

Department of CSE

C PROGRAMMING LAB MANUAL

C PROGRAMMING LAB

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C PROGRAMMING LAB MANUAL

DEPARTMENT OF CSE**EXPERIMENT LIST****CLASS:** I B.TECH CSE,ECE,EEE,ME,CE**SUBJECT:** C PROGRAMMING (R13)**Recommended Systems/Software Requirements:**

- Intel based desktop PC
- ANSI C Compiler with Supporting Editors

Week 1 :**Page No.5 - 8**

- a) Write a C program to find the sum of individual digits of a positive integer.
- b) A Fibonacci sequence is defined as follows: the first and second terms in the sequence are 0 and 1. Subsequent terms are found by adding the preceding two terms in the sequence. Write a C program to generate the first n terms of the sequence.
- c) Write a C program to generate all the prime numbers between 1 and n, where n is a value supplied by the user.

Week 2:**Page No. 9 - 13**

- a) Write a C program to calculate the following Sum:
$$\text{Sum} = 1 - x^2/2! + x^4/4! - x^6/6! + x^8/8! - x^{10}/10!$$
- b) Write a C program to find the roots of a quadratic equation.

Week 3 :**Page No.14 - 19**

- a) The total distance traveled by vehicle in 't' seconds is given by distance $= ut + \frac{1}{2}at^2$ where 'u' and 'a' are the initial velocity (m/sec.) and acceleration (m/sec²). Write C program to find the distance traveled at regular intervals of time given the values of 'u' and 'a'. The program should provide the flexibility to the user to select his own time intervals and repeat the calculations for different values of 'u' and 'a'.
- b) Write a C program, which takes two integer operands and one operator from the user, performs the operation and then prints the result. (Consider the operators +, -, *, /, % and use Switch Statement)

Week 4:**Page No.20 - 26**

- a) Write C programs that use both recursive and non-recursive functions
- To find the factorial of a given integer.
 - To find the GCD (greatest common divisor) of two given integers.

Week 5 :**Page No.27 - 41**

- a) Write a C program to find both the largest and smallest number in a list of integers.
- b) Write a C program that uses functions to perform the following:
- Addition of Two Matrices
 - Multiplication of Two Matrices

Week 6 :**Page No.42 - 49**

- a) Write a C program that uses functions to perform the following operations:
- To insert a sub-string in to given main string from a given position.
 - To delete n Characters from a given position in a given string.
- b) Write a C program to determine if the given string is a palindrome or not

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Week 7 :**Page No.50 - 55**

- a) Write a C program that displays the position or index in the string S where the string T begins, or - 1 if S doesn't contain T.
- b) Write a C program to count the lines, words and characters in a given text.

Week 8 :**Page No.56 - 60**

- a) Write a C program to generate Pascal's triangle.
- b) Write a C program to construct a pyramid of numbers.

Week 9 :**Page No.61- 63**

Write a C program to read in two numbers, x and n, and then compute the sum of this geometric progression:

$$1+x+x^2+x^3+\dots\dots\dots+x^n$$

For example: if n is 3 and x is 5, then the program computes 1+5+25+125.

Print x, n, the sum

Perform error checking. For example, the formula does not make sense for negative exponents - if n is less than 0. Have your program print an error message if n<0, then go back and read in the next pair of numbers of without computing the sum. Are any values of x also illegal ? If so, test for them too.

Week 10 :**Page No.64 - 70**

- a) 2's complement of a number is obtained by scanning it from right to left and complementing all the bits after the first appearance of a 1. Thus 2's complement of 11100 is 00100. Write a C program to find the 2's complement of a binary number.
- b) Write a C program to convert a Roman numeral to its decimal equivalent.

Week 11 :**Page No. 71 - 74**

Write a C program that uses functions to perform the following operations:

- Reading a complex number
- Writing a complex number
- Addition of two complex numbers
- Multiplication of two complex numbers

(Note: represent complex number using a structure.)

Week 12 :**Page No.75 - 77**

- a) Write a C program which copies one file to another.
- b) Write a C program to reverse the first n characters in a file.
- (Note: The file name and n are specified on the command line.)

Week 13 :

- a) Write a C program to display contents of a file.
- b) Write a C program to merge two files into a third file(i.e., the contents of the first file followed by those of the second are put in the third file)

Week 14 :**Page No.78 - 79**

- a) Write C programs that uses non recursive function to search for a key value in a given list of integers using Linear search
- b) Write C programs that uses non recursive function to search for a key value in a given list of integers using Binary search

Week 15 :**Page No.80 - 81**

- a) Write C programs that implements the Selection sort method to sort a given array of integers in ascending order.
- b) Write C programs that implements the Bubble sort method to sort a given array of integers in ascending order.

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Week 16 :**Page No.82 - 85**

Write C programs that uses functions to perform the following operations

- i) Create a single linked list of integers elements.
- ii) Traverse the above list and display the elements.

Week 17 :**Page No.86 - 87**

Write C programs that implement Stack (its operations) using singly linked list to display a given list of integers in reverse order.

Ex. Input 10 23 4 6. Output 6 4 23 10

Week 18 :**Page No.88 - 93**

Write C programs that implement Queue (its operations) using singly linked list to display a given list of integers in same order.

Ex. Input 10 23 4 6. Output 10 23 4 6

Week 19 :**Page No.94**

Write C program to implement linear regression algorithm.

Week 20 :**Page No.95-96**

Write C program to implement the polynomial regression algorithm.

Week 21 :**Page No.97**

Write C program to implement the Lagrange interpolation.

Week 22 :**Page No.98**

Write C program to implement the Newton- Gregory forward interpolation.

Week 23 :**Page No.99**

Write C program to implement Trapezoidal method.

Week 24 :**Page No.100-101**

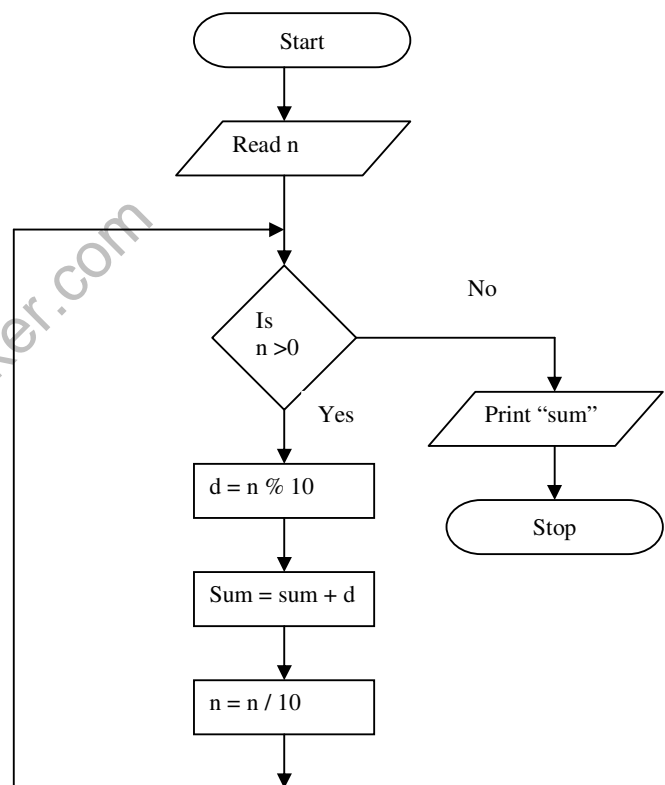
Write C programs to implement Simpson method.

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WEEK-1**A) AIM:** Write a C program to find the sum of individual digits of a positive integer.**Algorithm:**

1. Read the number n
2. Initialize sum \leftarrow 0
3. while n > 0
4. d \leftarrow n%10
5. sum \leftarrow sum+d
6. n \leftarrow n/10
7. print sum.

Flow chart:**Program:**

```
#include<stdio.h>
#include<conio.h>
void main()
{
    int n, sum=0,d;
    clrscr();
    printf("Enter any integer:");
    scanf("%d", &n);
    while(n>0)
    {
        d=n%10;
        sum=sum+d;
        n=n/10;
    }
    Printf("sum of individual digits is %d",sum);
    getch();
}
```

Result:

Enter any integer: 1234
Sum of individual digits is: 10

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B) AIM: A Fibonacci sequence is defined as follows: the first and second terms in the sequence are 0 and 1. Subsequent terms are found by adding the preceding two terms in the sequence. Write a C program to generate the first n terms of the sequence.

Algorithm:

1. Read the number of terms n
2. Initialize $a \leftarrow 0$, $b \leftarrow 1$
3. print a and b values
4. for $i \leftarrow 3$ to n
 - a. increment the i value
 - b. $c \leftarrow a+b$
 - c. print c value
 - d. $a \leftarrow b$
 - e. $b \leftarrow c$

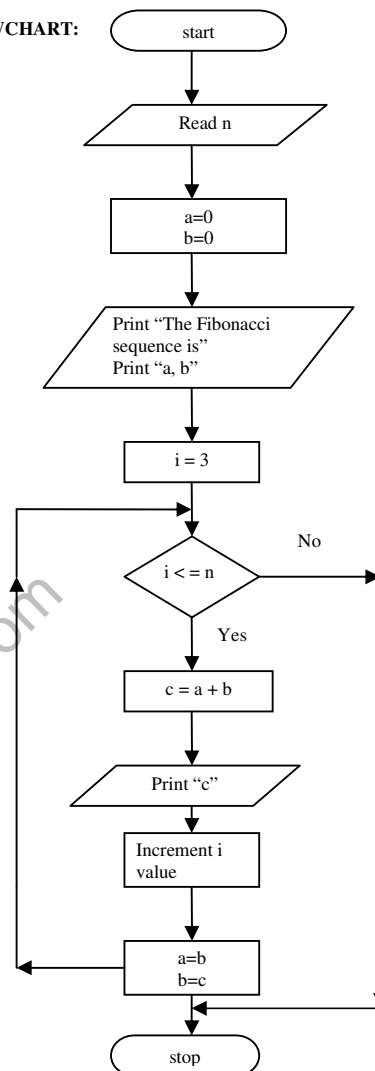
Program:

```
#include<stdio.h>
#include<conio.h>
void main()
{
    int a=0,b=1,c,n,i;
    clrscr();
    printf("Enter no. of terms:");
    scanf("%d", &n);
    printf("The Fibonacci sequence
is:");
    printf("%d%d", a,b);
    for(i=3;i<=n;i++)
    {
        c=a+b;
        printf("%d",c);
        a=b;
        b=c;
    }
    getch();
}
```

Result:

Enter no of items: 5
 The Fibonacci sequence is
 0 1 1 2 3

FLOWCHART:



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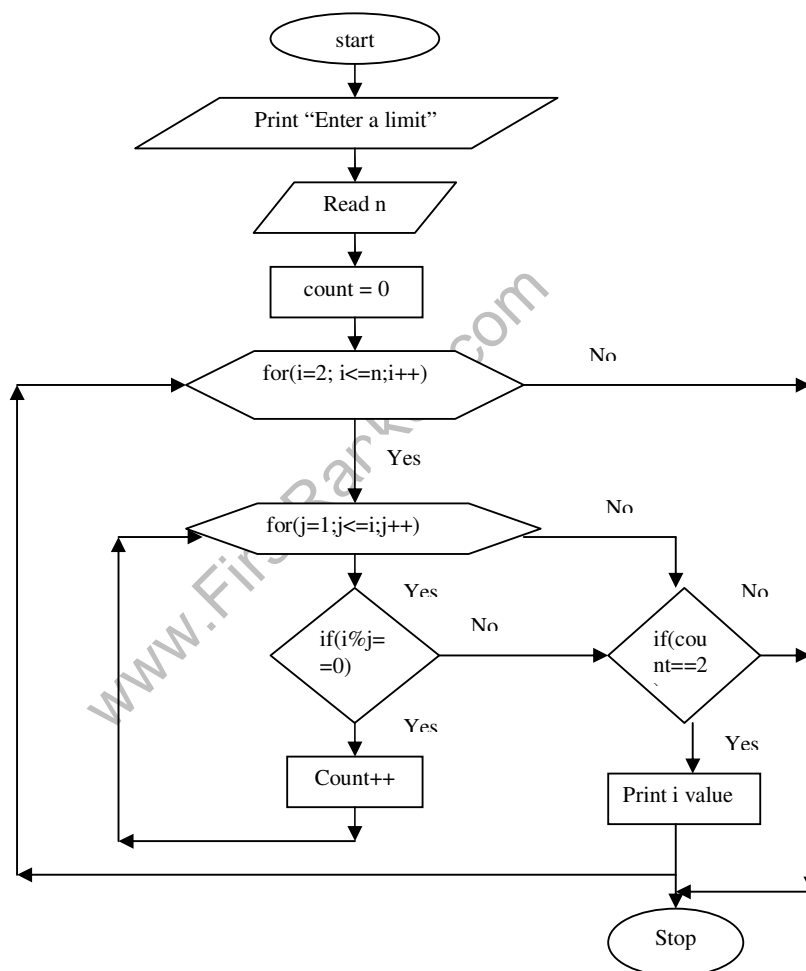
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C) AIM: Write a C program to generate all the prime numbers between 1 and n is a value supplied by the user.

Algorithm:

1. Read n value
2. Initialize count $\leftarrow 0$
3. for i $\leftarrow 2$ to n
 - a. for j $\leftarrow 1$ to i
 - b. if i mod j is equal to 0
 - c. then increment count
 - d. if count is equal to 2
 - e. then print i value.

Flow chart:



Program:

```

#include<stdio.h>
#include<conio.h>
void main()
{
    int i, j, n, count=0;

```

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```
clrscr();
printf("Enter the limit:");
scanf("%d", &n);
printf("The prime numbers are:");
for(i=2;i<=n;i++)
{
    for(j=1;j<=i;j++)
    {
        if(i%j==0)
            count++;
    }
    if(count==2)
        printf("%d\t", i);
}
getch();
}
```

Result:

Enter the limit: 4
The prime numbers are:
2 3 5 7

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WEEK-2

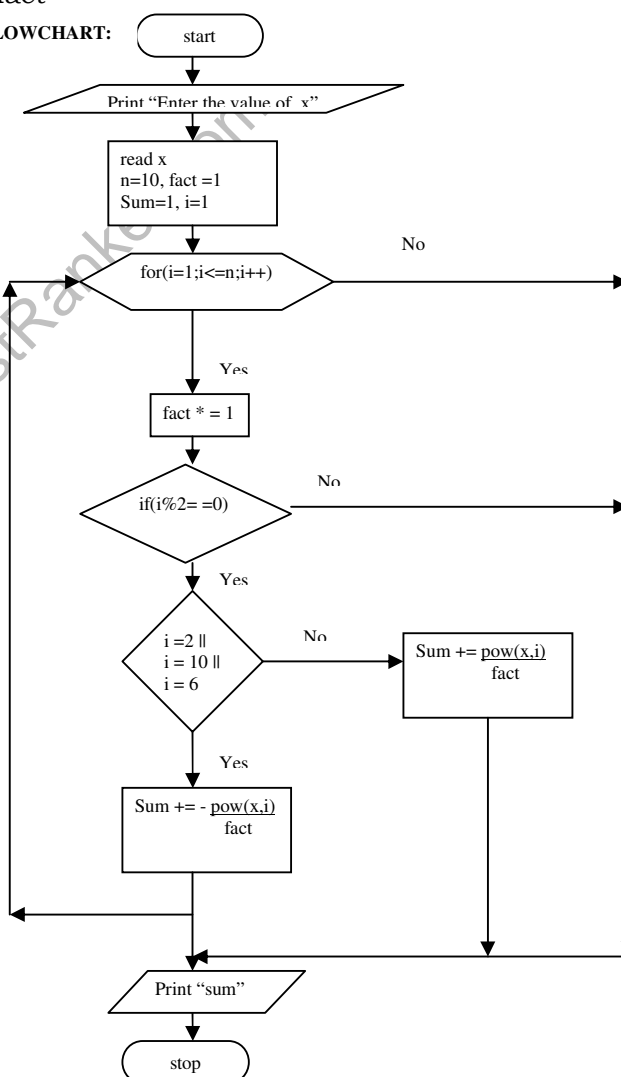
A) AIM: Write a C program to calculate the following sum:

$$\text{Sum} = 1 - x^2/2! + x^4/4! - x^6/6! + x^8/8! - x^{10}/10!$$

Algorithm:

1. Read the x value
2. Initialize fact $\leftarrow 1$, sum $\leftarrow 1$ and n $\leftarrow 10$
3. for i $\leftarrow 1$ to n
 - a. fact \leftarrow fact*i
 - b. if i mod 2 is equal to 0
 - c. then if i equal to 2 or i equal to 10 or i equal to 6
 - d. then sum += -pow(x,i)/fact
 - e. else sum += pow(x,i)/fact
4. print sum

FLOWCHART:



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Program:

