Batch:C1_2	**Roll No.:16010123032**
Experiment / assignment / tutorial No. 6	
Grade: AA / AB / BB / BC / CC / CD /DD	
Signature of the Staff In-charge with date	

TITLE: Write a program in C to implement user defined functions

AIM:

a) Write a program to find the GCD of two numbers using recursion.
b) Write a program to find the LCM of two numbers by using a) above.

Expected OUTCOME of Experiment:

Design modular programs using functions and the use of structure and union (CO4)

Books/ Journals/ Websites referred:

1. Programming in C, second edition, Pradeep Dey and Manas Ghosh, Oxford University Press.
2. Programming in ANSI C, fifth edition, E Balagurusamy, Tata McGraw Hill.
3. Introduction to programming and problem solving , G. Michael Schneider ,Wiley India edition.

Problem Definition:

1. The program finds the GCD of two numbers using recursion

Example:

Test case 1: Input: 24,28 Output: GCD: 4	Test case 2: Input: 24,25 Output: GCD: 1

2. The program finds the LCM of two numbers using GCD.

Example:

Test case 1: Input: 6,12 Output: LCM: 12	Test case 2: Input: 6,7 Output: LCM: 42

Algorithm:

1)Variable Declarations:

a, b, g, and k are integer variables used to store the two input numbers, the GCD, and the LCM, respectively.

2)Input:

The program prompts the user to enter two integers using printf and scanf.

3)GCD Calculation:

The gcd function is called to calculate the GCD of the two input numbers using the Euclidean algorithm.

4)LCM Calculation:

The LCM is calculated as the product of the two input numbers divided by their GCD.

5)Output:

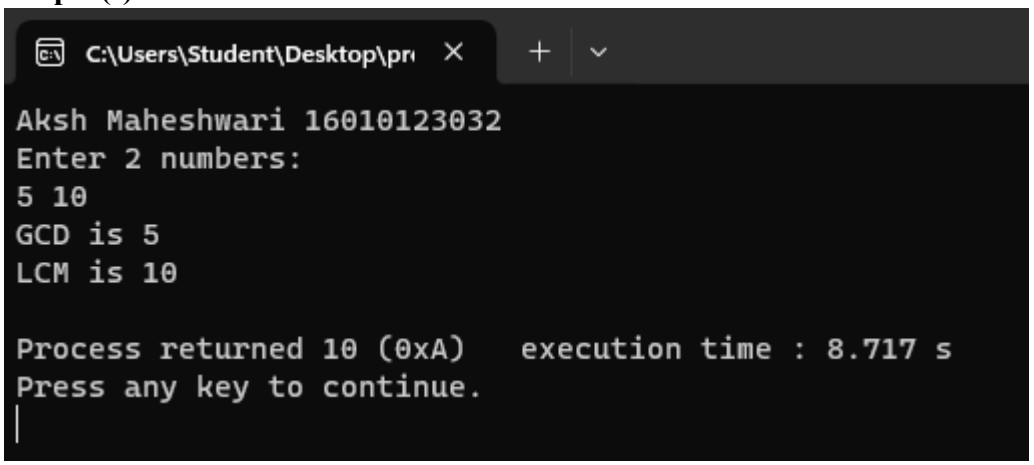
The program prints the GCD and LCM of the two input numbers using printf.

Implementation details:

```
#include <stdio.h>
```

```
#include <stdlib.h>
int gcd(int a,int b)
{
   if(b!=0)
      return(gcd(b,a%b));
   else
      return a;
}
void main()
{
   printf("Aksh Maheshwari 16010123032\n");
   int a,b;
   printf("Enter 2 numbers:\n");
   scanf("%d %d",&a,&b);
   int c = gcd(a,b);
   printf("GCD is %d\n",c);
   int lcm = (a*b)/c;
   printf("LCM is %d\n",lcm);

}
```

Output(s):



Conclusion:

We learnt about user defined functions and its versatile uses.We were also introduced to Recursion functions and used it in the above programs.

