VIT

Vellore Institute of Technology

SCHOOL OF COMPUTER SCIENCE AND ENGINEERING

Continuous Assessment Test - I, Winter Semester, 2018-19

Course Code	: CSE2003	**Programme**	: B.Tech.
Course Name	: Data Structures and Algorithms	**Max. Marks**	: 50
Slot	: G1	**Duration**	: 90 Minutes

ANSWER ALL THE QUESTIONS (5x10=50)

Marks

1 a) Point out the line in the following code segment which would result in a compilation error:

```
#include<stdio.h>      //line1
void f()               //line2
{                      //line3
printf("Hi");          //line4
}                      //line5
main()                 //line6
{                      //line7
int a=10;              //line8
a=f();                 //line9
printf("\n%d",a);      //line10
}                      //line11
```

[4]

b) Prove the correctness of an algorithm using loop invariant for the sum of n numbers. [6]

2. Solve the recurrence relation using Master's Theorem

a) $T(n) = 3T(n/3) + n/2$ [5]

b) Write an algorithm to print all distinct elements in an integer array. The given array may contain duplicates and the output should print every element only once. [5]

3. a) Find the complexity of the below recurrence equation [6]

$T(0) = 1$

$T(n) = T(n-1) + 1 \quad n>0$ [4]

b) Write an algorithm to check if an expression is correctly parenthesized.

4. a) Elucidate O, Ω and θ notations are asymptotically bounded above and below. Show graph representation for each notation. [6]

b) Derive the worst case, best case, average case of a linear search algorithm. [4]

5. a) Given a circular queue (array-based) Q capable of holding 7 objects. Show the final contents of the array after the execution of below code. [4]

```
for (int k = 1; k <= 7; k++)
 Q.enqueue(k);
for (int k = 1; k <= 4; k++)
{
 Q.enqueue(Q.dequeue());
 Q.dequeue();
}
```

b) Write an algorithm to check whether the entered string is palindrome or not. The algorithm should output TRUE or FALSE as result. Implement this concept using stack and queue. [6]