```
#include<stdio.h>
#include<conio.h>
#include<math.h>
void main()
{
    int i,n=10,x;
    long int fact=1;
    float sum=1;
    printf("Enter the x value:");
    scanf("%d", &x);
    for(i=1;i<=n;i++)
    {
        fact=fact*i;
        if(i%2==0)
        {
            if(i==2 || i==10 || i==6)
                sum+= -pow(x,i)/fact;
            else
                sum+=pow(x,i)/fact;
        }
    }
    Printf("sum is %f", sum);
}
```

Result:

Enter x value: 2
Sum is: 0

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B) AIM: Write a C program to find the roots of a quadratic equation.**Algorithm:**

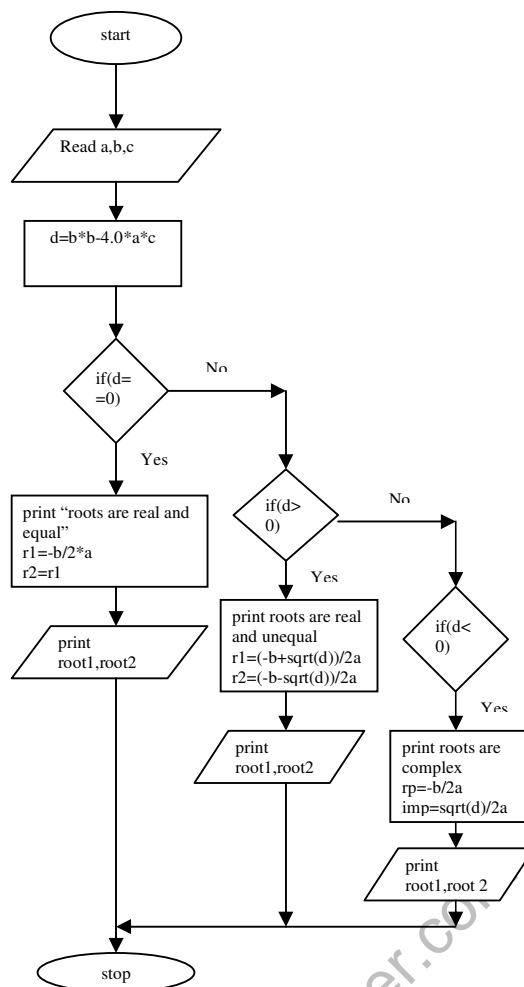
1. Read a,b,c values
2. Initialize $d \leftarrow b^2 - 4ac$
3. if $d == 0$
 - a. then print "roots are real and equal"
 - b. $r1 \leftarrow -b/2a, r2 \leftarrow r1$
4. else if $d > 0$
 - a. then print "roots are real and distinct"
 - b. $r1 \leftarrow (-b + \sqrt{d})/2a, r2 \leftarrow (-b - \sqrt{d})/2a$
5. else if $d < 0$
 - a. then print "roots are complex"
 - b. $rp \leftarrow -b/2a, imp \leftarrow \sqrt{d}/2a$
 - c. print r1 and r2.

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FLOWCHART



Program:

```

#include<stdio.h>
#include<conio.h>
#include<math.h>
void main()
{
    float a,b,c,d,r1,r2,imp,rp;
    clrscr();
    printf("Enter a,b,c:");
    scanf("%f%f%f",&a,&b,&c);
    d=b*b-4.0*a*c;
    if(d==0)
    {
        Printf("roots are real and equal");
        r1=-b/2*a;
        r2=r1;
        printf("root1=%f",r1);
        printf("root2=%f",r2);
    }
    else if(d>0)
    {
        Printf("roots are real and unequal");
        r1=(-b+sqrt(d))/2*a;
    }
}
  
```

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```
        r2=(-b-sqrt(d))/2*a;
        printf("root 1=%f",r1);
        printf("root2=%f",r2);
    }
    else if(d<0)
    {
        d=-d;
        printf("roots are complex");
        rp=-b/2*a;
        imp=sqrt(d)/2*a;
        printf("root 1=%f+i%f",rp,imp);
        printf("root2=%f-i%f",rp,imp);
    }
    getch();
}
```

Result:

Enter a,b & c: 1 5 3

Roots are real & unequal

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WEEK-3

- A)** The total distance travelled by vehicle in 't' seconds is given by $\text{distance} = ut + \frac{1}{2}at^2$ where 'u' and 'a' are the initial velocity (m/sec.) and acceleration (m/sec²). Write C program to find the distance travelled at regular intervals of time given the values of 'u' and 'a'. The program should provide the flexibility to the user to select his own time intervals and repeat the calculations for different values of 'u' and 'a'.

Algorithm:

Step 1: Start

Step 2 : Read t ,dt

Step 3: Set i to 1

Step 4: Set k to dt

Step 5: Read u,a

Step 6: set s to $u*k + 0.5*a*k*k$

Step 7: Write s

Step 8: If($k \leq t$) and $i=1$ then

Begin

Step 8.1 go to step 6

And

Else

Begin

Step 8.2 :read

Step 8.3 :if($j=0$) then

Begin

Step 8.3.1: Set I to 0

End

Else

Begin

Step 8.3.2: Set I to 1

Step 8.3.3: go to step 4

End

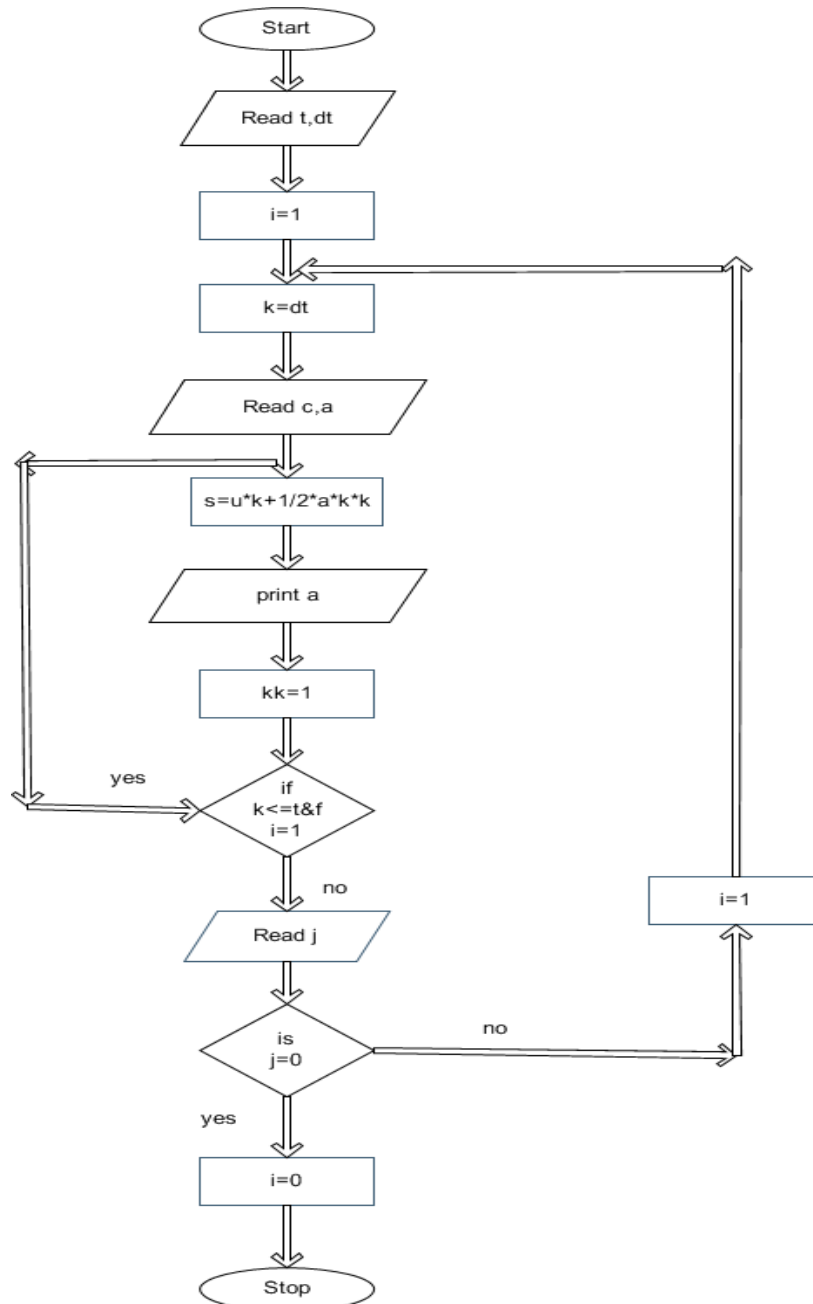
Step 9: Stop

Step 10: End

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Flowchart:



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Program:

```
#include<stdio.h>
main()
{
    int a,u,t,t1,t2,i;
    float s;
    clrscr();
    printf("ENTER THE VALUES OF a,u,t,t1,t2:");
    scanf("%d%d%d%d%d",&a,&u,&t,&t1,&t2);
    for(i=t1;i<=t2;i=i+t) // performing the looping operation for time intervals
    {
        s=(u*i)+(0.5*a*i*i); // calculate the total distance
        printf("\n\nthe distance travelled in %d seconds is %f",i,s);
    }
    getch();
}
```

Input/Output:

1. ENTER THE VALUES OF a,u,t,t1,t2:

1
2
3
1
5

the distance travelled in 1 seconds is 2.500000

the distance travelled in 4 seconds is 16.000000

2. ENTER THE VALUES OF a,u,t,t1,t2:0

1
2
3
4

the distance travelled in 3 seconds is 3.000000

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- B) AIM:** Two integer operands and one operator form user, performs the operation and then prints the result.
(Consider the operators +,-,*, /, % and use Switch Statement)

Algorithm:

Step 1: Start

Step 2: Read the values of a,b and operator

Step 3: if the operator is '+' then

R=a+b

Go to step 8

Break

Step 4: Else if the operator is '-' then

R=a-b

Go to step 8

Step 5: Else if the operator is '*' then

R=a*b

Go to step 8

Step 6: Else if the operator is '/' then

R=a/b

Go to step 8

Step 7: Else if the operator is '%' then

R=a%b

Go to step 8

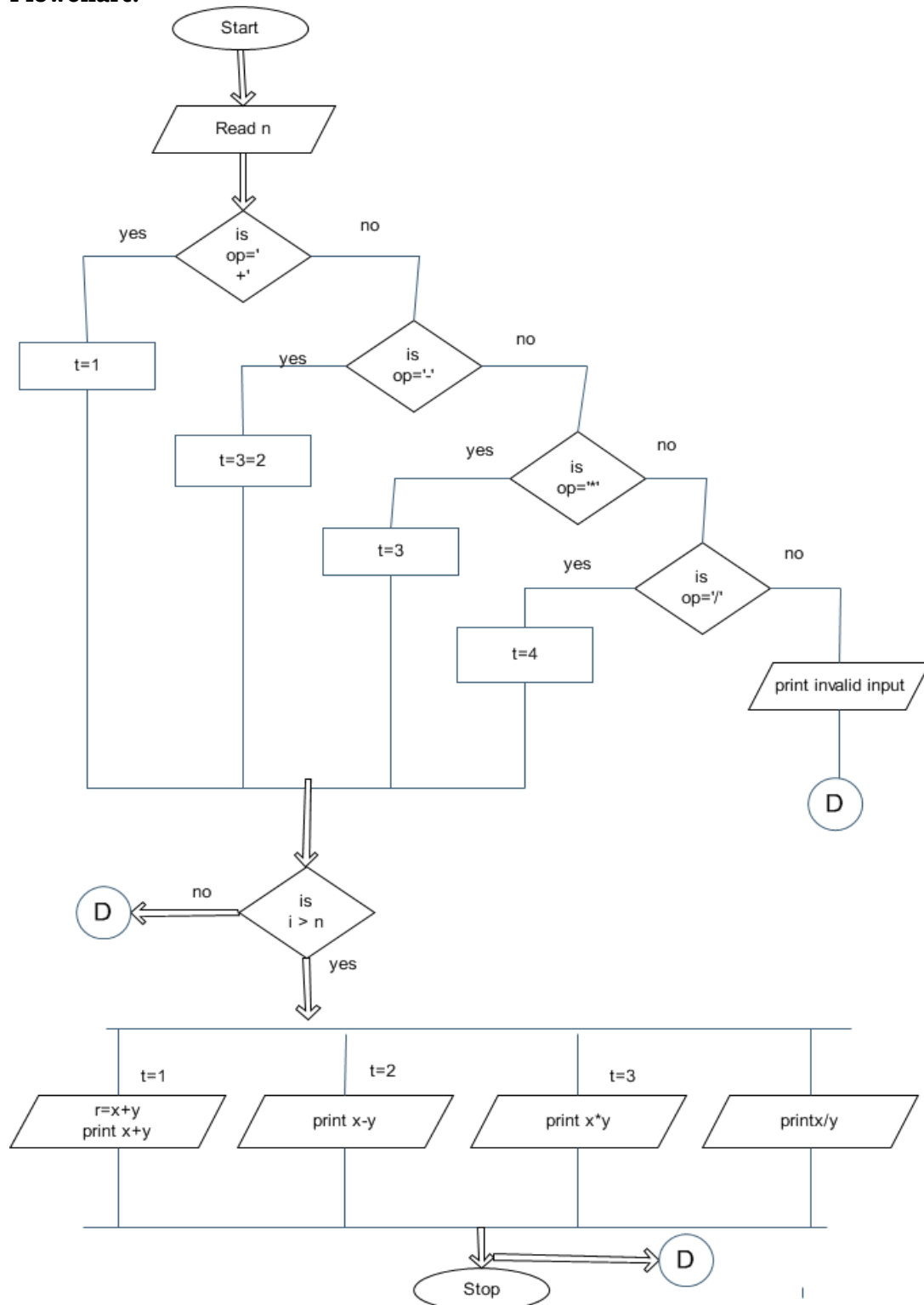
Step 8: write R

Step 9:End

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Flowchart:



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Program:

```
#include<stdio.h>
main()
{
    char op;
    float a,b,c;
    clrscr();
    printf("enter two operands:");
    scanf("%d%d",&a,&b);
    printf("enter an operator:");
    scanf(" %c",&op);
    switch(op) // used to select particular case from the user
    {
        case '+':printf("sum of two numbers %2d %2d is:   %d",a,b,a+b);
                break;
        case '-':printf("subtraction of two numbers %2d %2d is:
                %d",a,b,a-b);
                break;
        case '*':printf("product of two numbers %2d %2d is:
                %d",a,b,a*b);
                break;
        case '/':printf("quotient of two numbers %2d %2d is:
                %d",a,b,a/b);
                break;
        case '%':printf("remainder of two numbers %2d %2d is:
                %d",a,b,c);
                break;
        default:printf("please enter correct operator");
                break;
    }
    getch();
}
```

Result:

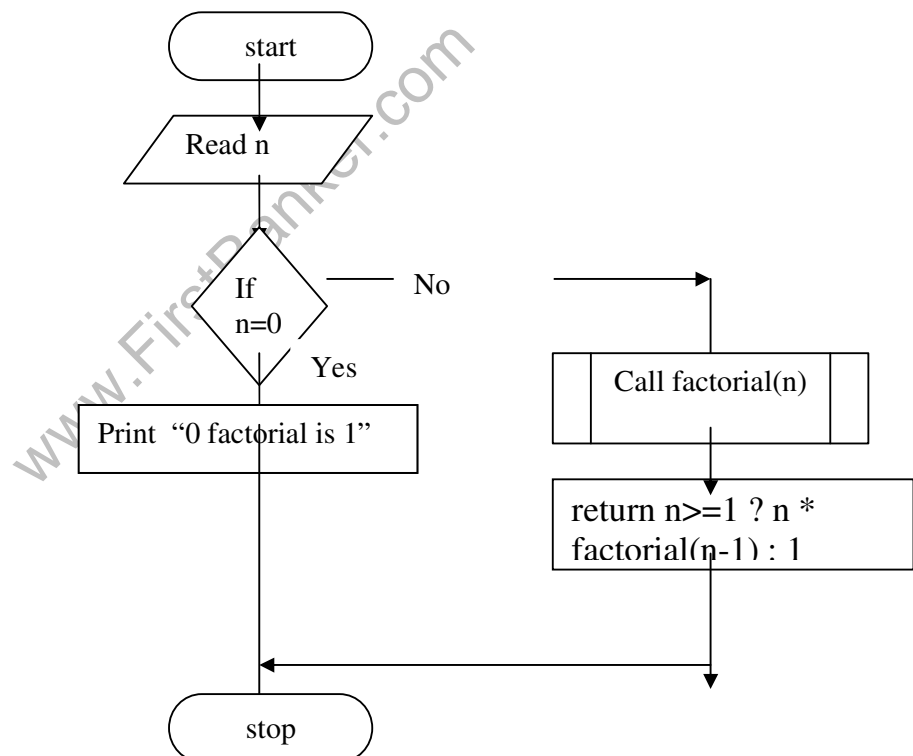
1. enter two operands: 2 3
enter an operator: +
sum of two numbers 2 3 is: 5
2. enter two operands: 3 4
enter an operator: -
subtraction of two numbers 3 4 is: -1
3. enter two operands: 3 5
enter an operator: *
product of two numbers 3 5 is: 15

WEEK-4

A) AIM: Write a C program to find the factorial of a given integer by using recursive and non-recursive functions.

i)Recursive Algorithm:

1. Define the recursive function
2. Read the number n
3. if n is equal to 0
4. then print "factorial of 0 is 1"
5. else call the recursive function
6. print the factorial value.

