertion sort and give its time complexity
(CO2) [Comprehension]
7. Write the algorithm for Binary search and derive its time complexity
(CO2) [Comprehension]
8. Explain the general plan for analysis of recursive algorithms
(CO1) [Comprehension]
9. Apply Strassen's Matrix Multiplication algorithm to compute the resultant matrix of size 2×2 .
 $A = [1, 2 : 5,6]$
 $B = [4, 6 : 2,3]$
 (CO2) [Comprehension]

PART C

ANSWER ALL THE QUESTIONS

(2 X 10 = 20M)

10. Apply merge sort algorithm for the given unsorted array and give its all three time complexity.
 $arr = \{38, 27, 43, 3, 9, 82, 10\}$
 (CO2) [Application]
11. Write the algorithm for Quick sort and Derive its time complexity for Best case using backward substitution method
 (CO2) [Application]