Dharwad
ज्ञानेन विकासः
INDIAN INSTITUTE OF
INFORMATION
TECHNOLOGY

INTRODUCTION TO ALGORITHMS

EC351

ASSIGNMENT 1

FIBONACCI SERIES

Submitted by:

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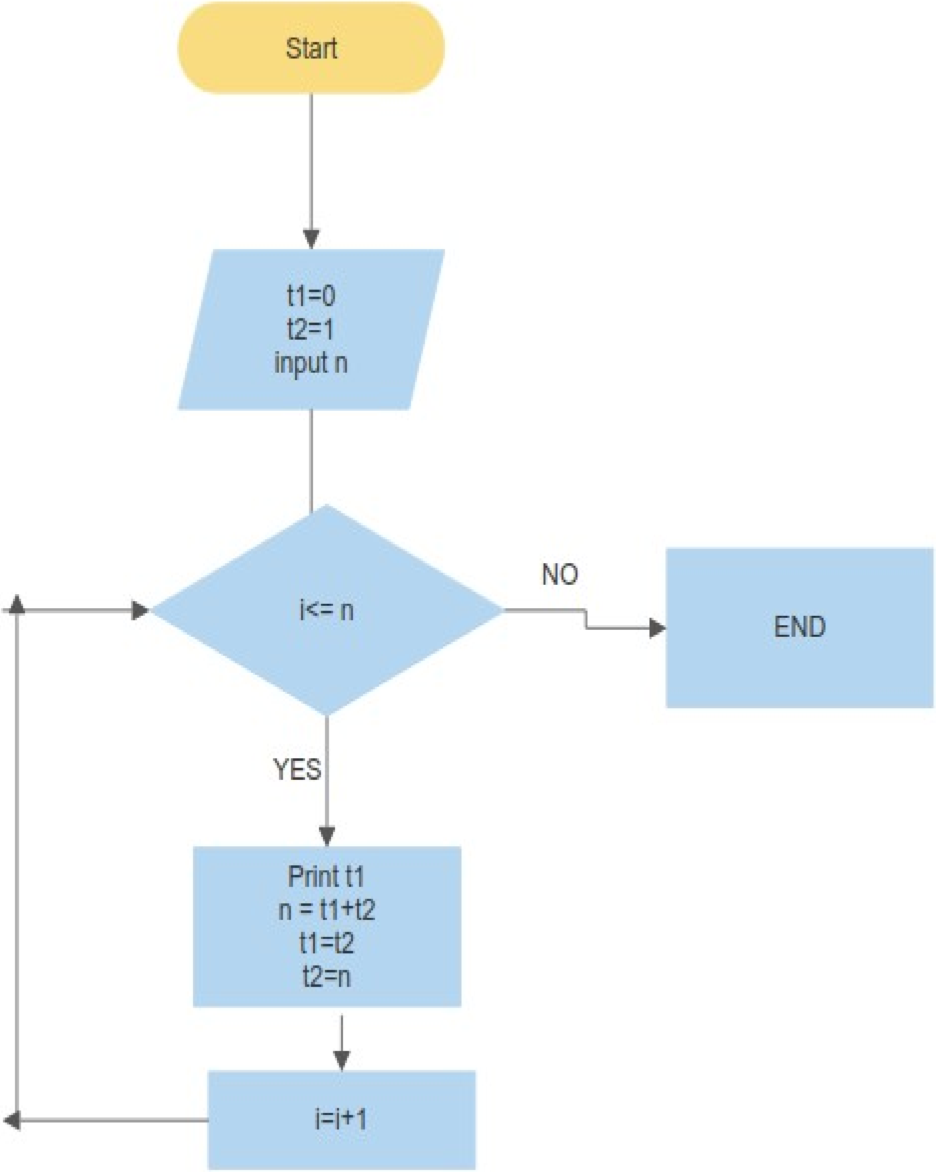
QUESTION: Consider the following Fibonacci series and solve the following conditions

fib (n) = fib(0), fib (1), fib (2),..........fib(n)
where fib(n) = fib(n-1) + fib(n-2)

- **Flowchart**



- **Itrative Code**

```
#include <stdio.h>
int count =0;
int main() {
    int i, n, t1 = 0, t2 = 1, nextTerm;
    printf("Enter the number of terms: ");
    scanf("%d", &n);
    printf("Fibonacci Series: ");

    for (i = 1; i <= n; ++i) {
        printf("%d, ", t1);
        nextTerm = t1 + t2;
        t1 = t2;
        t2 = nextTerm;
        count++;
    }
    printf("\nVariable used %d times\n",count);
    return 0;
}
```

- **Recursive Code**

```
#include<stdio.h>
int count =0;
int x,y,n;

int fib(int n){
count++;
        if(n==0||n==1)
        return n;
        else
        return fib(n-1) + fib(n-2);

}
int main()
{
        printf("Enter the number ");
        scanf("%d",&n);
        printf("%d\n",fib(n));
        printf("Veriable used %d times\n",count);
}
```

- For the iterative approach, the amount of space required is the same for fib(5) and fib(500), i.e. as N changes the space/memory used remains the same. Hence it’s space complexity is O(1) or constant.

- For the iterative approach, the amount of space required is the different for fib(5) and fib(500), the maximum depth is proportional to the N, hence the space complexity of Fibonacci recursive is O(N).

- The best case scenario is itrative approch as the space complexity is O(1).

- Worst Case scenario is recursive approch where space complexity is O(N)