Flow chart:

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Program:

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

unsigned int factorial(int n);

void main()
{
    int n,i;
    long int fact;
    clrscr();
    printf("Enter the number: ");
    scanf("%d",&n);

    if(n==0)
        printf("Factorial of 0 is 1\n");
    else
        printf("Factorial of %d Using Recursive Function is      %d\n",n,factorial(n));

    getch();
}

/* Recursive Function*/
unsigned int factorial(int n)
{
    return n>=1 ? n * factorial(n-1) : 1;
}
```

Result:

Enter number: 5
Factorial of 5 using recursive function is: 120

ii)Non-Recursive Algorithm: main program

Step 1: start
Step 2: read n
Step 3: call the sub program fact(n)
Step 4: print the f value
Step 5: stop

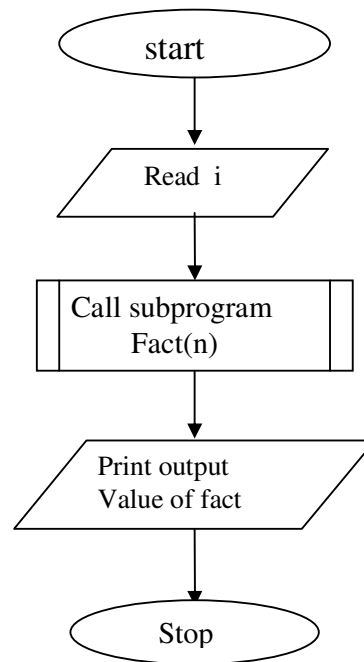
Sub program: fact

Step 1: initialize the f=1
Step 2: if n==0 or n=1 return 1 to main program. If not goto step 3
Step 3: perform the looping operation as follows
 For i=1 i<=n; i++
Step 4: f=f*i
Step 5: return f value to the main program

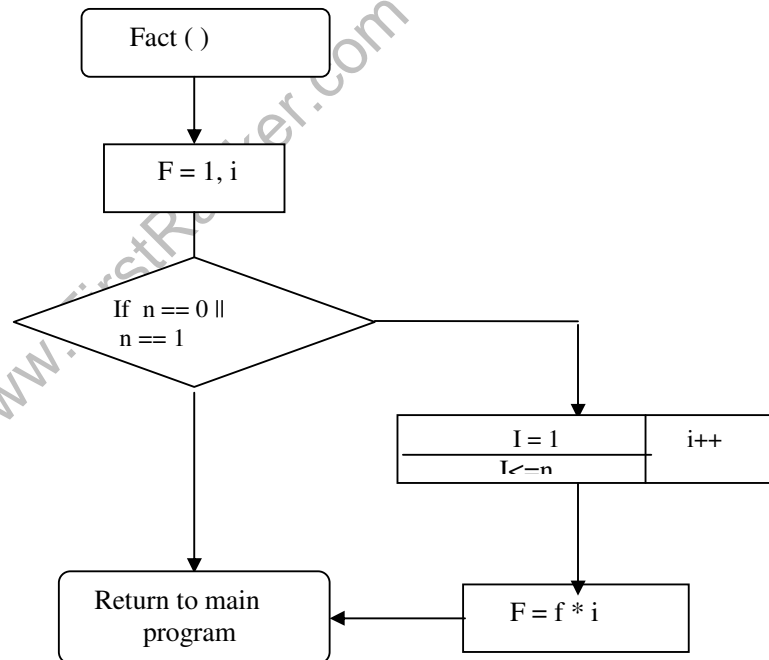
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Factorial nonrecursive



Sub program



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Program:

```
#include<stdio.h>
#include<conio.h>
int fact(int n) //starting of the sub program
{
    int f=1,i;
    if((n==0) || (n==1)) // check the condition for n value
        return(1);
    else
        for(i=1;i<=n;i++) // perform the looping operation for calculating the factorial
            f=f*i;
        return(f);
}
void main()
{
    int n;
    clrscr();
    printf("enter the number :");
    scanf("%d",&n);
    printf("factoria of number%d",fact(n));
    getch();
}
```

Result:

1.Enter a number: 7
Factorial of number: 5040

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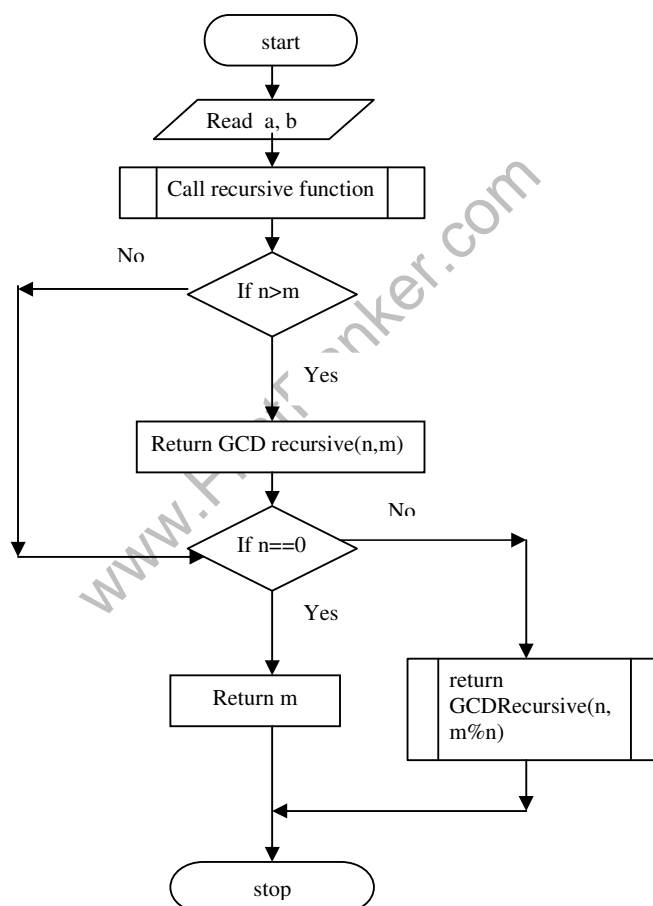
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B) AIM: Write a C program to find the GCD(greatest common divisor) of two given integers by using recursive and Non-recursive functions.

i)Recursive Algorithm:

1. Define the recursive function
2. Read the a,b values
3. Call the recursive function
 - a. if $n > m$
 - b. then return the function with parameters m, n
 - c. if $n == 0$
 - d. then return m
 - e. else return the function with parameters $n, m \% n$.

Flow chart:



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Program:

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

unsigned int GCDRecursive(unsigned m, unsigned n);
int main(void)
{
    int a,b;
    clrscr();

    printf("Enter the two numbers whose GCD is to be found: ");
    scanf("%d%d",&a,&b);

    printf("GCD of %d and %d Using Recursive Function is %d\n",a,b,GCDRecursive(a,b));

    getch();
}

/* Recursive Function*/
unsigned int GCDRecursive(unsigned m, unsigned n)
{
    if(n>m)
        return GCDRecursive(n,m);
    if(n==0)
        return m;
    else
        return GCDRecursive(n,m%n);
}
```

Result:

Enter the two numbers whose GCD is to be found 18 6
GCD of 18 and 6 Using Recursive Function is 6

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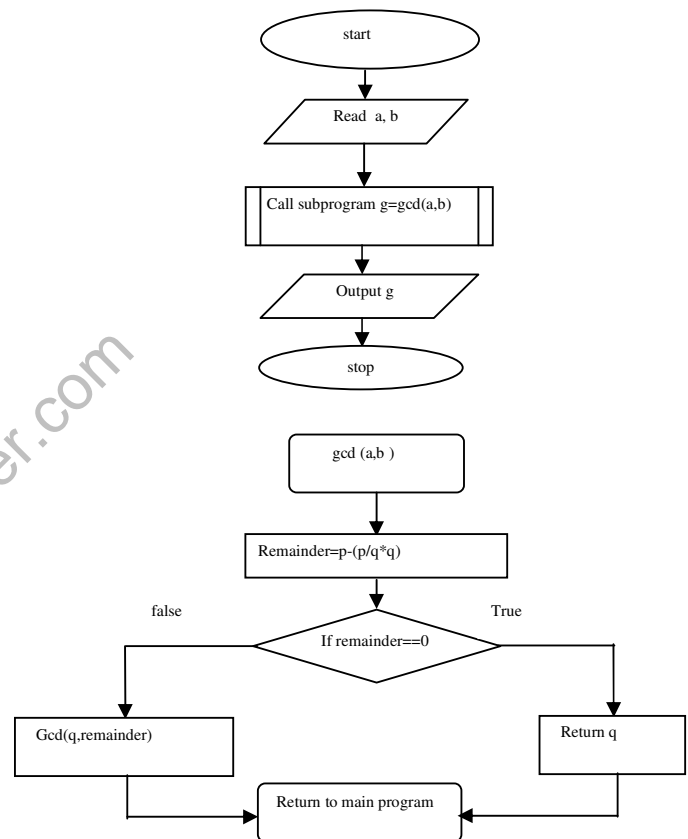
ii)Non-Recursive Algorithm:

Step 1: start
 Step 2: read a,b
 Step 3: call sub program $g = \text{GCD}(a,b)$
 Step 4: print the g value
 Step 5: stop

Sub program: $\text{GCD}(a,b)$

Step 1: initialize the $p=1$, q , remainder
 Step 2: $\text{remainder} = p - (p/q * q)$
 Step 3: $\text{remainder} = 0$ return q else goto step 4
 Step 4: $\text{GCD}(q, \text{remainder})$ return to main program

Flowchart:



Program:

```

#include<stdio.h>
#include<conio.h>
#include<math.h>
int gcdnonrecursive(int m,int n)
{
    int remainder;
    remainder=m-(m/n*n);
    if(remainder==0)
        return n;
    else
        gcdnonrecursive(n,remainder);
}

void main()
{
    int a,b,igcd;
    clrscr();
    printf("enter the two numbers whose gcd is to be found:");
    scanf("%d%d",&a,&b);
    printf("GCD of %d",gcdnonrecursive(a,b));
    getch();
}
  
```

Result:

- enter the two numbers whose gcd is to be found:5,25
GCD of a,b is : 5
- enter the two numbers whose gcd is to be found:36,54
GCD of a,b is : 18

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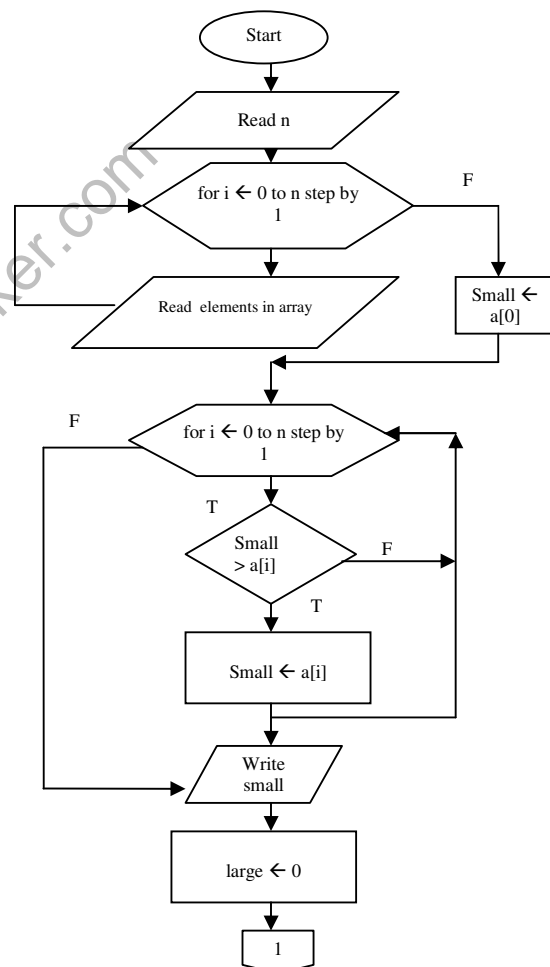
WEEK-5

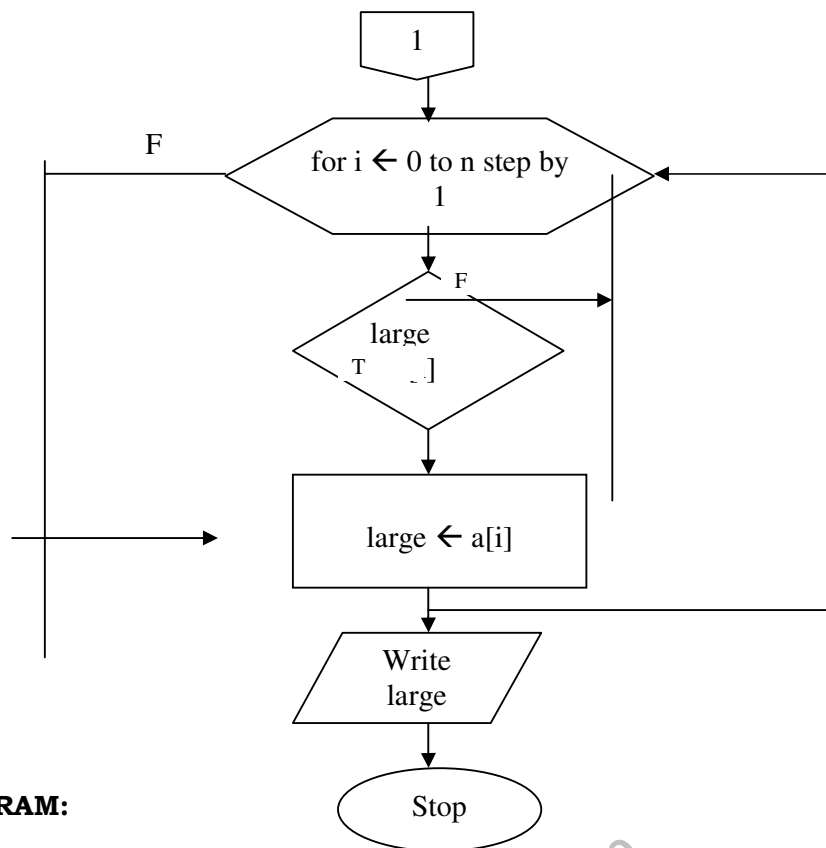
A) AIM: - A C program to find both the largest and smallest number in list of integers

Algorithm:

1. Start
2. Read n
3. for i \leftarrow 0 to n
4. do read a[i]
5. small \leftarrow a[0]
6. for i \leftarrow 0 to n
7. do if small > a[i]
8. then small \leftarrow a[i]
9. write small
10. large \leftarrow 0
11. for i \leftarrow 0 to n
12. do if large < a[i]
13. then large \leftarrow a[i]
14. write large
15. Stop

Flowchart:





PROGRAM:

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

```
Void main()
{
```

```
    int i,n,small=0,large=0;
    int a[30];
```

```
    clrscr();
    printf("\n Enter size of the array:");
    scanf("%d",&n);
```

```
    printf("\n Enter values in array elements:");
    for(i=0;i<n;i++)
```

```
    {
        scanf("%d",&a[i]);
    }
```

```
    small = a[0];
    for(i=0;i<n;i++)
```

```
    {
        if(small > a[i])
            small = a[i];
    }
```

```
    printf("\n The smallest element in given array is %d",small);
```

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```
large=0;
for(i=0;i<n;i++)
{
    if(large < a[i])
        large = a[i];
}
printf("\n The largest element in given array is %d",large);

