CMR INSTITUTE OF TECHNOLOGY

USN

Internal Assessment Test - I

Sub: **DESIGN & ANALYSIS of ALGORITHMS** Code: 15CS43

Date: 13 / 03/ 2018 Duration: 90 mins Max Marks: 50 Sem: IV Branch: ISE

Answer Any **FIVE** Complete Questions.

		Marks
1	Explain the asymptotic notations for analysis of algorithms. Support your answer with proper graphs and examples.	[10]
2 (a)	Write the **control abstraction** for the Divide & Conquer technique, thus explaining the strategy.	[05]
(b)	Solve the following recurrence using substitution method for the case when the constants have values **a = 2, b = 2, f(n) = n** $T(n) = aT(n/b) + f(n)$ when $n > 1$ $T(n) = 1$ when $n = 1$	[05]
3	Consider the following algorithm: **Algorithm Mystery(n)** **//Input: a non negative integer n** S ← 0; for i ← 1 to n do S ← S + i*i; **return S;** a) What does this algorithm compute? b) What is its basic operation? c) How many times is the basic operation executed? d) What is the efficiency class of this algorithm?	[10]
	OR	
	You are given a set of n elements. Your task is to design an algorithm to find the **maximum and minimum** element in the set. Use the **divide & conquer** approach. The algorithm should satisfy all the criteria of a good algorithm	[10]
4	The recurrence relation for **Strassen's** algorithm for Matrix multiplication is $T(n) = 7\,T(n/2) + 18n^2$; if $n > 2$ $T(n) = 1$; if $n <= 2$ Solve the recurrence and determine its complexity.	[10]

OR

Write the algorithm for **Merge Sort** and solve its recurrence relation to determine its complexity. [10] CO4 L3

— [10]

5 What strategy does the Binary Search algorithm use? Write the recursive algorithm for **Binary Search** and state its complexity. [10] CO4 L3

— [10]

OR

For the following code fragment, compute the worst case asymptotic complexity (as a function of n), where the loop body is a constant number of lines. You may assume the loop body to be a **constant = 1** [10] CO3 L3

equation (Summation Series) + Solution [10]

```
for (i = 0; i <= (n-1); i++) {
for (j = (i+1); j <= (n-1); j++) {
    // loop body
}}
```

6 What is an algorithm? Give 2 real world examples of algorithms which you use in daily life. Give the criteria that a good algorithm should satisfy. [10] CO1 L1

Creativity fetches more marks — [10]