EXPERIMENT NO. 5

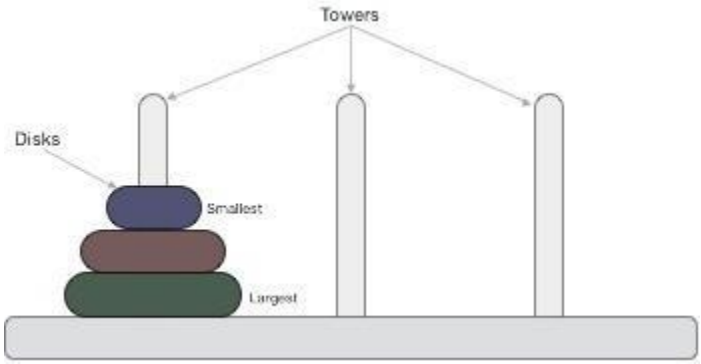
AIM: Write a program to implement Tower of Hanoi problem.

SCOPE: 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.

FACILITIES: Software Needed: Turbo C

THEORY:

Tower of Hanoi, is a mathematical puzzle which consists of three towers (pegs) and more than one rings is as depicted



These rings are of different sizes and stacked upon in an ascending order, i.e. the smaller one sits over the larger one. There are other variations of the puzzle where the number of disks increase, but the tower count remains the same.

Rules

The mission is to move all the disks to some another tower without violating the sequence of arrangement. A few rules to be followed for Tower of Hanoi are –

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 the stack on another peg.
3. No disk may be placed on top of a smaller disk.

The puzzle was invented by the French mathematician Édouard Lucas in the 19th century and has since become a classic problem in computer science and recreational mathematics.

The minimum number of moves required to solve the Tower of Hanoi problem with exponential growth in the number of moves required as the number of disks increases makes the Tower of Hanoi problem an interesting challenge for algorithm design and analysis

IMPLEMENTATION:

```
// Tower of Hanoi program in C using Recursion
#include <stdio.h>
void toH(int n, char rodA, char rodC, char rodB)
{
        if (n == 1)
        {
                printf("\n Move disk 1 from rod %c to rod %c",rodA ,rodC );
                return;
        }
        toH(n-1, rodA, rodB, rodC);
        printf("\n Move disk %d from rod %c to rod %c", n, rodA, rodC);
        toH(n-1, rodB, rodC,rodA);
}

int main()
{
        int no_of_disks ;
        printf("Enter number of disks: ");
        scanf("%d", &no_of_disks);
        toH(no_of_disks, 'A','C','B');
        return 0;
}
```

Output:

```
Enter number of disks: 3

 Move disk 1 from rod A to rod C
 Move disk 2 from rod A to rod B
 Move disk 1 from rod C to rod B
 Move disk 3 from rod A to rod C
 Move disk 1 from rod B to rod A
 Move disk 2 from rod B to rod C
 Move disk 1 from rod A to rod C
```

RESULT: In this way we have implemented Tower of Hanoi problem using recursion with Turbo C.