printf("\n :End of the Main Program:");
getch();
}
```

RESULT:

Input :

Enter size of the array: 9

Enter values in array elements:

96 46 86 6 36 76 26 16 56

Output:

The smallest element in given array is 6

The largest element in given array is 96

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B)Aim: Write a c- program that uses functions to perform addition and multiplication on two matrices.

Algorithm

1. Start
2. read r1,r2,c1,c2
3. if $r1 \neq r2$ and $c1 \neq c2$
4. then "matrix addition is not possible"
5. else
6. do init_mat(a,r1,c1)
7. print_mat(a,r1,c1)
8. init_mat(b,r2,c2)
9. print_mat(b,r2,2)
10. add_mat(a,b,c,r1,c1)
11. print_mat(c,r1,c1)
12. Stop

init_mat(a4,r4,c4)

1. for $i \leftarrow 0$ to r4
2. do for $j \leftarrow 0$ to c4
3. read a4[i][j]

print_mat(a4,r4,c4)

1. for $i \leftarrow 0$ to r4
2. do for $j \leftarrow 0$ to c4
3. print a[i][j]
4. print next_line

add_mat(a4,b4,c24.r4,c4)

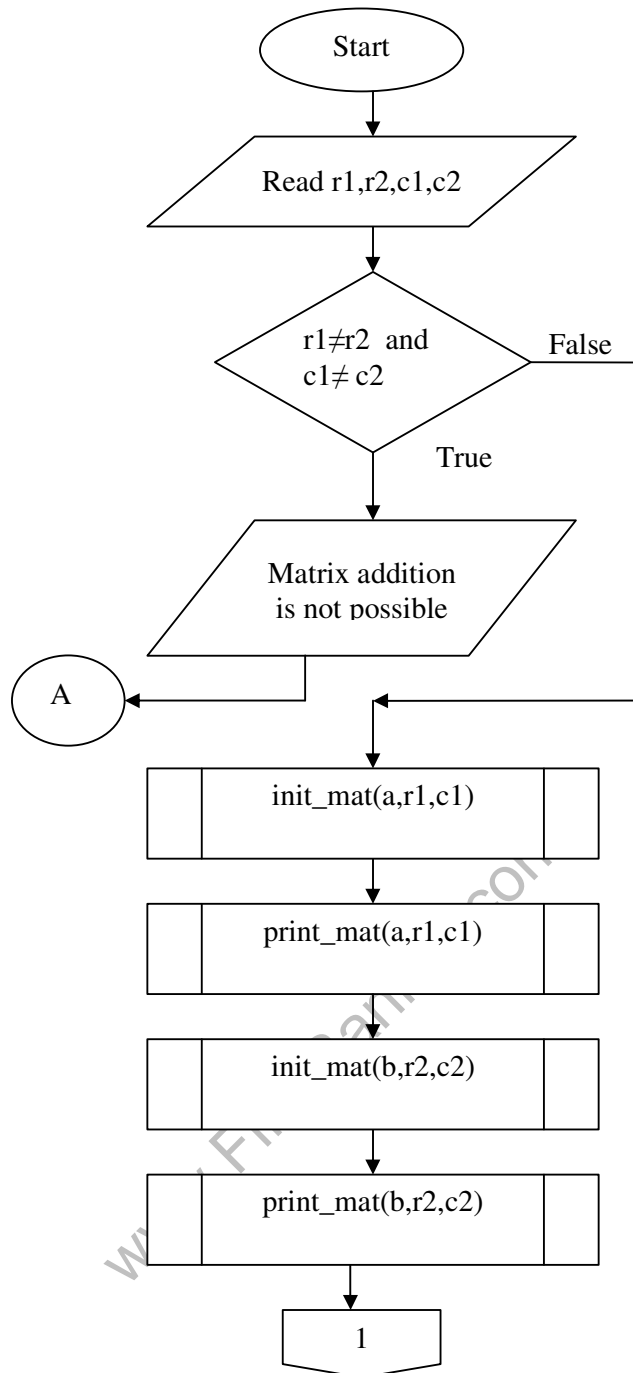
1. for $i \leftarrow 0$ to r4
2. do for $j \leftarrow$ to c4
3. $c[i][j] \leftarrow a[i][j] + b[i][j]$

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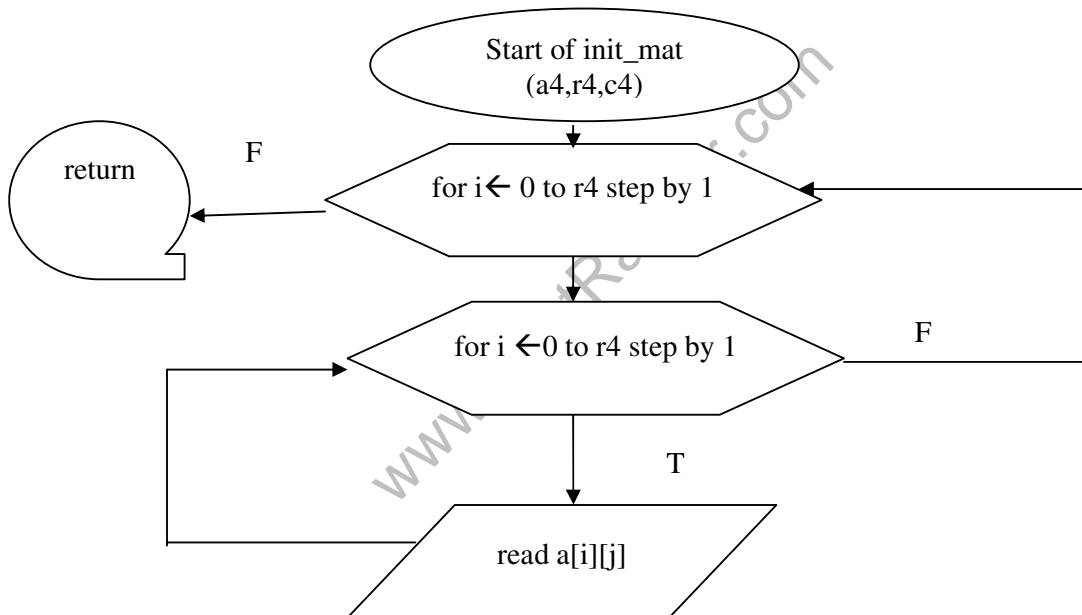
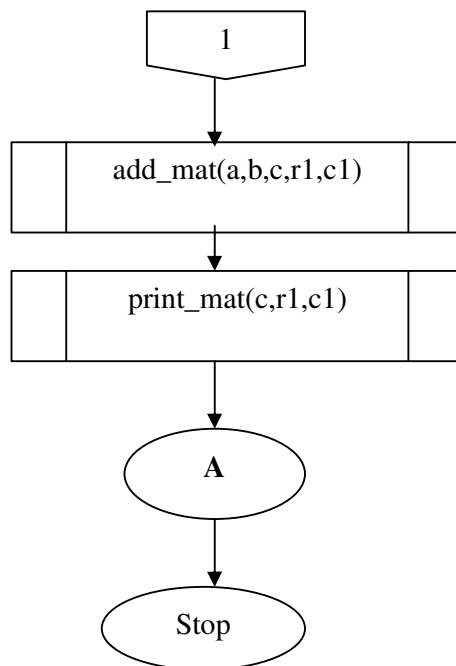
C PROGRAMMING LAB MANUAL

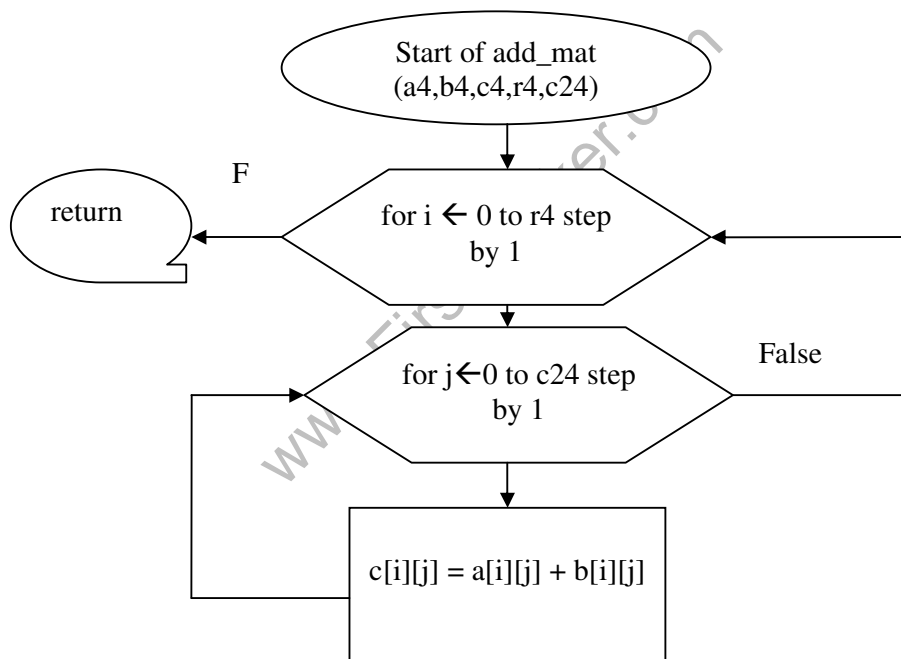
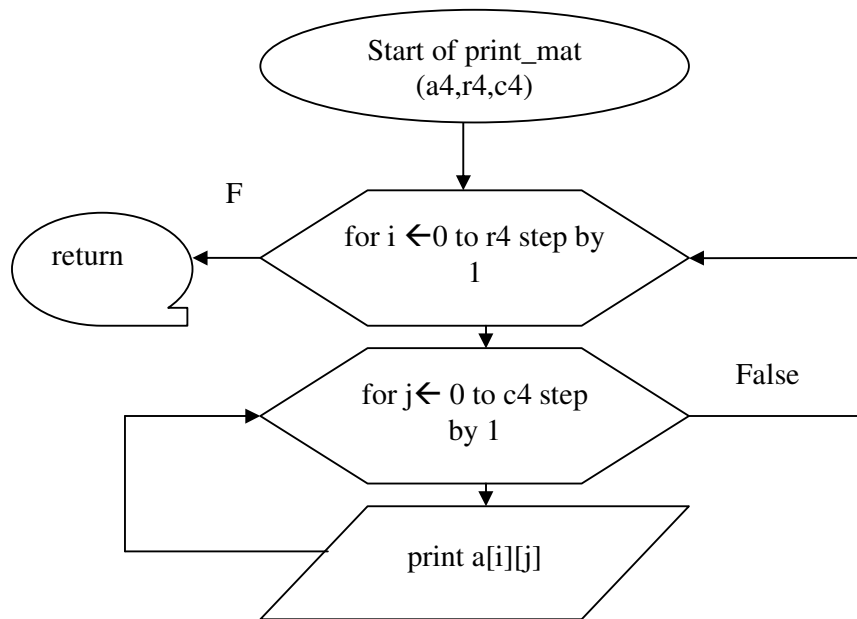
Flowchart:-



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PROGRAM:

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

```
void init_mat (int [[10], int, int);
void print_mat (int [[10], int, int);
void add_mat (int [[10], int [[10], int [[10], int, int);
```

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```
main()
{
    int r1,r2,c1,c2;
    int a[10][10],b[10][10],c[10][10];
    clrscr();

    /* Giving order of the Matrix - A */
    printf("\n Enter the order of Matrix - A:");
    scanf("%d%d",&r1,&c1);

    /* Giving order of the Matrix - B */
    printf("\n Enter the order of Matrix - B:");
    scanf("%d%d",&r2,&c2);

    if(r1!=r2 || c1!=c2)
    {
        printf("\n Matrix Addition is not possible ");
        getch();
        exit(0);
    }
    else
    {
        /* Matrix - A */
        printf("\n Enter the elements of Matrix - A:");
        init_mat(a,r1,c1);
        printf("\n The elements of Matrix - A");
        print_mat(a,r1,c1);

        /* Matrix - B */
        printf("\n Enter the elements of Matrix - B");
        init_mat(b,r2,c2);
        printf("\n The elements of Matrix - B");
        print_mat(b,r2,c2);

        /* Function call to Matrix addition logic */
        add_mat(a,b,c,r1,c1);

        /* Matrix after addition */
        printf("\n The elements of Matrix - C after addition of A & B");
        print_mat(c,r1,c1);
    }
    getch();
}

/* Function for two dimensional array initialization */
void init_mat(int mat[][10],int r,int c)
{
    int i,j;
    for(i=0;i<r;i++)
    {
        for(j=0;j<c;j++)
        {
            scanf("%d",&mat[i][j]);
        }
    }
}
```

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```
    }  
  }  
}  
  
/* Function for printing element in Matrix form */  
void print_mat(int mat[][10],int r, int c)  
{  
    int i,j;  
    printf("\n");  
    for(i=0;i<r;i++)  
    {  
        for(j=0;j<c;j++)  
        {  
            printf(" %d ",mat[i][j]);  
        }  
        printf("\n");  
    }  
}  
  
/* function for matrix addition logic */  
void add_mat(int a[][10],int b[][10],int c[][10],int r1,int c1)  
{  
    int i,j;  
  
    for(i=0;i<r1;i++)  
    {  
        for(j=0;j<c1;j++)  
        {  
            c[i][j] = a[i][j]+b[i][j];  
        }  
    }  
}
```

RESULT:**Case - 1****Input :**

Enter the order of Matrix - A: 2 2
Enter the order of Matrix - B: 2 2
Enter the elements of Matrix - A: 1 2 3 4
The elements of Matrix - A:
1 2
3 4
Enter the elements of Matrix - B: 1 2 3 4
The elements of Matrix - B:
1 2
2 4

Output:

The elements of Matrix - C after addition of A & B:
2 4
4 8

Case - 2**Input :**

Enter the order of Matrix - A: 2 3
Enter the order of Matrix - B: 2 2

Output :

Matrix Addition is not possible

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B) AIM: Write A C- Program That Uses Functions To Perform Matrice Multiplication On Two Matrices.

Algorithm

1. Start
2. read r1,r2,c1,c2
3. if r1 \neq c2
4. then "matrix multiplication is not possible"
5. else
6. do init_mat(a,r1,c1)
7. print_mat(a,r1,c1)
8. init_mat(b,r2,c2)
9. print_mat(b,r2,c2)
10. mul_mat(a,b,c,r1,c1,c2)
11. print_mat(c,r1,c1)
12. Stop

init_mat(a4,r4,c4)

1. for i \leftarrow 0 to r4
2. do for j \leftarrow 0 to c4
3. read a4[i][j]

print_mat(a4,r4,c4)

1. for i \leftarrow 0 to r4
2. do for j \leftarrow 0 to c4
3. print a[i][j]
4. print next_line

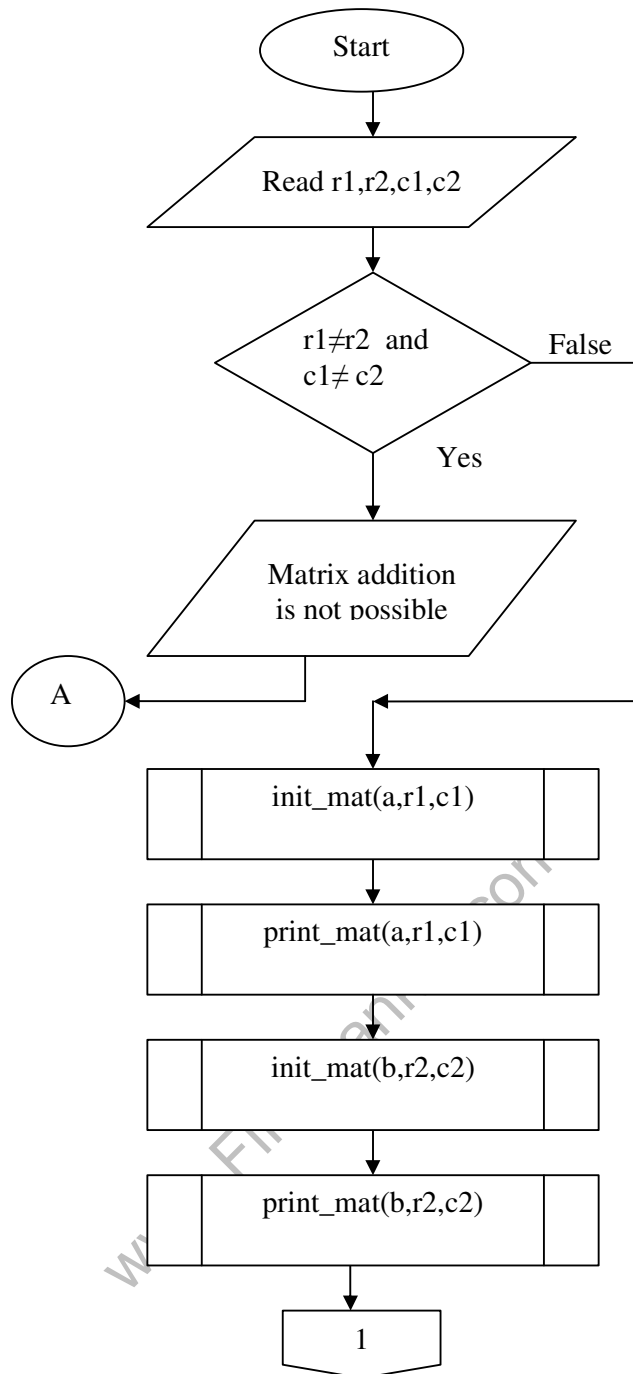
mul_mat(a4,b4,c24.r4,c4,c5)

1. for i \leftarrow 0 to r4
2. do for j \leftarrow to c5
3. do c[i][j] \leftarrow 0
4. for k \leftarrow 0 to c4
5. c[i][j] \leftarrow c[i][j] + a[i][k]*b[k][j]

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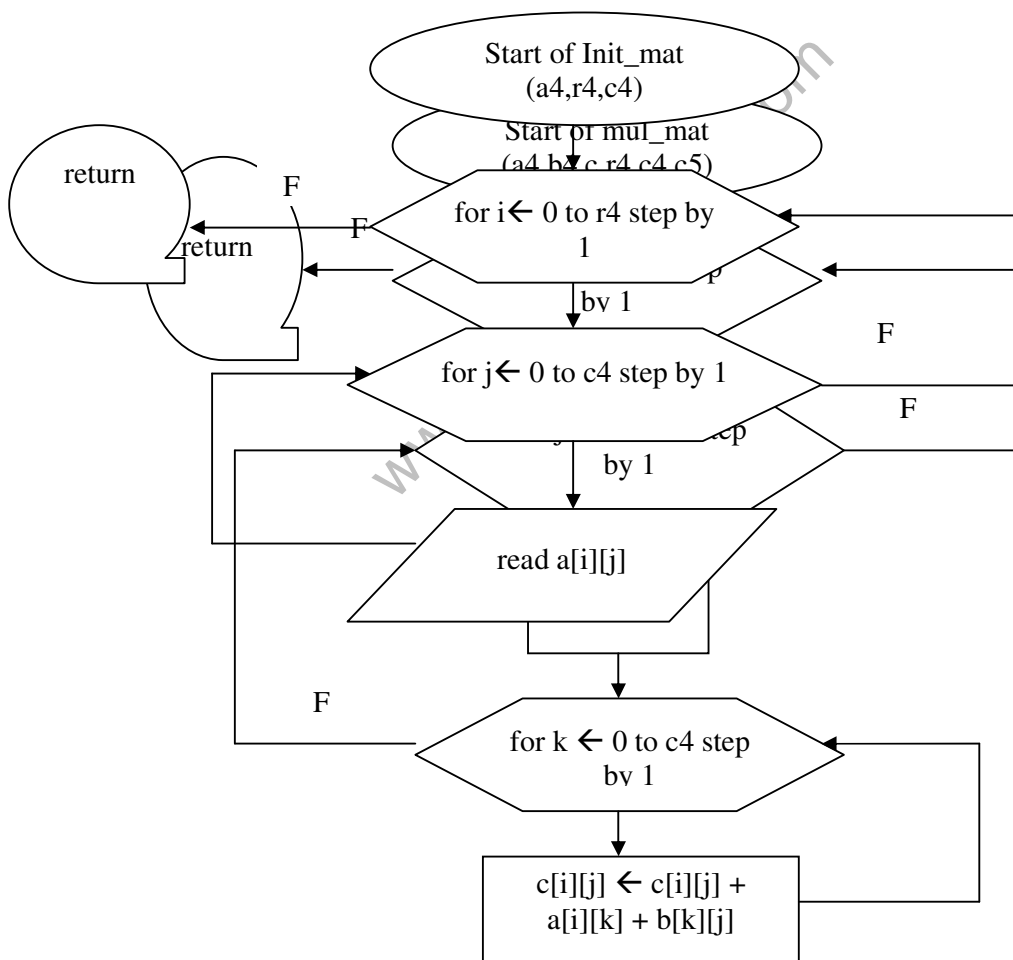
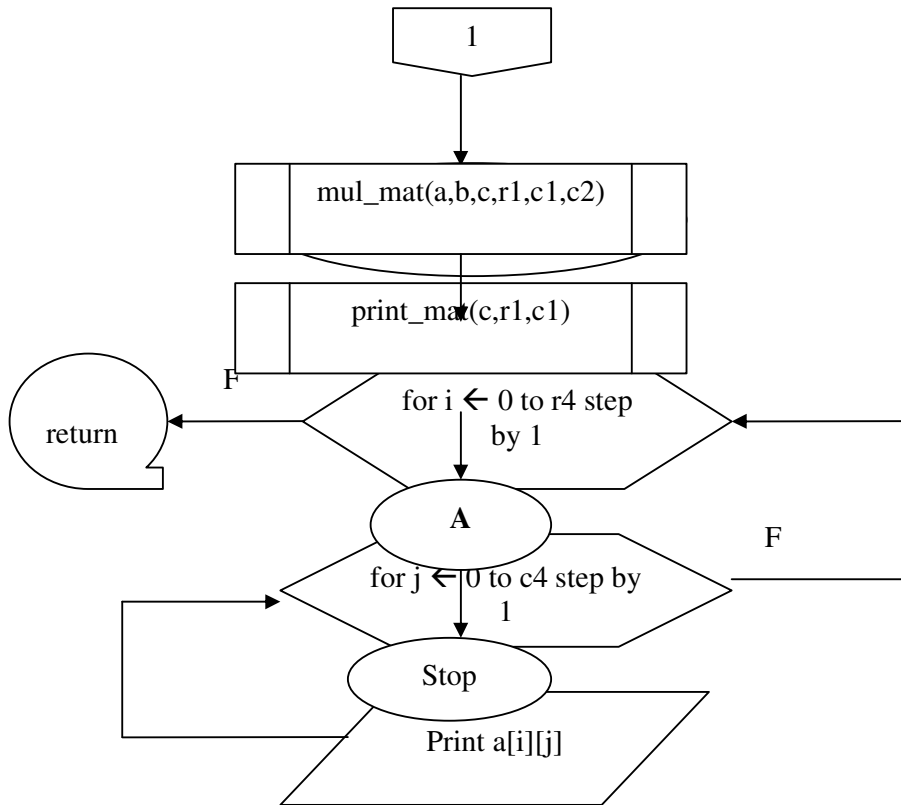
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Flow Chart:



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PROGRAM :

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

/* Declaring function prototypes */
void init_mat (int [[10], int, int);
void print_mat (int [[10], int, int);
void mul_mat (int [[10], int [[10], int [[10], int, int, int);

/* Main Function starting */
main()
{
    int r1,r2,c1,c2;
    int a[10][10],b[10][10],c[10][10];
    clrscr();

    /* Giving order of the Matrix - A */
    printf("\n Enter the order of Matrix - A:");
    scanf("%d%d",&r1,&c1);

    /* Giving order of the Matrix - B */
    printf("\n Enter the order of Matrix - B:");
    scanf("%d%d",&r2,&c2);

    if(r1!=c2)
    {
        printf("\n :: Matrix Multiplication is not possible :: ");
        getch();
        exit(0);
    }
    else
    {

        /* Matrix - A */
        printf("\n Enter the elements of Matrix - A:");
        init_mat(a,r1,c1);
        printf("\n The elements of Matrix - A:");
        print_mat(a,r1,c1);

        /* Matrix - B */
        printf("\n Enter the elements of Matrix - B:");
        init_mat(b,r2,c2);
        printf("\n The elements of Matrix - B:");
        print_mat(b,r2,c2);

        /* Logic for matrix multiplication */
        mul_mat(a,b,c,r1,c1,c2);

        /* Matrix after Multiplication */
        printf("\n The elements of Matrix - C after multiplication of A & B:");
        print_mat(c,r1,c2);
    }
    getch();
}
```

