# Vidush Somany Institute of Technology & Research, Kadi

## CE / CSE / IT (3<sup>rd</sup> Semester)

## Subject – Data Structures and Algorithms (CT303-N)

## Assignment-2

1) What is an array, and how is it represented in memory?

2) Write recursive solution for tower of Hanoi. How many moves require for transferring three discs?

3) Write C program to find the Fibonacci sequence of n terms using recursion.

4) Define stack. Write algorithms for PUSH, POP and PEEP operations of stack.

5) Enlist and explain any 3 applications of stack in computer science with example.

6) Convert the following infix expression into postfix and prefix expression using stack. Show stack contents after each symbol.

   a. (A-B)/C*D^(E/F)^(G+H)

   b. A*B+C/D

   c. (A*B)+(C/D)-(D+E)

7) Evaluate the postfix expression:

   a. 8 2 / 6 7 * +

   b. 5 3 + 6 2 / * 3 5 * +

8) Answer the following questions.

    a.  Let S is an instance of the Stack. Consider the following sequence of operations performed on S, which initially contains element 55 as top most elements. What is the status of top of stack after execution of each step?

```
S.push(33);
S.push(20);
S.pop();
S.pop();
S.push(10);
S.push(40);
› S.pop();
```

    b.  Let Q be an instance of a Queue. **Q.enqueue(x)** is insertion and **Q.dequeue()** deletion functions. Consider the following code and determine what will be the value of the variable count, when completes its execution? And show trace for every step.

```
Q.enqueue(1);
int count=1;
do
{
    count=count+1;
    x = Q.dequeue();
    Q.enqueue( 2*x );
    Q.enqueue( 4*x );
} while(x != 32);
```

9) Define queue. Write algorithms for INSERT, DELETE.

10) State disadvantages of simple queue. How to overcome it? Explain with example.

11) Write algorithm to (i) insert (ii) delete elements in circular queue.

12) Design an algorithm to insert and delete an element in doubly linked list.

13) What is priority queue? Is simple queue is anyhow priority queue? Explain your answer.

14) Explain pros & cons of linked allocation.

15) Write an algorithm for the following in singly linked list.

    a. Insert at first position

    b. Insert at last position

    c. Insert in Ordered Linked list

    d. Delete Element

    e. Copy Linked List

16) Write an algorithm for the following in circular linked list.

    a. Insert at first position

    b. Insert at last position

    c. Insert in Ordered Linked list

    d. Delete Element

17) Explain the following operations of doubly linked list with example.

    a. Insert first

    b. Insert last

    c. delete

18) Explain Enqueue and Dequeue operations of simple queue using a singly linked list.

19) Explain push and pop operations of stack using a singly linked list.