Walchand College of Engineering,Sangli

Computer Science & Engineering Third Year

Course: Design and analysis of algorithm Lab

Lab course coordinator:

Mrs A M Chimanna- Batch: - T1, T2, T3,T4

# Week 3 Assignment

# Tower of Hanoi

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**Q.1** [What is the Tower of Hanoi?](https://www.interviewbit.com/blog/tower-of-hanoi/#what-is-the-tower-of-hanoi)

The Tower of Hanoi is a classic mathematical puzzle that involves moving a stack of disks from one peg to another, with the help of a third peg, subject to the following rules:

1. Only one disk can be moved at a time.
2. Each move consists of taking the top disk from one of the stacks and placing it on top of another stack or on an empty peg.
3. No disk may be placed on top of a smaller disk.

Q.2 Write a program to Tower of Hanoi Problem in recursive approach.

public class TowerOfHanoi {

    public static void towerOfHanoi(int n, char source, char auxiliary, char target) {

        if (n == 1) {

            System.out.println("Move disk 1 from " + source + " to " + target);

            return;

        }

        towerOfHanoi(n - 1, source, target, auxiliary);

        System.out.println("Move disk " + n + " from " + source + " to " + target);

        towerOfHanoi(n - 1, auxiliary, source, target);

    }

    public static void main(String[] args) {

        int n = 3; // Number of disks

        System.out.println("Steps required : "+(Math.pow(2,n)-1));

        towerOfHanoi(n, 'A', 'B', 'C');

    }

}

Q.3What are the minimum moves to solve Tower of Hanoi Problem.

The minimum number of moves required to solve the Tower of Hanoi problem with 'n' disks is 2^n - 1. This means that for 3 disks, it would take 2^3 - 1 = 7 moves.

Q.4 What is the space complexity of Tower of Hanoi Problem.

The space complexity of the Tower of Hanoi problem using a recursive approach is O(n), where 'n' is the number of disks. This is because the recursive function calls are added to the call stack, and in the worst case, there could be 'n' function calls active on the stack at the same time, corresponding to the number of disks being moved.The space complexity of the Tower of Hanoi problem using a recursive approach is O(n), where 'n' is the number of disks. This is because the recursive function calls are added to the call stack, and in the worst case, there could be 'n' function calls active on the stack at the same time, corresponding to the number of disks being moved.