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```
/* Function for two dimensional array initialization */
void init_mat(int mat[][10],int r,int c)
{
    int i,j;
    for(i=0;i<r;i++)
    {
        for(j=0;j<c;j++)
        {
            scanf("%d",&mat[i][j]);
        }
    }
}

/* Function for printing elements in Matrix form */
void print_mat(int mat[][10],int r, int c)
{
    int i,j;
    printf("\n");
    for(i=0;i<r;i++)
    {
        for(j=0;j<c;j++)
        {
            printf(" %d ",mat[i][j]);
        }
        printf("\n");
    }
}

/* Function for matrix multiplication logic */
void mul_mat(int a[][10],int b[][10],int c[][10],int r1,int c1,int c2)
{
    int i,j,k;
    for(i=0;i<r1;i++)
    {
        for(j=0;j<c2;j++)
        {
            /* Initializing Matrix - C with 0's */
            c[i][j] = 0;
            /* logic for Multiplication */
            for(k=0;k<c1;k++)
            {
                c[i][j] += a[i][k] * b[k][j];
            }
        }
    }
}
```

RESULT:**Case - 1****Input :**

Enter the order of Matrix – A: 2 2
Enter the order of Matrix – B: 2 2
Enter the elements of Matrix – A: 1 2 3 4

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The elements of Matrix – A:

1 2

3 4

Enter the elements of Matrix – B: 1 2 3 4

The elements of Matrix – B:

3 2

4 4

Output:

The elements of Matrix - C after multiplication of A & B:

7 10

15 22

Case – 2

Input :

Enter the order of Matrix – A: 2 3

Enter the order of Matrix – B: 1 2

Output :

Matrix Multiplication is not possible

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WEEK-6

A). AIM: - Write A C- Program That Uses Functions To Insert A Sub-String In To A Given Main String From A Given Position.

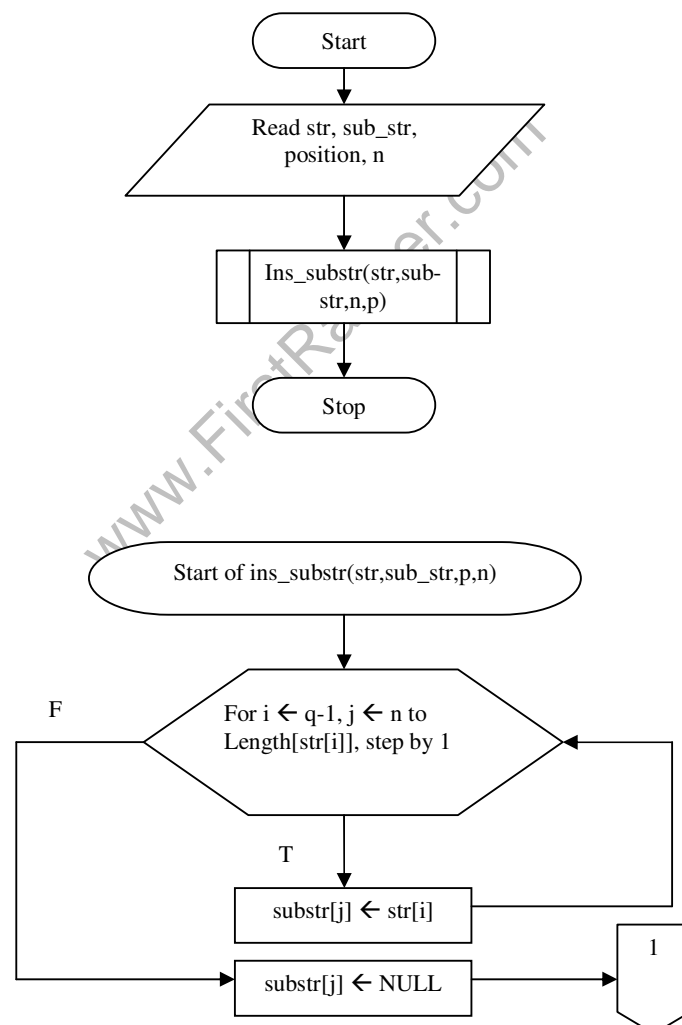
Algorithm:

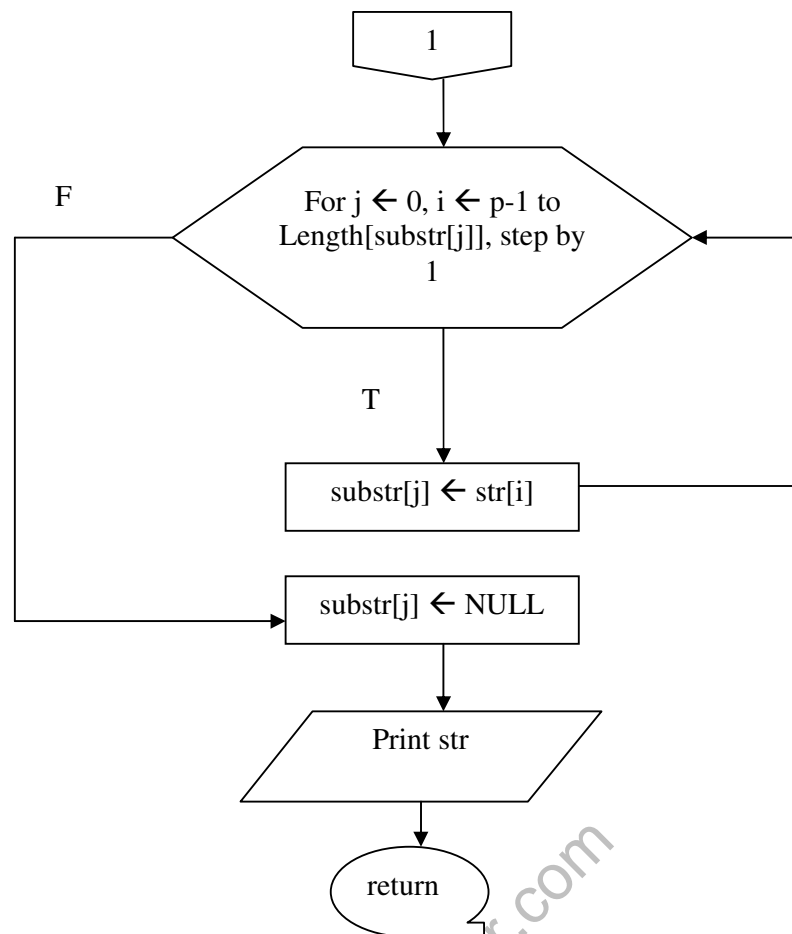
1. start
2. read str (string)
3. read n(position), substr (sub string)
4. ins_substr(str,substr,p,n)
5. stop

ins_substr(str,substr,p,n)

1. $k \leftarrow \text{Length}[\text{str}]$
2. $m \leftarrow p-1$
3. for $i \leftarrow m$ and $j \leftarrow n$ to k
4. $\text{substr}[j] \leftarrow \text{str}[i]$
5. $\text{substr}[j] \leftarrow \text{NULL}$
6. for $j \leftarrow 0$ and $i \leftarrow m$ to $\text{Length}[\text{substr}]$
7. $\text{str}[i] \leftarrow \text{substr}[j]$
8. $\text{str}[i] \leftarrow \text{NULL}$
9. print str

Flowchart:





PROGRAM:

```

/* Declaring C-Libraries */
#include <stdio.h>
#include <conio.h>

/* Declaring function prototypes */
void ins_substr(char [], char [], int, int);

/* main function is starting */
main()
{
  int p,n,i,j;
  char str[50],substr[50];
  clrscr();

  /* Initializing character array */
  puts("\n Enter the String:");
  gets(str);
  fflush(stdin);

  /* Entering the position where you want to insert a substring */
  printf("Enter the specific position ");
  scanf("%d",&p);
  
```

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```
printf("\n Enter the Number of Characters:");
scanf("%d",&n);
fflush(stdin);
puts("\n Enter Sub-String:");
gets(substr);

/* function call to inserting string in main string */
ins_substr(str,substr,p,n);

printf("\n :: End of the main program ::");
getch();
}

/* logic to insert sub string in main string */
void ins_substr(char str[], char substr[], int p, int n)
{
    int q,i,j;
    q=p-1;
    for(i=q,j=n;str[i]!='\0';i++,j++)
        substr[j]=str[i];
    substr[j]='\0';
    for(j=0,i=q;substr[j]!='\0';j++,i++)
        str[i]=substr[j];
    str[i]='\0';
    printf("\n The string after inserting substring :");
    puts(str);
}
```

RESULT:**Case - 1****Input :**

Enter the String: HELO WORLD
Enter the specific position : 3
Enter the Number of Characters: 1
Enter Sub-String: L

Output :

The string after inserting substring : HELLO WORLD
:: End of the main program ::

Case - 2**Input :**

Enter the String: HELLO
Enter the specific position : 5
Enter the Number of Characters: 5
Enter Sub-String: WORLD

Output :

The string after inserting substring : HELLO WORLD
:: End of the main program ::

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AIM: - Write A C- Program That Uses Functions To Delete N – Charactres From A Given Position In A Given String.

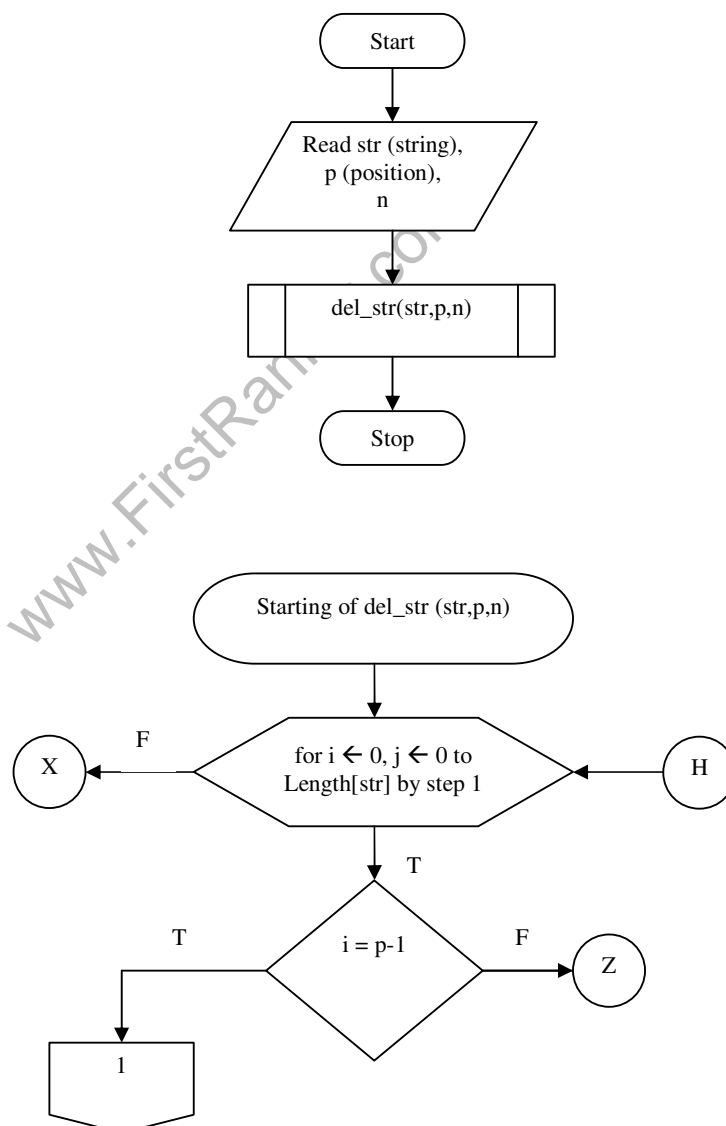
Algorithm:

1. start
2. read str(main string)
3. read p (position)
4. read n (number of characters to delete)
5. del_str(str,p,n)
6. stop

del_str(str,p,n)

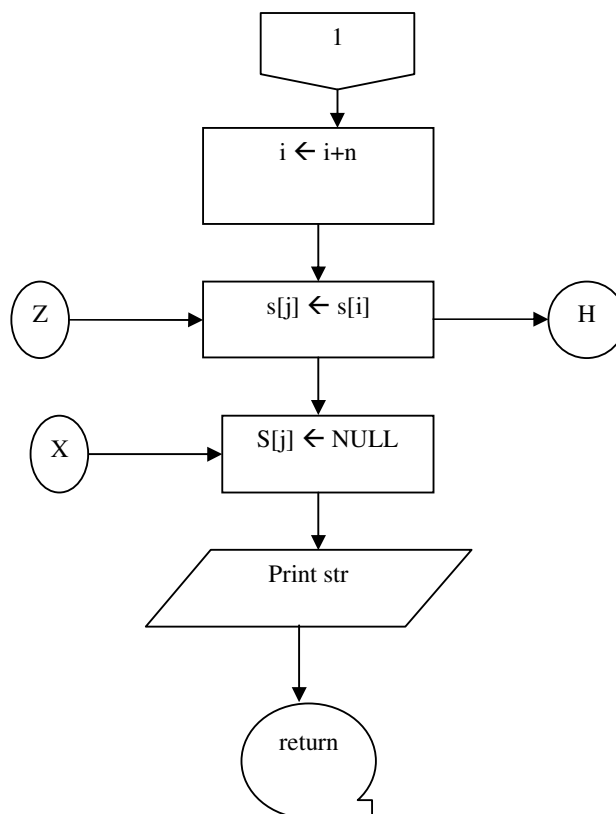
1. for $i \leftarrow 0$, $j \leftarrow 0$ to Length[str]
2. do if $i = p-1$
3. $i \leftarrow i + n$
4. str[j] \leftarrow str[i]
5. str[j] \leftarrow NULL
6. print str

Flow Chart:



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PROGRAM:

```

/* Declaring C - Libraries */
#include <stdio.h>
#include <conio.h>

/* declaring prototype of function */
void del_str(char [],int, int);

/* Main function starting */
main()
{
    int n,p;
    char str[30];
    clrscr();
    printf("\n Enter the String::");
    gets(str);
    fflush(stdin);
    printf("\n Enter the position from where the characters are to be deleted:");
    scanf("%d",&p);
    printf("\n Enter Number of characters to be deleted:");
    scanf("%d",&n);

    /* function call to deletion of n-characters */
    del_str(str,p,n);
    printf("::End of the Main program::");
    getch();
}

/* function call to Logic of delete n-characters from string */
void del_str(char str[],int p, int n)

```

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```
{
    int i,j;
    for(i=0,j=0;str[i]!='\0';i++,j++)
    {
        if(i==(p-1))
        {
            i=i+n;
        }
        str[j]=str[i];
    }
    str[j]='\0';

