

## QUIZ-1

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Sub- Algorithms Analysis and Design-1 (CSE2631)

Section-24E1Q2

Full Marks-10

Time- 30 minutes

**CO1-To apply knowledge of computing and mathematics to algorithm, running time, Asymptotic analysis**

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1. The time complexity of the following C function is? (assume  $n > 0$ ) [GATE-2004] 2  

```
int recursive(int n) {  
    if(n == 1) {  
        return (1);  
    }  
    return (recursive(n - 1) + recursive(n - 1));  
}
```
2. Two alternate packages A and B are available for processing a database having  $10^k$  records. Package A requires  $0.0001n^2$  time units and package B requires  $10n \log n$  time units to process  $n$  records. What is the smallest value of  $k$  for which package B will be preferred over A? [GATE-2010] 2
3. Consider the following two functions  $g_1(n) = \begin{cases} n^3 & \text{for } 0 \leq n < 10,000 \\ n^2 & \text{for } n \geq 10,000 \end{cases}$  and  $g_2(n) = \begin{cases} n & \text{for } 0 \leq n < 100 \\ n^3 & \text{for } n > 100 \end{cases}$ . Which one of the following is TRUE? [GATE-1994] 2  
(a)  $g_1(n)$  is  $O(g_2(n))$       (b)  $g_1(n)$  is  $O(n^3)$       (c)  $g_2(n)$  is  $O(g_1(n))$       (d)  $g_2(n)$  is  $O(n)$
4. Suppose  $T(n)$  is the worst-case time complexity of an algorithm expressed in terms of the input size  $n$  as:  $T(n) = n^3 / 1000 - 100n^2 - 100n + 3$ . Find out the value of constants  $c_1 > 0$ ,  $c_2 > 0$ , and  $n_0$  (where  $n_0$  is an instance of  $n$ ), such that  $T(n) = \Theta(n^3)$ . 2
5. Solve the following recurrence using iteration method and provide the asymptotic upper bound for  $T(n)$ , where  $T(n) = 2T(n-1) + \Theta(1)$ . 2