Post Lab Questions

1. Write a C program to find the minimum, maximum and sum of elements in an array using functions.

```
#include <stdio.h>
#include <stdlib.h>
int calculate_sum(int array[], int n) {
  int sum = 0;
  for (int i = 0; i < n; i++) {
    sum = sum + array[i];
  }
  return sum; // Added return statement to return the sum
}
int max(int array[], int n) {
  int MAX = array[0];
  for (int i = 0; i < n; i++) {
    if (MAX < array[i])
      MAX = array[i];
  }
  return MAX; //returns maximum
}

int min(int array[], int n) {
  int MIN = array[0];
  for (int i = 0; i < n; i++) {
    if (MIN > array[i])
      MIN = array[i];
  }
  return MIN; //returns minimum
}

int main() {
  int n;
  printf("Aksh Maheshwari 16010123032\n");
  printf("Enter size of array: ");
  scanf("%d", &n);
  int array[n];
  int s;
  printf("Enter elements of the array:\n");
```

```
  for (int i = 0; i < n; i++) {
    scanf("%d", &array[i]);
  }
  s = calculate_sum(array, n); // Updated to capture the returned sum
  int maximum, minimum;
  maximum = max(array, n);
  minimum = min(array, n);
  printf("Maximum element of the array is %d\n", maximum);
  printf("Minimum element of the array is %d\n", minimum);
  printf("Sum of input array is %d\n", s);
  return 0;
}
```

2. Virtual Lab for functions.
   https://cse02-iiith.vlabs.ac.in/exp/cp-recursion/simulation.html

   https://cse02-iiith.vlabs.ac.in/exp/functions/simulation.html

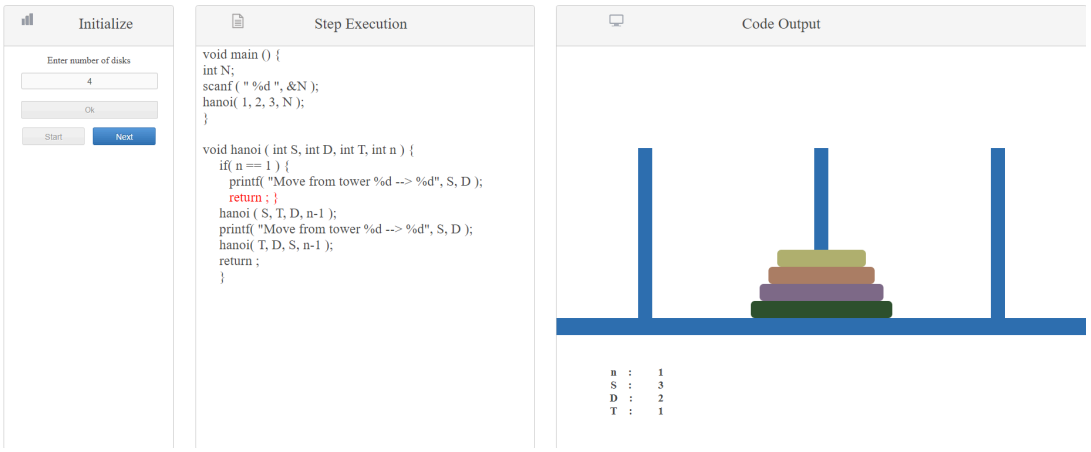
OUTPUT

Q1)