    /* the string after deletion */
    puts(" The string after deletion of characters::");
    puts(str);
}
```

RESULT:**Case - 1****Input :**

Enter the String: ABCD EFGH IJKL

Enter the position from where the characters are to be deleted: 5

Enter Number of characters to be deleted: 4

Output :

The string after deletion of characters:: ABCD IJKL

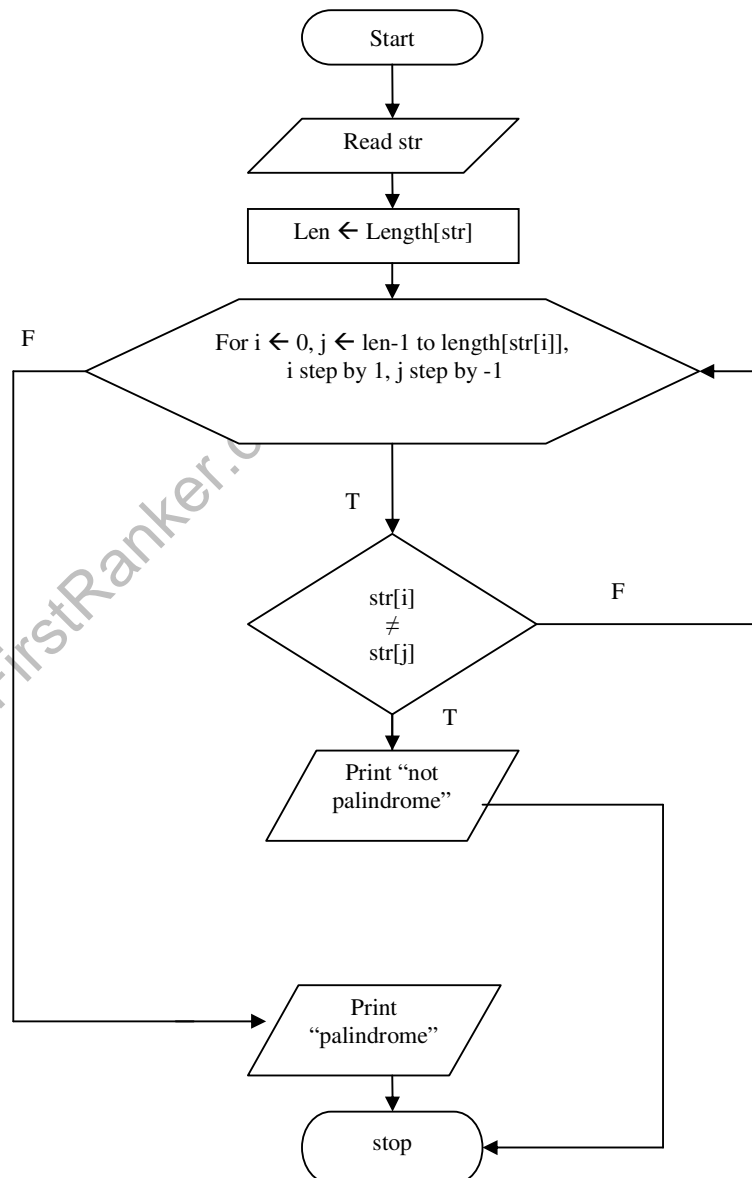
:: End of the main program ::

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B) AIM: Write A C- Program To Determine If The Given String Is A Palindrome Or Not**Algorithm:**

1. Start
2. read str (string)
3. $len \leftarrow \text{Length}[\text{str}]$
4. for $i \leftarrow 0$ (increment step), $j \leftarrow len-1$ (decrement step) to $\text{Length}[\text{str}]$
5. do $\text{str}[i] \neq \text{str}[j]$
6. print "not palindrome"
7. stop
8. print "palindrome"
9. stop

Flowchart:-

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PROGRAM:

```
/* Declaring C-library */
#include <stdio.h>
#include <conio.h>

/* Main function definition */
main()
{
    int i,n,j,len=0;
    char str[30];
    clrscr();
    printf("\n Enter String:");
    gets(str);

    /* logic to checking string for palindrome */
    for(i=0;str[i]!='\0';i++)
        len++;
    printf("\n The length of the string is %d",len);
    for(i=0,j=len-1;str[i]!='\0';i++,j--)
    {
        if(str[i]!=str[j])
        {
            printf("\n :The given string is not a palindrome:");
            getch();
            exit(0);
        }
    }
    printf("\n :the given string is palindrome:");
    getch();
}
```

RESULT:**Case - 1****Input :**

Enter the String: MALAYALAM
The length of the string is 9

Output :

:the given string is palindrome:

Case - 2**Input :**

Enter the String: ABC
The length of the string is 3

Output :

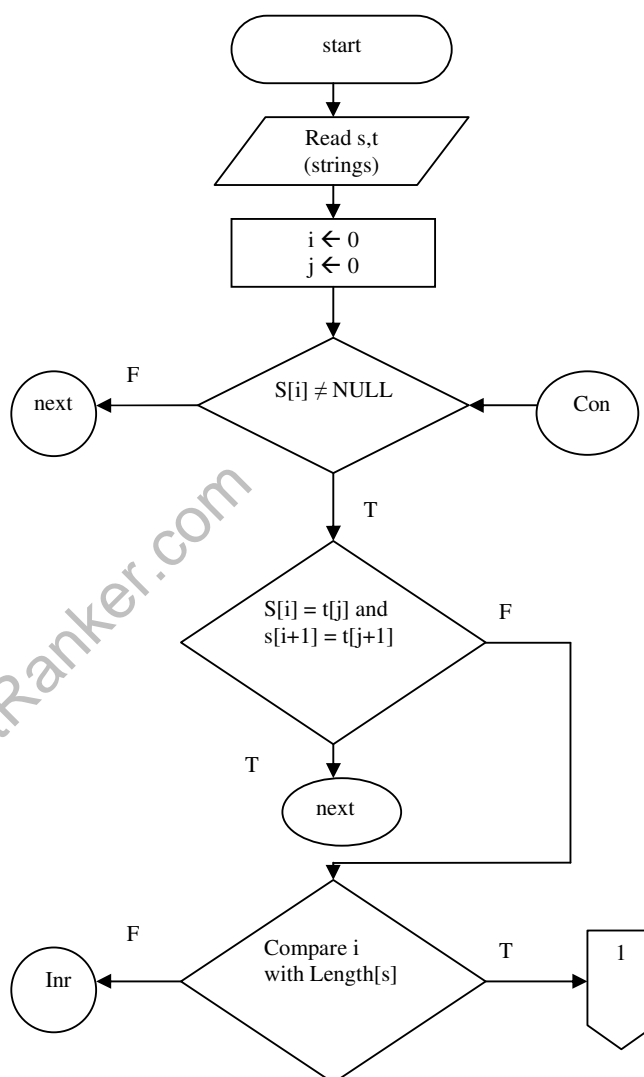
The given string is not a palindrome:

WEEK-7

A) AIM: - Write A C- Program That Displays The Positions Or Index Of In The String – S Where The String – T Begins, Or -1 If String – S Doesnot Contain String – T.

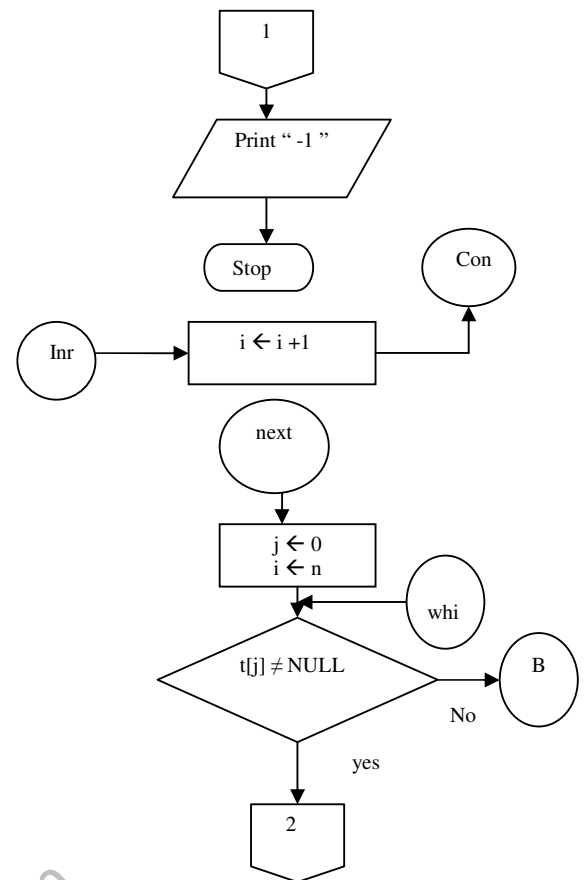
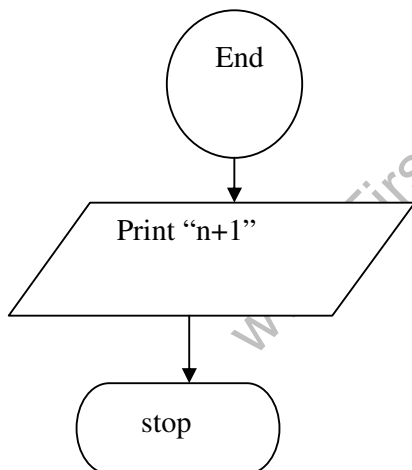
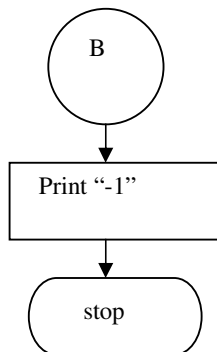
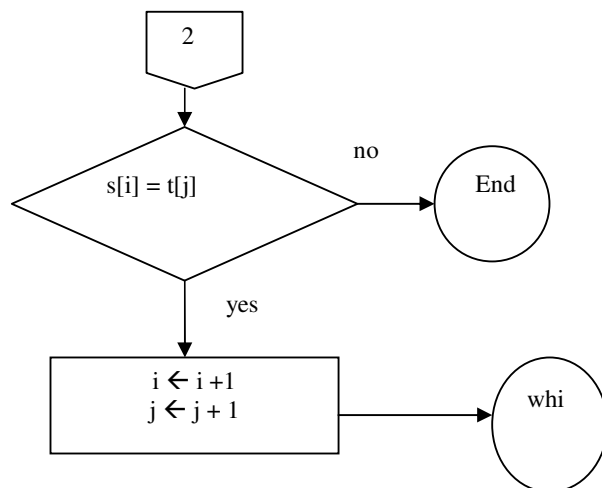
Algorithm:

1. Start
2. read s, t
3. while Length[str]
4. do if s[i] == t[j] and s[i+1] == t[j+1]
5. then break
6. if i = Length[s]
7. then print "-1"
8. goto end
9. j ← 0, n ← i
10. while Length[t[j]]
11. do if s[i] == t[j]
12. then i ← i+1
13. j ← j+1
14. else
15. print "-1"
16. goto end
17. print "n+1"
18. end:
19. stop

Flowchart:


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PROGRAM:

```

/* declaring C-Libraries */
#include <stdio.h>
#include <conio.h>
#include <string.h>

/* main function is starting */
  
```

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```
main()
{
    int i,j,n;
    char s[40],t[40];
    clrscr();
    printf("\n Enter the string:");
    gets(s);
    fflush(stdin);
    printf("\n Enter the sub string:");
    gets(t);

    /* logic to search sub string */
    i=0;
    j=0;
    while( s[i] != '\0')
    {
        if((s[i] == t[j]) && (s[i+1] == t[j+1]))
            break;
        if(i==strlen(s))
        {
            printf("-1");
            getch();
            exit(0);
        }
        i++;
    }
    j=0;
    n=i;
    while(t[j] != '\0')
    {
        if(s[i] == t[j])
        {
            i++;
            j++;
        }
        else
        {
            printf("-1");
            getch();
            exit(0);
        }
    }
    printf("\n The string is found at %d",n+1);
    getch(); }
```

RESULT:**Input :**

Enter the String: HELLO WORLD
Enter substring : WORLD

Output :

The String is found at 6

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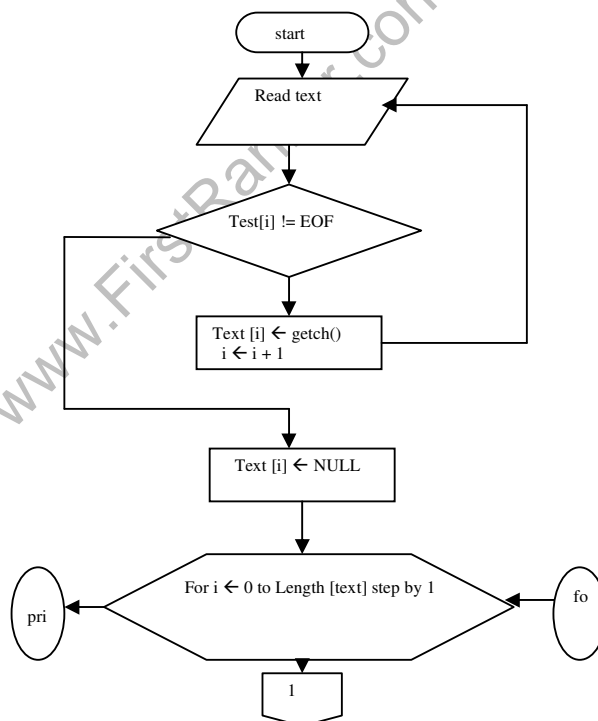
C PROGRAMMING LAB MANUAL

AIM: - Write A C- Program To Count The Lines, Words, Characters In A Given Text

Algorithm:

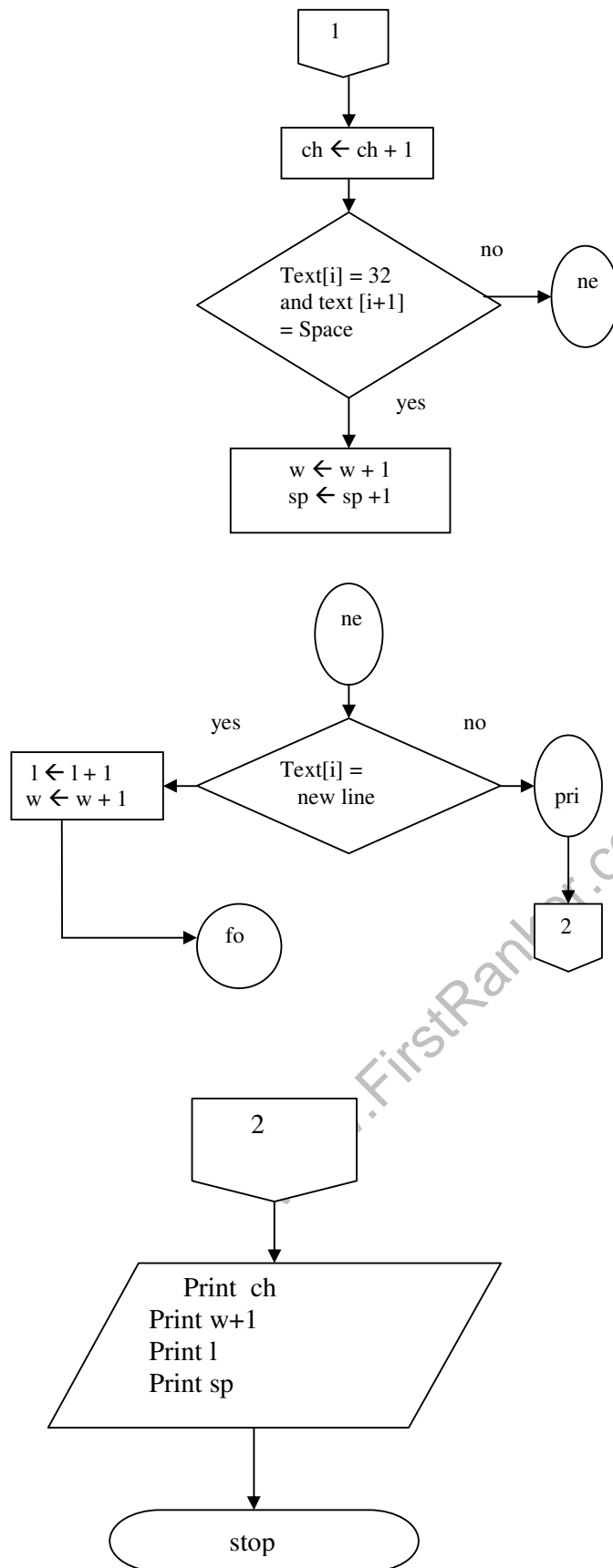
1. start
2. read text
3. while text[i] != EOF
4. do i \leftarrow i+1
5. print i
6. for i \leftarrow 0 to Length[text]
7. do ch++
8. if text[i] = 32 and text[i+1] \neq ' '
9. then w++
10. sp++
11. if text[i] = '\n'
12. then l++
13. w++
14. print ch
15. print w+1
16. print l
17. print sp

Flow Chart:



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C PROGRAMMING LAB MANUAL



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PROGRAM:

```
/* Declaring C - Libraries */
#include <conio.h>
#include <stdio.h>
/* Main function is starting */
main()
{
    char text[200];
    int i,l,ch,w,sp;
    clrscr();

    /* logic to count number of characters */
    i=0;
    printf("\n Enter lines of text and press ^Z");
    while((text[i]=getchar())!=EOF)
    {
        i++;
    }
    printf("\n The number of characters is %d",i);

    /* logic to count the lines, words and spaces in text */
    text[i]='\0';
    l=0;
    ch=w=sp=0;
    for(i=0;text[i]!='\0';i++)
    {
        ch++;
        if(text[i]==32 && text[i+1] != ' ')
        {
            w++;
            sp++;
        }
        if(text[i] == '\n')
        {
            l++;
            w++;
        }
    }
    printf("\n Total size of the text : %d",ch);
    printf("\n Number of Words : %d",w+1);
    printf("\n Number of Lines : %d",l);
    printf("\n Number of Spaces : %d",sp);
    getch();
}
```

Result:

Enter lines of text and press ^Z" ABCD EFGH IJKL MNOP

Total size of the text: 14
Number of Words:8
Number of Lines:1
Number of Spaces:4

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C PROGRAMMING LAB MANUAL

WEEK 8

A) Aim: Write an algorithm, flowchart and program to generate Pascal's triangle.

