VIT-AP UNIVERSITY

Apply Knowledge. Improve Life!

QUESTION PAPER

Name of the Examination: WINTER 2022-2023 – CAT-1

Course Code: CSE2001 **Course Title: Data Structures and Algorithms**

Set number: 1 **Date of Exam:** 16-2-2023 (FN)

Duration: 90min **Total Marks: 50** (01)

Instructions:

1. Assume data wherever necessary.
2. Any assumptions made should be clearly stated.

Q1. a) Consider the following pseudo-code fragment **(5M)**

```
1: procedure STARS(n)
2:     for i = 1,...,n do
3:         print "*" i many times
```

(i) Using the *O*-notation, Upper bound the running time of STARS

(ii) Using the Ω-notation, lower bound the running time of STARS to show your upper bound is in fact asymptotically tight.

b) Find the total time required in Big-OH Notation. **(5M)**

```
for(int i=0;i<n;i++)
{
        for(int j=0;j<=i;j++)
        {
            for(int k=0;k<100;k++)
            {
              System.out.println("VITAP");
            }
        }
}
```

Q2. Given a string, the task is to remove all the duplicate adjacent characters from a string using stack .You can implement the program also. **(10M)**

Hint: Original String ***:"ababbac"***

After removing duplicates ***: "abc"***

Q3. Given a stack, the task is to reverse the stack using the queue data structure. And also you can implement the program with the given task. **(10M)**

Input: Stack: (Top to Bottom) [10 -> 20 -> 30 -> 40]

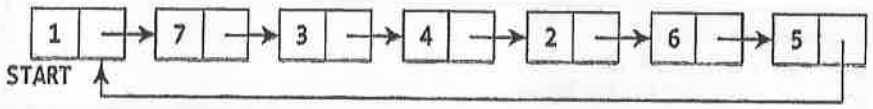
Output: Stack: (Top to Bottom) [40 -> 30 -> 20 -> 10]

Q4. Write a program to create a singly linked list of 'n' nodes and reverse the order of nodes of the given linked list. Mention algorithm and steps to reverse a singly linked list also. **(10M)**

Input: Head of following linked list
1->2->3->4->NULL

Output: Linked list should be changed to
4->3->2->1->NULL

Q5. Design an algorithm to insert a new node at the Beginning of the given Circular Linked List. **(10M)**



QP MAPPING

Q. No.	Module Number	CO Mapped	PO Mapped	PEO Mapped	PSO Mapped	Marks
Q1	1	1	1	2	1	10
Q2	1	1	1	2	1	10
Q3	1	1	1	2	1	10
Q4	2	2	4	-	1	10
Q5	2	2	4	-	1	10