Institute of Computer Technology

B. Tech. Computer Science and Engineering

Sub: DS

Course Code: 2CSE302

Practical – 7

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Sem - 3

Branch: CS

Class: A

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Problem Definition-1: 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. Design a program for Tower of Hanoi using recursion.

Code:

```c
#include <stdio.h>

// Function to solve the Tower of Hanoi problem
void tower_of_hanoi(int n, char source, char destination, char auxiliary) {
    // Base case: If there is only one disk, move it from source to
destination
    if (n == 1) {
        printf("Top Disk moved from %c to %c\n", source, destination);
        return;
    }
```

```c
    // Move n-1 disks from source to auxiliary using destination as the
auxiliary rod
    tower_of_hanoi(n - 1, source, auxiliary, destination);

    // Move the top disk from source to destination
    printf("Top Disk moved from %c to %c\n", source, destination);

    // Move the n-1 disks from auxiliary to destination using source as the
auxiliary rod
    tower_of_hanoi(n - 1, auxiliary, destination, source);
}

int main() {
    int n;

    printf("Enter the number of disks: ");
    scanf("%d", &n);

    // Rods are represented as 'A', 'B', 'C'
    tower_of_hanoi(n, 'A', 'B', 'C');

    return 0;
}
```

Output:

```
PS C:\ICT\SEM-3\DS\Practical> cd 'c:\ICT\SEM-3\DS\Practical\Practical-7\output'
PS C:\ICT\SEM-3\DS\Practical\Practical-7\output> & .\'main.exe'
Enter the number of disks: 3
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
PS C:\ICT\SEM-3\DS\Practical\Practical-7\output>
```