Algorithm:

Step 1: Start

Step 2: Read the height of the pascal triangle

Step 3: for $i := 0$ to $n-1$ do Step 3.1: for $k := 1$ to $n-i$ do

Step 3.1.1: Print blankspace

 Step 3.1.2: $k := k+1$ Step 3.2: for $j := 0$ to i do Step 3.2.1: if ($j == 0$) or ($i == j$) then Step 3.2.1.1: $a[i,j] := 1$

Step 3.2.2: else

 Step 3.2.2.1: $a[i,j] = a[i-1,j-1] + a[i-1,j]$

Step 3.2.3: End if

 Step 3.2.4: print $a[i,j]$ Step 3.2.5: $j := j+1$ Step 3.3: $i := i+1$

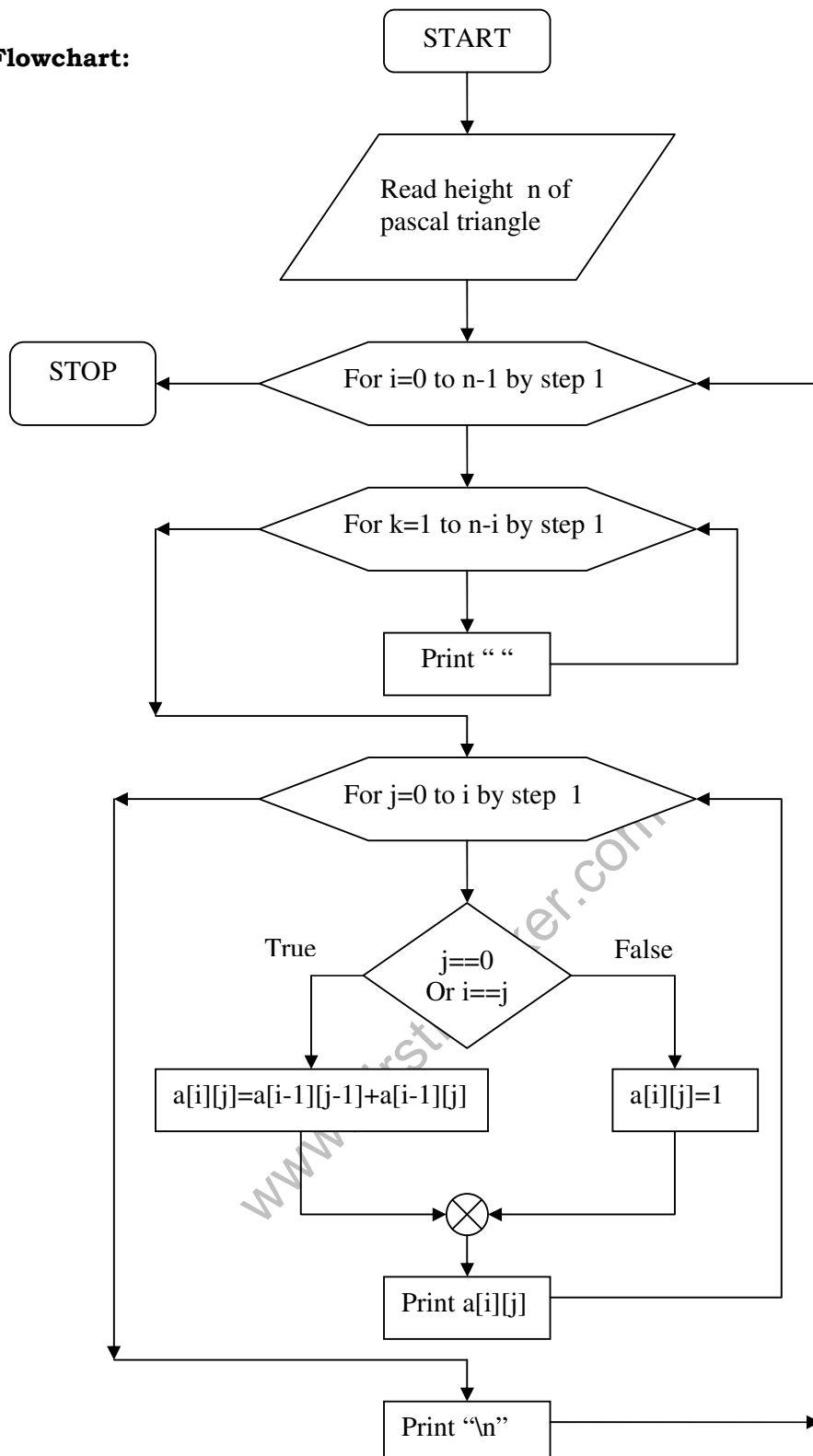
Step 4: Stop

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Flowchart:



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Program:

```
#include <stdio.h>
#include <conio.h>
main()
{
    int a[10][10],i,j,k,n;
    clrscr();
    printf("Enter the height of the pascal traingle");
    scanf("%d",&n);
    for(i=0;i<n;i++)
    {
        for(k=1;k<=n-i;k++)
            printf(" ");
        for(j=0;j<=i;j++)
        {
            if(j==0 || i==j)
                a[i][j]=1;
            else
                a[i][j]=a[i-1][j-1]+a[i-1][j];
            printf("%d ",a[i][j]);
        }
        printf("\n");
    }
}
```

Result:

Enter height of pascal triangle: 4

```
      1
     1 2 1
    1 3 3 1
   1 6 6 4 1
```

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b) Aim: Write an algorithm, flowchart and program to construct a pyramid of numbers.

Algorithm:

Step 1: Start

Step 2: Read height n of the pyramid

Step 3: for j := 0 to n do

Step 3.1: for k:= 1 to 2*(n-j) do

Step 3.1.1: Print blankspace

Step 3.1.2: k := k+1

Step 3.2: for i:= -j to j do

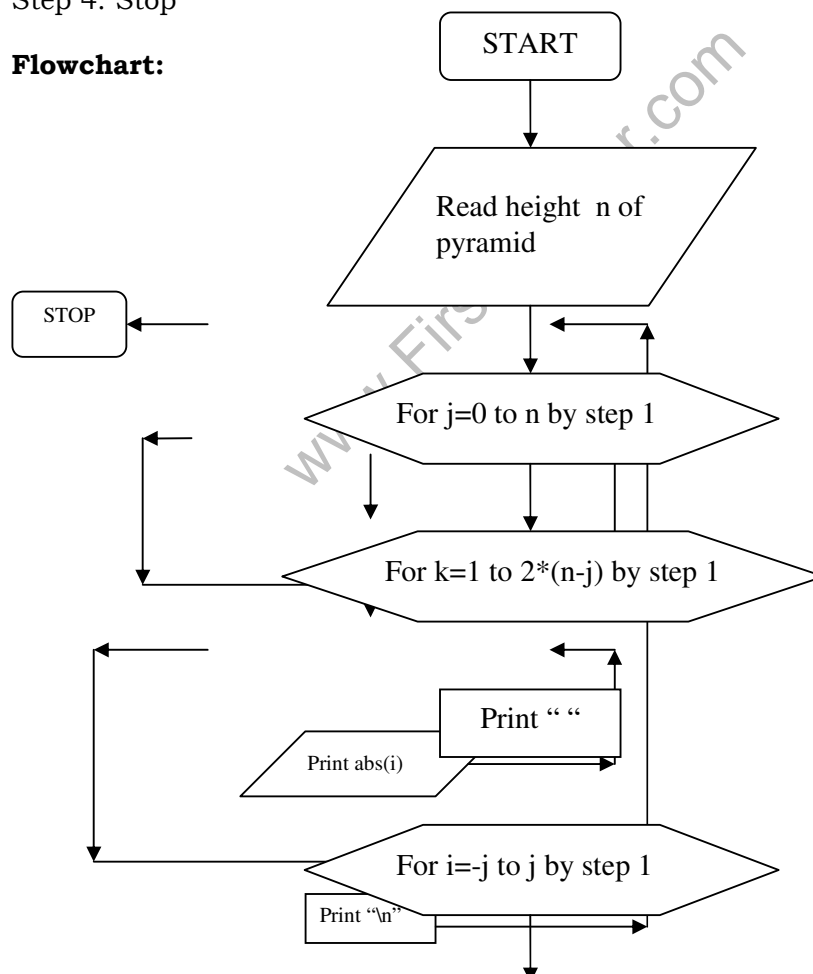
Step 3.2.1: print abs(i)

Step 3.2.2: i := i+1

Step 3.3: j := j+1

Step 4: Stop

Flowchart:



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Program:

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

main()
{
    int i,j,k,n;
    clrscr();
    printf("Enter the height of the pyramid");
    scanf("%d",&n);
    for(j=0;j<=n;j++)
    {
        for(k=1;k<=2*(n-j);k++)
            printf(" ");
        for(i=-j;i<=j;i++)
            printf("%d ",abs(i));
        printf("\n");
    }
}
```

Result:

Enter the height of the pyramid: 2

```
    1
 2   2
```

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C PROGRAMMING LAB MANUAL

WEEK 9

A) Aim: Write an algorithm, flowchart and a C program to read in two numbers, x and n, and then compute the sum of this geometric progression:

$$1+x+x^2+x^3+x^4+\dots+x^n$$

Print x, n, the sum

Perform error checking. For example, the formula does not make sense for negative exponents- if n is less than 0. Have your program print an error message if $n < 0$, then go back and read in the next pair of numbers without computing the sum. Are any values of x also illegal? If so, test for them too.

Algorithm :

Step 1: Start

Step 2: rept:

Step 3: Read values for x and n

Step 4: if $n > 0$ then

Step 4.1: for i := 0 to n do

Step 4.1.1: sum := sum + pow(x,i)

Step 4.1.2: i := i+1

Step 4.2 : print x, n and sum

Step 5: else

Step 5.1: print not a valid n value

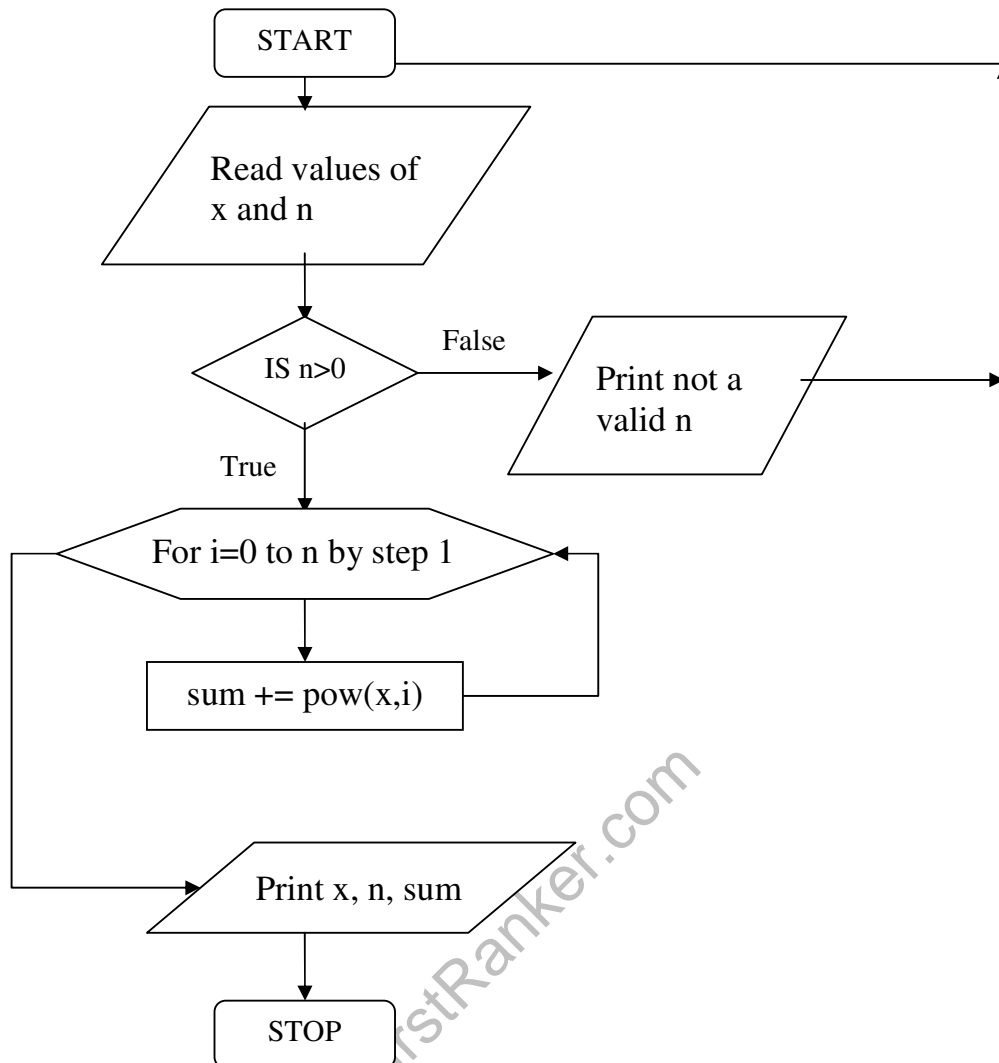
Step 5.2: goto rept

Step 6: End if

Step 7: Stop

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C PROGRAMMING LAB MANUAL

Flowchart:**Program:**

```
#include <stdio.h>
#include <conio.h>
#include <math.h>
main()
{
    int x,n,sum=0,i;
    start:
    clrscr();
    printf("enter the values for x and n");
    scanf("%d%d",&x,&n);
    if(n>0)
    {
        for(i=0;i<=n;i++)
        {
            sum = sum+pow(x,i);
        }
    }
}
```

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```
        printf(" x is - %d, n is -%d \n",x,n);
        printf("The sum of the geometric progression is:%d",sum);
    }
    else
    {
        printf("not a valid n:%d value",n);
        getch();
        goto start;
    }
}
```

Result:

Enter the values for x and n 1 1
The sum of the geometric progression: 2

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C PROGRAMMING LAB MANUAL

WEEK 10

A) Aim: Write an algorithm, flowchart and a C program for finding the 2's complement of a binary number

Algorithm:

Step 1: Start

Step 2: Read the binary number

Step 3: copying the binary number to strdp

Step 4: len := strlen(str)

Step 5: for i := 0 to len-1 do

Step 5.1: if str[i] == '1' then

Step 5.1.1: str[i] == '0'

Step 5.2: else

Step 5.2.1: str[i] == '1'

Step 5.3: i := i+1

Step 6: mask := 1

Step 7: for i := len-1 to 0 do

Step 7.1: if mask == 1 then

Step 7.1.1: if str[i] == '1' then

Step 7.1.1.1: str[i] := '0'

Step 7.1.1.2: mask := 1

Step 7.1.2: else

Step 7.1.2.1: str[i] := '1'

Step 7.1.2.2: mask := 0

Step 7.1.3: End if

Step 7.2: End if

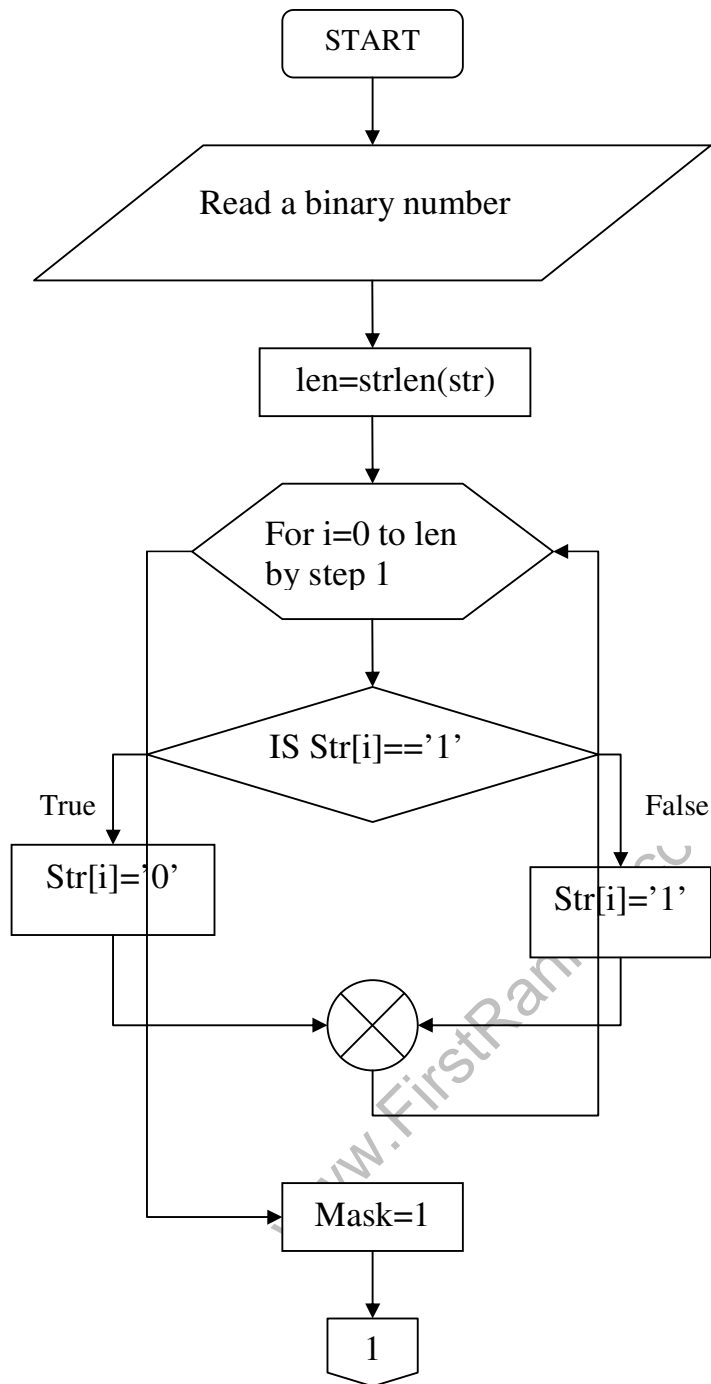
Step 8: print the 2's complement

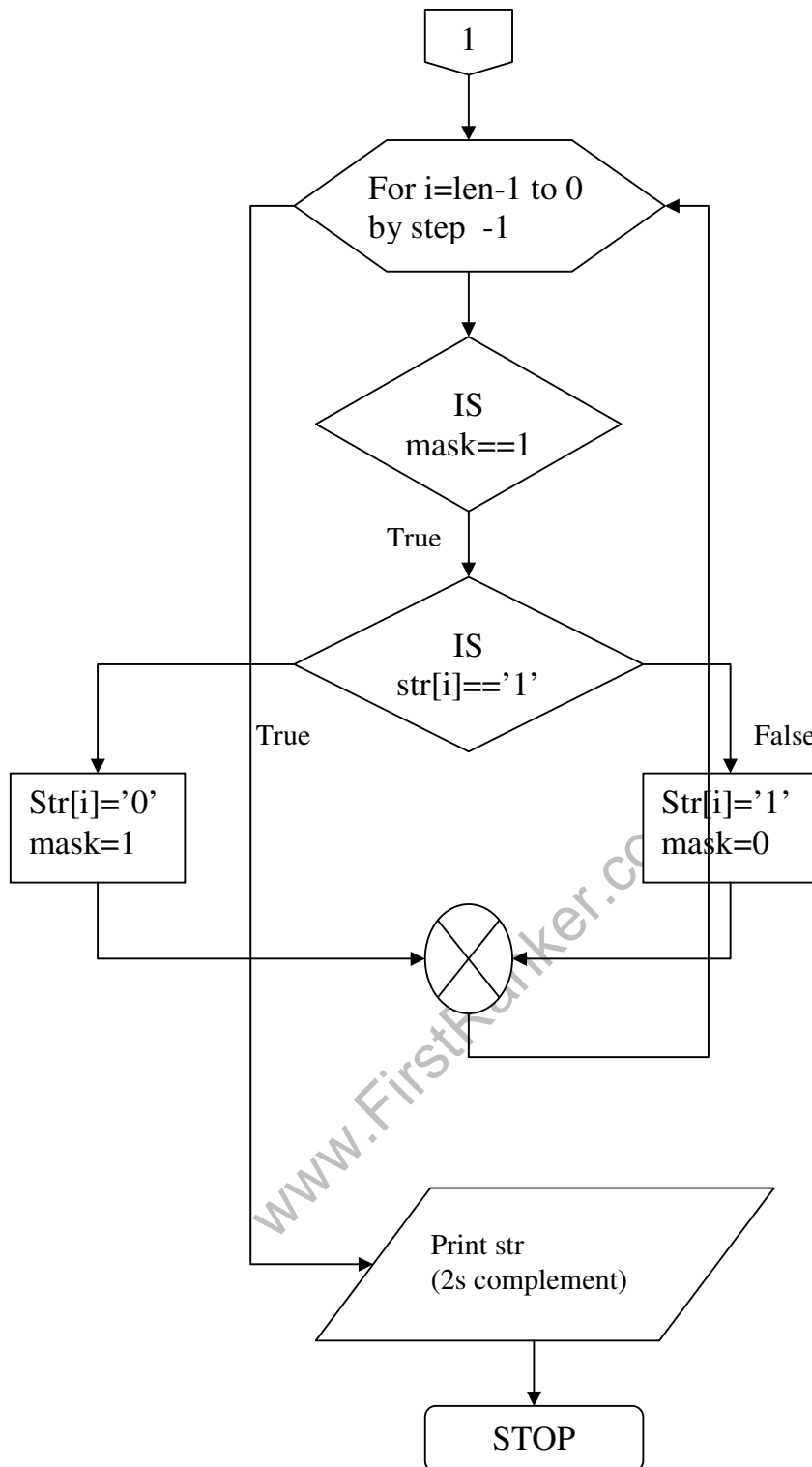
Step 9: Stop

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Flowchart:





