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Lab - 4

① WAP to find GCD of two numbers using Recursion.

```
#include <stdio.h>
int hcf(int n1, int n2)
{
    if (n2 != 0)
        return hcf(n2, n1%n2);
    else
        return n1;
}
int main()
{
    int n1, n2;
    printf("Enter two positive integers : \n");
    scanf("%d %d", &n1, &n2);
    printf("GCD of %d & %d is %d", n1, n2,
            hcf(n1, n2));
    return 0;
}
```

Expected Input / Output :

Enter two positive integers :

13

91

GCD of 13 and 91 is 13

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(2) Write Fibonacci series of a given no

```
#include <stdio.h>
int f(int n) {
    if (n == 0)
        return 0;
    else if (n == 1)
        return 1;
    else
        return f(n-1) + f(n-2);
}
int main() {
    int i, n, sum = 0;
    printf("Enter n : ");
    scanf("%d", &n);
    printf("%d fibonacci series is :\n", n);
    for(i = 1; i <= n; i++) {
        printf("f(%d) = %d\n", i, f(sum));
    }
    return 0;
}
```

Expected input/output

Enter n : 3

3 fibonacci series is :

f(1) = 0

f(2) = 1

f(3) = 1

③ Find factorial of a no. using Recursion

```
#include <stdio.h>
unsigned long long int calc(int n){
    if(n==0)
        return 1;
    return(n*calc(n-1));
}
int main(){
    int n;
    unsigned long long int f;
    printf("Enter a number: ");
    scanf("%d", &n);
    f = calc(n)
    printf("Factorial of %d is: %lld\n", n, f);
    return 0;
}
```

Expected Input / Output:

Enter a number : 5

Factorial of 5 is : 120

④ WAP for binary search using Recursion.

```
#include <stdio.h>
int search(int n, int a[n], int s, int e,
           int K){
    if(e>=s){
```

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```
    int m = s + (e - s)/2;
    if (a[m] == k) {
        return m;
    }
    else if (a[m] > k) {
        return search(n, a, s, m-1, k);
    }
    return search(n, a, m+1, e, k);
}
return -1;
}
int main()
{
    int n, i, x, g;
    printf("Enter no. of elements in array: ");
    scanf("%d", &n);
    int a[n];
    printf("Enter elements of array: \n");
    for (i = 0; i < n; i++) {
        scanf("%d", &a[i]);
    }
    printf("Enter element to be searched: ");
    scanf("%d", &g);
    x = search(n, a, 0, n-1, g);
    if (x == -1) {
```

```
    printf("Element not found");
}
else {
    printf("Element is present and its
        position is : %d", m+1);
}
return 0;
}
```

Expected Input/Output :-

Enter the number of elements in array : 3
Enter elements :
27
45
63
Enter element to be searched : 63
Element is present & its position is : 3.

Q->(5) WAP for Tower of Hanoi.

```
#include<stdio.h>
void towers(int n, char s, char t, char d)
{
    if(n==1) {
        printf("Move disk 1 from %c to %c\n",
                s, d);
        return;
```

```
    towers(n-1, s, d, t);
    printf("Move disk %d from %c to
        %c\n", n, s, d);
    towers(n-1, t, s, d);
}
int main()
{
    int n;
    printf("Enter no. of disks : ");
    scanf("%d", &n);
    towers(n, 'S', 'T', 'D');
    return 0;
}
```

Expected Input / Output :-

Enter no of disks : 2
Move disk 1 from S to T
Move disk 2 from S to D
Move disk 1 from T to D