VIT
Vellore Institute of Technology

Slot :E2+TE2

School of Computer Science Engineering and Information Systems

Fall Semester 2023-2024

Continuous Assessment Test – I

Programme Name & Branch MCA

Course Name & code: Data Structures and Algorithms , PMCA501L

Class Number (s): VL2023240106168, VL2023240106164, VL2023240106713

Faculty Name (s) Dr.N.Mythili, Dr.R.Seetha, Dr.R.Raghavan

Exam Duration: 90 Min. **Maximum Marks:** 50

General instruction(s): Answer all questions (5*10 = 50 Marks)

1. Write the recursive algorithm to solve Towers of Hanoi problem and trace the execution of the algorithm **only till** the top (n-1) disks are moved to the intermediate tower and the nth disk is moved to the destination tower, where n=4. Represent how stack is helpful in recursion in terms recursion tree

2. The algorithm ENQUEUE may fail even though there is memory space available in the queue. One way to avoid this problem is to rewrite the algorithm ENQUEUE and DEQUEUE. Two Solutions are suggested here:

Suggestion 1: Rewriting the pseudocode ENQUEUE. (5)

Whenever the REAR pointer gets to the end of the queue , test whether the pointer FRONT is at location 0 or not; if not, shift all the elements so that they wrapped from the beginning and thus make room for a new item.

Rewriting the pseudocode DEQUEUE.

After the end of each deletion, all the elements at the trail are shifted once towards the front; here the idea is to fix the FRONT always at 1. The queue which follows such operations is termed a dynamic queue.

Suggestion 2: Propose a suitable data structure and rewrite the pseudocode for enqueue and dequeue operations (5)

So, rewrite the pseudocode ENQUEUE and DEQUEUE based on above suggestions.

3. Evaluate the given Arithmetic expression and show the result using stack.

(5 * 20)/10+ 7*(8-6)

4. In a **circular singly linked list**, it is said that having a pointer to the last node in a circular linked list is better than having a pointer to the first node, with respect to insertion. Give the necessary code snippet to perform front, back and middle insertion in both the cases

5. Assume a Singly Linked List contain the following structure definition

```
struct emp
{
char sex;   // male 'm' , female 'f'
 int empid;
struct student *next;
};
```

Using the above definition write the algorithm for following operations

a. Create a singly linked list (3)

b. Search for a empid and modify its sex as 'f' (3)

c. Delete all 'm' (male sex) employees (4)