

Roll No. \_\_\_\_\_

4/10

Section BS SE 3A

National University of Computer and Emerging Sciences, Lahore Campus



Course: Data Structures  
 Program: BS(SE)  
 Duration: 10 Minutes  
 Paper Date: 28 Sep 2021  
 Section: A

Course Code: CS 201  
 Semester: Fall 2021  
 Total Marks: 10  
 Exam: Quiz 1

Instruction/Notes: Solve the exam on this question paper.

Question: Consider the following program

i) Give an estimate of  $T(N)$ . (Show your work and give a  $T(N)$  estimate for each line of code.)

	$T(N)$ for each line
sum = 0;	$O(1)$
for (i = n; i > 0; i--) {	$O(1) + O(N) + O(N)$
for (j = i; j > 0; j = j/2)	$O(N \lg_2 N) + O(N \lg_2 N) + O(N \lg_2 N)$
sum++;	$O(N \lg_2 N)$
if (j % 2 == 0)	$O(N \lg_2 N)$
for (j = 1; j < i * i; j++)	$O(N \lg_2 N) + O(N^2 \lg_2 N) + O(N^3 \lg_2 N)$
++sum;	$O(N^2 \lg_2 N)$
}	
#	
i   j   k	
5   5   1	
4   4   2	
3   3   5	

$$T(N) = 2 + 2N + 6N \lg_2 N + 3N^2 \lg_2 N$$

ii) Find the tight big Oh for the Best-case and Worst-case scenario. Explain in one line how you drive it.

Best CaseIn case  $n=0$ then no  
loop runs

$$\approx O(1)$$

Worst CaseIn case  $n > 0$ .

$$O(1) + O(N) + O(N) + O(N \lg_2 N) + O(N \lg_2 N) + O(N \lg_2 N) + O(N \lg_2 N) + O(N \lg_2 N) + O(N^2 \lg_2 N) + O(N^2 \lg_2 N)$$

$$\approx O(N^2 \lg_2 N)$$

		25
i	j	k
5	5	1
	2	2
4	4	5
3	3	