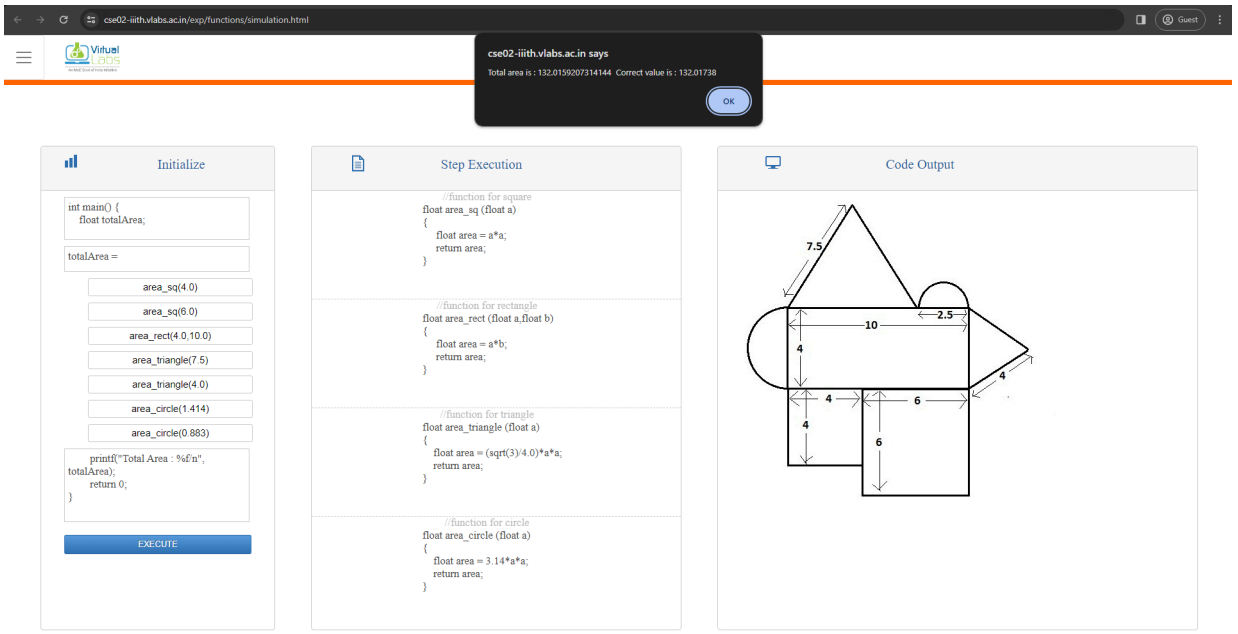
```
Aksh Maheshwari 16010123032
Enter size of array: 7
Enter elements of the array:
3 2 4 5 1 7 9
Maximum element of the array is 9
Minimum element of the array is 1
Sum of input array is 31

Process returned 0 (0x0)   execution time : 20.398 s
Press any key to continue.
```

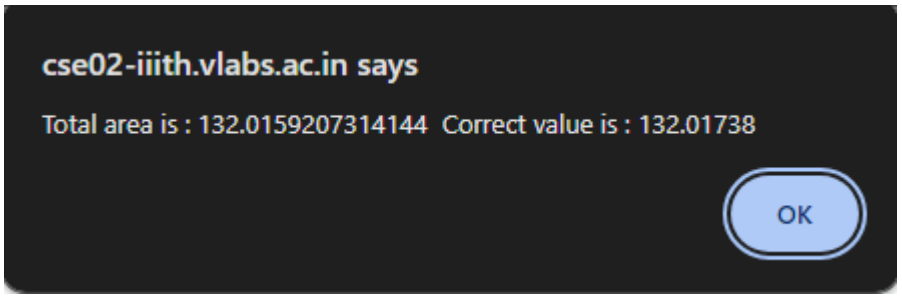
Q2)

I)


Initialize
Enter number of disks
4
Ok
Start
Next
Step Execution
void main () {
int N;
scanf (" %d ", &N);
hanoi(1, 2, 3, N);
}
void hanoi (int S, int D, int T, int n) {
if(n == 1) {
printf("Move from tower %d --> %d", S, D);
return ; }
hanoi (S, T, D, n-1);
printf("Move from tower %d --> %d", S, D);
hanoi(T, D, S, n-1);
return ;
}
Code Output
n : 1
S : 3
D : 2
T : 1

II)


cse02-iiith.vlabs.ac.in/exp/functions/simulation.html
cse02-iiith.vlabs.ac.in says
Total area is : 132.0159207314144 Correct value is : 132.01738
OK
Initialize
int main() {
float totalArea;
totalArea =
area_sq(4.0)
area_sq(6.0)
area_rect(4.0,10.0)
area_triangle(7.5)
area_triangle(4.0)
area_circle(1.414)
area_circle(0.883)
printf("Total Area : %f\n", totalArea);
return 0;
}
EXECUTE
Step Execution
//function for square
float area_sq (float a)
{
float area = a*a;
return area;
}
//function for rectangle
float area_rect (float a,float b)
{
float area = a*b;
return area;
}
//function for triangle
float area_triangle (float a)
{
float area = (sqrt(3)/4.0)*a*a;
return area;
}
//function for circle
float area_circle (float a)
{
float area = 3.14*a*a;
return area;
}
Code Output
7.5
10
2.5
4
4
4
6
4
6



Date: _____ **Signature of faculty in-charge**