**Lab Exercise #1**

**Implementation of Toy Problem**

**Title: Tower Of Hanoi**

**Problem Description:** 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:

1) Only one disk can be moved at a time.

2) 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.

3) No disk may be placed on top of a smaller disk.

**Solution:**The minimal number of moves required to solve a Tower of Hanoi puzzle is 2n − 1, where n is the number of disks. This is precisely the nth Mersenne number.

**Python Code:**

**# Recursive Python function to solve the tower of hanoi**

def TowerOfHanoi(n , source, destination, auxiliary):

if n==1:

print "Move disk 1 from source",source,"to destination",destination

return

TowerOfHanoi(n-1, source, auxiliary, destination)

print "Move disk",n,"from source",source,"to destination",destination

TowerOfHanoi(n-1, auxiliary, destination, source)

#Driver Code

print("Enter value of n : ")

n = input()

TowerOfHanoi(n,'A','B','C')

**Input and output:**

I/P:-

Enter value of n : 4

**O/P:-**

Move disk 1 from rod A to rod B

Move disk 2 from rod A to rod C

Move disk 1 from rod B to rod C

Move disk 3 from rod A to rod B

Move disk 1 from rod C to rod A

Move disk 2 from rod C to rod B

Move disk 1 from rod A to rod B

Move disk 4 from rod A to rod C

Move disk 1 from rod B to rod C

Move disk 2 from rod B to rod A

Move disk 1 from rod C to rod A

Move disk 3 from rod B to rod C

Move disk 1 from rod A to rod B

Move disk 2 from rod A to rod C

Move disk 1 from rod B to rod C

**Result:** Hence the tower of hanoi problem has been solved.