



VIT
Vellore Institute of Technology
(Deemed to be University under section 3 of UGC Act, 1956)

SCHOOL OF COMPUTER SCIENCE AND ENGINEERING

Continuous Assessment Test-1, Winter 2019-2020

CSE2003- Data Structures and Algorithms

Slot: B1

Exam Duration: 90 Minutes

Maximum marks : 50

Answer all questions (5*10 = 50)

- 1 a) Prove the correctness of algorithm using loop invariant for the Product of N natural number.

(5 Marks)

- b) Describe the various stages of algorithm development for solving a problem

(5 Marks)

2. a) Solve the recurrence relation using Masters Theorem

$$T(n) = 5T(n-2) + n^2 \log n$$

(5 Marks)

- b) Find the time Complexity of a given Recurrence Relation using Backward Substitution method

$$T(n) = n + 2T(n/2) \text{ when } n > 1 \text{ and } T(n) = 1, \text{ when } n = 1$$

(5 Marks)

3. Devise an algorithm to create a single linked list for storing the ages of employees and perform insertion in a list except at the last.

- 4 a) Evaluate the following postfix notation using stack. Show the various steps involved to obtain result of evaluation and elements of the stack. Use the following values to evaluate the expression (a=8 ,b=4 ,c=2 , d=3 , e =2, and f=1)

$$a \ b - \ c / \ d \ e + \ f - *$$

(5 Marks)

- b) Narrate the following operations in a circular queue of size 9. Show the status of circular queue for each of the print operation

```
for (int k = 0; k <= 8; k++)  
    printf(enqueue(k));  
for (int k = 0; k <= 5; k++)  
{  
    printf(enqueue(dequeue()));  
    printf(dequeue());  
    printf(dequeue());  
}
```

(5 Marks)