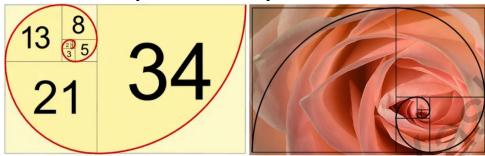
Institute of Computer Technology

B. Tech Computer Science and Engineering Subject: DS (2CSE302)

PRACTICAL-6

AIM: - To learn applications of recursion in real-life scenario.

6. The Fibonacci appears in the smallest, to the largest objects in nature. It is a way for information to flow in a very efficient manner. The number of petals in a flower consistently follows the Fibonacci sequence. Famous examples include the lily, which has three petals, buttercups, which have five, the chicory's 21, the daisy's 34, and so on.



a) Flowers of all kinds follow the pattern, but roses are most favourite kind to use as an example of the Fibonacci Sequence. The petals unfold more & more and the sequence increases for the best possible exposure to sunlight and other factors. There is a rose flower (as shown in Figure), which is having only 9 petals. So, Write the c program to print fibonacci series till Nth term (9th petal) using recursion.

Hint: N=9

- Input: Enter number of terms in Fibonacci series: 9
- Output: Fibonacci series till 9 terms

01123581321

SOLUTION

```
#include<stdio.h>
void fibonacci(int num)
{
     static int n1=0,n2=1,n3;
     if(num>0)
     {
          n3 = n1 + n2;
          n1 = n2;
          n2 = n3;
          printf("%d ",n3);
          fibonacci(num-1);
     }
}
```

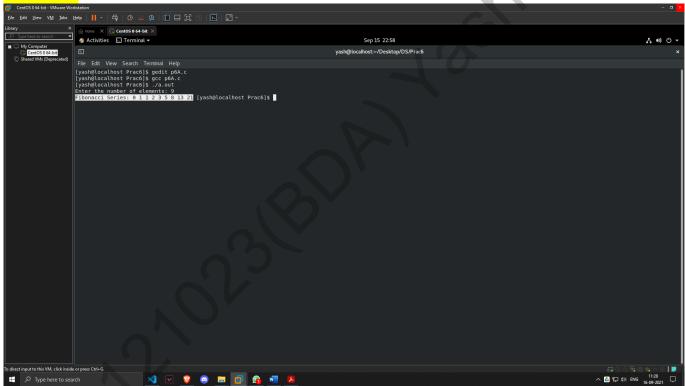
```
int main()
{
    int yash;
    printf("Enter the number of elements: ");
    scanf("%d",&yash);

    printf("Fibonacci Series: ");
    printf("%d %d ",0,1);

    fibonacci(yash-2);

    return 0;
}
```

OUTPUT



- b) Tower of Hanoi is a mathematical puzzle where we have three rods and n disks. The objective of the puzzle is to move the entire stack to another rod, obeying the following simple rules:
 - Only one disk can be moved at a time.
 - Each move consists of taking the upper disk from one of the stacks and placing it on top of another stack i.e. a disk can only be moved if it is the uppermost disk on a stack.
 - No disk may be placed on top of a smaller disk.

Write the c program for Tower of Hanoi using recursion. Hint:

- No of Disk =3 and no. of rod = 3
- Take an example for 2 disks:

Let rod 1 = 'A', rod 2 = 'B', rod 3 = 'C'.

Step 1: Shift first disk from 'A' to 'C'.

Step 2: Shift second disk from 'A' to 'B'.

Step 3: Shift first disk from 'C' to 'B'.

The pattern here is:

Top Disk moved from A to C

Top Disk moved from A to B

Top Disk moved from C to B

Input: Enter the Number of Disks: 3

Output:

Top Disk moved from A to B

Top Disk moved from A to C

Top Disk moved from B to C

Top Disk moved from A to B

Top Disk moved from C to A

Top Disk moved from C to B

Top Disk moved from A to B

SOLUTION

```
#include <stdio.h>
void TOH(int n, char a, char b, char c)
{
   if (n > 0)
{
      TOH(n - 1, a, c, b);
      printf("\nTop Disk moved from %c to %c ", a, b);
      TOH(n - 1, c, b, a);
}
   int main()
{
   int yash;
   printf("\nEnter the Number of Disks: ");
   scanf("%d", &yash);
```

```
TOH(yash, 'A', 'B', 'C');
printf("\n\n");
}
```

OUTPUT

