

## Lab 5: Implementation of Recursion to solve various problems.

### Algorithm for factorial:

```
facto (n)
1. Start
2. Read n and Initialize fact=1;
3. if(n==0)
    return fact;
   else
    return n*facto(n-1);
4. Stop
```

### Algorithm for finding nth Fibonacci number:

```
fib (n)
1. Start
2. Enter the n for which you want to find the Fibonacci number
3. if (n == 1 || n==2)
    return n;
   else
    return fib(n-1) + fib(n-2);
4.Stop
```

### Algorithm for solving TOH:

```
move(n, src, dst, tmp)
1.Start
2. Enter number of towers(pegs)
3. if (n == 1)
    move disk 1 from src to dst
   else
    move(n-1, src, tmp, dst)
    move disk n from src to dst
    move(n-1, tmp, dst, src)
4. Stop
```

### Algorithm for finding GCD:

```
GCD(a,b)
1. Start
2. Read a and b.
3. if (b==0)
    return a;
   else
    return(GCD(b,a%b));
4. Stop
```

**Source Code:**

**//factorial**

```
#include <stdio.h>
#include <conio.h>
long int fact(int n);
int main()
{
    int n;
    long int result;
    printf("Enter a number : ");
    scanf("%d",&n);
    result=fact(n);
    printf("Result : %ld \n",result);
    return 0;
}

long int fact(int n)
{
    if(n==0)
        return 1;
    else
        return n*fact(n-1);
}
```

```
Enter a number : 5
Result : 120
```

## //Fibonacci

```
#include <stdio.h>
#include <conio.h>
long int rfibo(int);
int main()
{
    int n;
    long int result;
    printf("Enter n: ");
    scanf("%d",&n);
    result=rfibo(n);
    printf("RESULT IS %ld",result);
    return 0;
}
long int rfibo(int n)
{
    if(n==1||n==2)
        return 1;
    else
        return rfibo(n-1)+rfibo(n-2);
}
```

```
Enter n: 6
RESULT IS 8
```

//TOH

```
#include <stdio.h>
#include <conio.h>
void move(int n,char source,char destination,char temp);
int main()
{
    int n;
    printf("Enter number of discs : ");
    scanf("%d",&n);
    move(n,'A','C','B');
    return 0;
}
void move(int n,char source,char destination,char temp)
{
    if(n==1)
    {
        printf("Move disc 1 from %c to %c \n",source,destination);
    }
    else
    {
        move(n-1,source,temp,destination);
        printf("Move disc %d from %c to %c \n",n,source,destination);
        move(n-1,temp,destination,source);
    }
}
```

```
Enter number of discs : 3
Move disc 1 from A to C
Move disc 2 from A to B
Move disc 1 from C to B
Move disc 3 from A to C
Move disc 1 from B to A
Move disc 2 from B to C
Move disc 1 from A to C
```

## //GCD

```
#include <stdio.h>
#include <conio.h>
int gcd(int,int);
int main()
{
    int a,b,result;
    printf("Enter a: ");
    scanf("%d",&a);
    printf("Enter b: ");
    scanf("%d",&b);
    result=gcd(a,b);
    printf("GCD IS %d",result);
    return 0;
}
int gcd(int a,int b)
{
    if (b==0)
        return a;
    else
        return gcd(b,a%b);
}
```

```
Enter a: 18
Enter b: 12
GCD IS 6
```

**Conclusion:** Hence, in this lab we successfully implemented different programs using recursive approach.