Program:

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

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```
#include <conio.h>
#include <string.h>
main()
{
    char str[32],strdp[32];
    int mask,i;
    clrscr();
    printf("Enter a binary number:");
    scanf("%s",str);
    strcpy(strdp,str); /* creating duplicate copy */
    for(i=0;i<strlen(str);i++) /* computing 1's complement */
    {
        if(str[i]=='1')
            str[i]='0';
        else
            str[i]='1';
    }
    printf("1\'s complement of %s is %s\n",strdp,str);
    mask=1;
    for(i=strlen(str)-1;i>=0;i--) /* computing 2's complement */
    {
        if(mask==1)
        {
            if(str[i]=='1')
            {
                str[i]='0';
                mask=1;
            }
            else
            {
                str[i]='1';
                mask=0;
            }
        }
    }
    printf("2\'s complement of %s is %s",strdp,str);
}
```

Result:

Enter a binary number: 1111
1's complement is: 0000
2's complement is: 0001

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B) Aim: Write an algorithm, flowchart and a C program to convert a Roman numeral to its decimal equivalent.

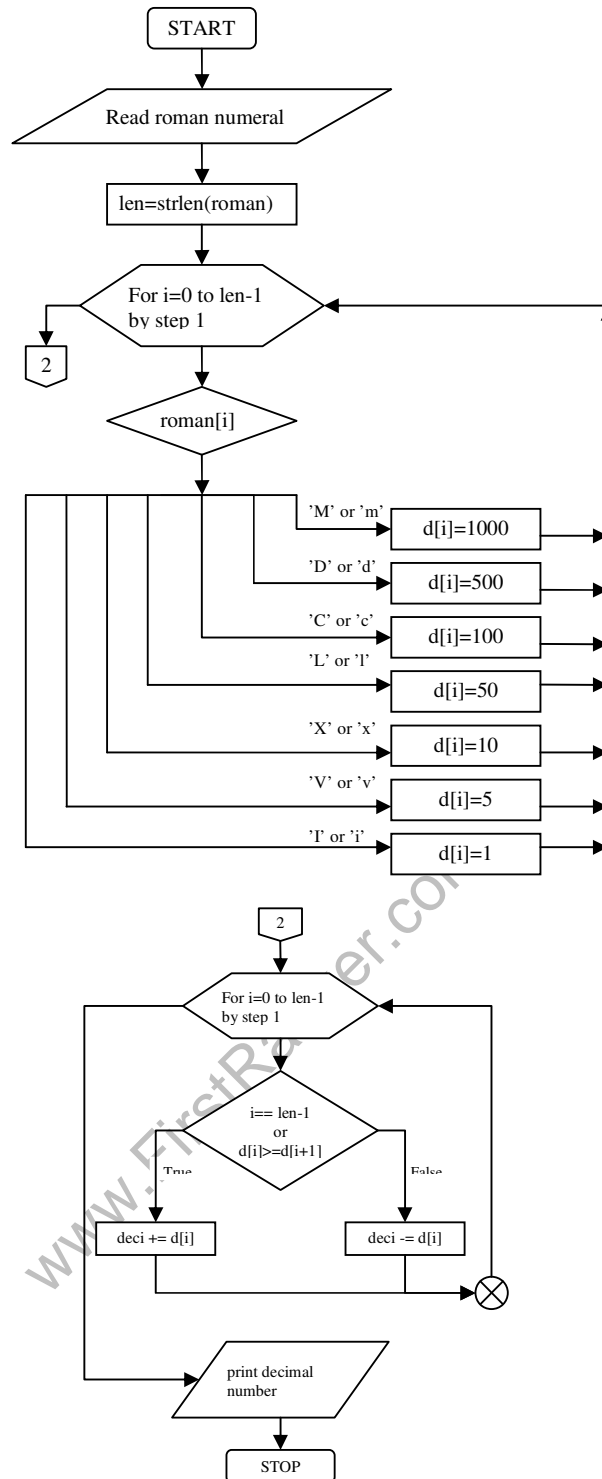
Algorithm:

```
Step 1: Start
Step 2: Read the roman numeral
Step 3: len := strlen(roman)
Step 4: for i := 0 to len-1 do
    Step 4.1: switch(roman[i])
        Step 4.1.1: case 'm':
        Step 4.1.2: case 'M':
            Step 4.1.2.1: d[i]:=1000
        Step 4.1.3: case 'd':
        Step 4.1.4: case 'D':
            Step 4.1.4.1: d[i]:=500
        Step 4.1.5: case 'c':
        Step 4.1.6: case 'C':
            Step 4.1.6.1: d[i]:=100
        Step 4.1.7: case 'l':
        Step 4.1.8: case 'L':
            Step 4.1.8.1: d[i]:=50
        Step 4.1.9: case 'x':
        Step 4.1.10: case 'X':
            Step 4.1.10.1: d[i]:=10
        Step 4.1.11: case 'v':
        Step 4.1.12: case 'V':
            Step 4.1.12.1: d[i]:=5
        Step 4.1.13: case 'i':
        Step 4.1.14: case 'I':
            Step 4.1.14.1: d[i]:=1
Step 5: for i :=0 to len-1 do
    Step 5.1: if (i==len-1) or (d[i]>=d[i+1]) then
        Step 5.1.1: deci += d[i]
    Step 5.2: else
        Step 5.2.1: deci -= d[i]
Step 6: print the decimal equivalent of roman numeral
Step 7: Stop
```

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C PROGRAMMING LAB MANUAL

Flowchart:



Program:

```

#include <stdio.h>
#include <conio.h>
main()
{
    char roman[30];
    int deci=0;
    int len,i,d[30];
    clrscr();

```

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C PROGRAMMING LAB MANUAL

```
printf("The following table shows the Roman equivalent to decimal\n");
printf("Decimal:.....Roman\n");
printf("%5d.....%3c\n",1,'I');
printf("%5d.....%3c\n",5,'V');
printf("%5d.....%3c\n",10,'X');
printf("%5d.....%3c\n",50,'L');
printf("%5d.....%3c\n",100,'C');
printf("%5d.....%3c\n",500,'D');
printf("%5d.....%3c\n",1000,'M');
printf("Enter a Roman numeral:");
scanf("%s",roman);
len=strlen(roman);
for(i=0;i<len;i++)
{
    switch(roman[i])
    {
        case 'm':
        case 'M': d[i]=1000;      break;
        case 'd':
        case 'D': d[i]= 500;  break;
        case 'c':
        case 'C': d[i]= 100;  break;
        case 'l':
        case 'L': d[i]= 50;   break;
        case 'x':
        case 'X': d[i]= 10;   break;;
        case 'v':
        case 'V': d[i]= 5;    break;
        case 'i':
        case 'I': d[i]= 1;
    }
}
for(i=0;i<len;i++)
{
    if(i==len-1 || d[i]>=d[i+1])
        deci += d[i];
    else
        deci -= d[i];
}
printf("The Decimal equivalent of Roman numeral %s is  d", roman, deci);
}
```

Result:

Enter a Roman numeral: L

The Decimal equivalent of Roman numeral L is :50

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C PROGRAMMING LAB MANUAL

WEEK 11

Aim: Write an algorithm, flowchart and a C program that uses functions to perform the following operations:

- i) Reading a complex number
- ii) Writing a complex number
- iii) Addition of two complex numbers
- iv) Multiplication of two complex numbers

Algorithm:

Step 1: Start

Step 2: Read the first complex number by calling readcomplex()

Step 3: Read the second complex number by calling readcomplex()

Step 4: read the operator op

Step 5: switch(op)

Step 5.1: case '+': c3 := add(c1,c2)

Step 5.2: case '-': c3 := sub(c1,c2)

Step 5.3: case '*': c3 := mul(c1,c2)

Step 5.4: case 'e': program end

Step 6: print c3 by calling printcomplex(c1,c2,c3,op)

Step 7: Stop

add (c1,c2)

step 1: c3.x := c1.x + c2.x

step 2: c3.y := c1.y + c2.y

step 3: return c3

sub(c1,c2)

step 1: c3.x := c1.x - c2.x

step 2: c3.y := c1.y - c2.y

step 3: return c3

mul(c1,c2)

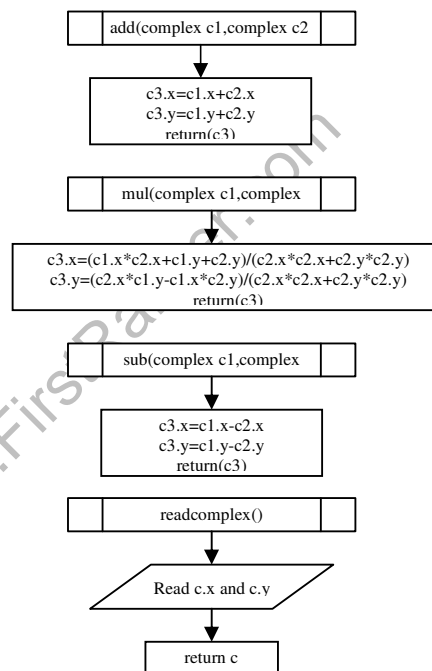
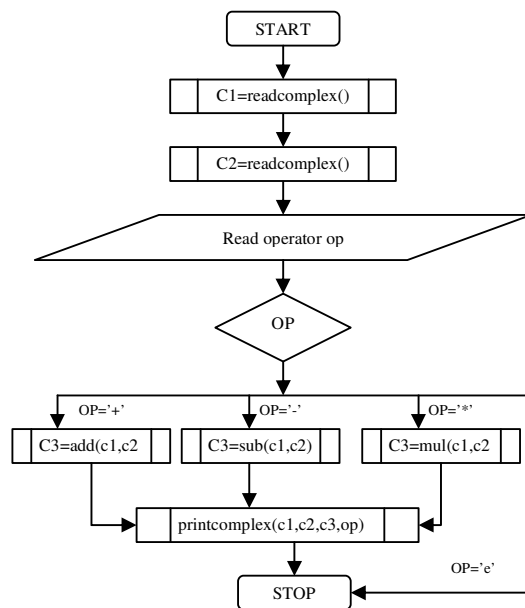
step 1: $c3.x := (c1.x * c2.x + c1.y * c2.y) / (c2.x * c2.x + c2.y * c2.y)$

step 2: $c3.y := (c2.x * c1.y - c1.x * c2.y) / (c2.x * c2.x + c2.y * c2.y)$

step 3: return c3

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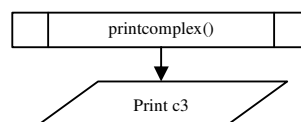
C PROGRAMMING LAB MANUAL

Flowchart:

Program:

```

#include <stdio.h>
#include <stdlib.h>
struct compl
{
    int x;
    int y;
};
typedef struct compl complex;
main()

```



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C PROGRAMMING LAB MANUAL

```
{
    complex c1,c2,c3;
    complex add(complex c1,complex c2);
    complex sub(complex c1,complex c2);
    complex mul(complex c1,complex c2);
    complex readcomplex();
    complex printcomplex(complex c1,complex c2,complex c3,char op);
    char op;
    clrscr();
    printf("Reading the first complex number\n");
    c1=readcomplex();
    printf("Reading the second complex number\n");
    c2=readcomplex();
    printf("Enter + for addition \n"
           "Enter * for multiplication\n"
           "Enter - for subtraction\n"
           "Enter e for exit:");
    fflush(stdin);
    op=getche();
    switch(op)
    {
        case '+': c3=add(c1,c2);
                break;
        case '-': c3=sub(c1,c2);
                break;
        case '*': c3=mul(c1,c2);
                break;
        case 'e': exit(0);
    }
    printcomplex(c1,c2,c3,op);
    getch();
}

complex add(complex c1,complex c2)
{
    complex c3;
    c3.x=c1.x+c2.x;
    c3.y=c1.y+c2.y;
    return(c3);
}
complex sub(complex c1,complex c2)
{
    complex c3;
    c3.x=c1.x-c2.x;
    c3.y=c1.y-c2.y;
    return(c3);
}
complex mul(complex c1,complex c2)
{
    complex c3;
    c3.x=(c1.x*c2.x+c1.y*c2.y)/(c2.x*c2.x+c2.y*c2.y);
    c3.y=(c2.x*c1.y-c1.x*c2.y)/(c2.x*c2.x+c2.y*c2.y);
    return(c3);
}
complex readcomplex()
```

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```
{
    complex c;
    printf("Enter the values of x and y of a complex number");
    scanf("%d%d",&c.x,&c.y);
    return(c);
}
complex printcomplex(complex c1,complex c2,complex c3,char op)
{
    printf("\n(%d+i%d)%c(%d+i%d)=%d+i(%d)",c1.x,c1.y,op,c2.x,c2.y,c3.x,c3.y);
}
```

Result:

Reading the first complex number: 2 + 2i

Reading the second complex number: 2 - 2i

Enter + for addition

"Enter * for multiplication"

"Enter - for subtraction"

"Enter e for exit : *"

Result is: 0

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C PROGRAMMING LAB MANUAL

WEEK-12**A)AIM:** Write a C program which copies one file to another.**PROGRAM:**

```
#include <stdio.h>
#include <conio.h>
#include <process.h>
void main(int argc, char *argv[])
{
    FILE *fs,*ft;
    char ch;
    clrscr();
    if(argc!=3)
    {
        puts("Invalid number of arguments.");
        exit(0);
    }
    fs = fopen(argv[1],"r");
    if(fs==NULL)
    {
        puts("Source file cannot be opened.");
        exit(0);
    }
    ft = fopen(argv[2],"w");
    if (ft==NULL)
    {
        puts("Target file cannot be opened.");
        fclose(fs);
        exit(0);
    }
    while(1)
    {
        ch=fgetc(fs);
        if (ch==EOF)
            break;
        else
            fputc(ch,ft);
    }
    fclose(fs);
    fclose(ft);
    getch();
}
```

Result:

File created is passed as parameter:

File is copied

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C PROGRAMMING LAB MANUAL

B) AIM: Write a C program to reverse the first n characters in a file.
(Note: The file name and n are specified on the command line.)

ALGORITHM:

STEP1: Declare the variables and file pointer

STEP2: Check the number of arguments in command line
if arg is not equal to 3
then print "invalid arguments"
exit

STEP3: Open an existed file in read mode

STEP4: if file not found
then print "file can not be open"

STEP5: Assign 2nd argument in command line to a variable

STEP6: Read the contents from existed file and reverse first n characters in the string from file.

PROGRAM:

```
#include <stdio.h>
#include <conio.h>
#include <string.h>
#include <process.h>
void main(int argc, char *argv[])
{
    char a[15];
    char s[20];
    char n;
    int k;
    int j=0;
    int i;
    int len;
    FILE *fp;
    if(argc!=3)
    {
        puts("Improper number of arguments.");
        exit(0);
    }
    fp = fopen(argv[1], "r");
    if(fp == NULL)
    {
        puts("File cannot be opened.");
        exit(0);
    }
    k=atoi(argv[2]);
    n = fread(a, 1, k, fp);
    a[n]='\0';
```

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```
len=strlen(a);
for(i=len-1;i>=0;i--)
{
    s[j]=a[i];
    printf("%c",s[j]);
    j=j+1;
}
s[j+1]='\0';
getch();
}
```

Result:

Abc.txt: He is a good boy

Output: yob doog a si eH

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C PROGRAMMING LAB MANUAL

WEEK 14**Aim:** Write a C program to Implement the following searching method.

- i) linear search ii) Binary search

Program**i) Linear search:**

```
/*SEQUENTIAL SEARCH*/
#include<stdio.h>
main()
{
    int a[10],i,n,key,co=0;
    clrscr();
    printf("how many you want");
    scanf("%d",&n);
    printf("enter array elements:");
    for(i=0;i<n;i++)
    {
        scanf("%d",&a[i]);
    }
    printf("enter the searching elements");
    scanf("%d",&key);
    search(a,n);
}
```

```
Void search(int a[10], int n)
{
    int i;
    for(i=0;i<n;i++)
    {
        if(a[i]==key)
            co++;
    }
    if(co>0)
        printf("Element is found");
    else
        printf("Not found");
    getch();
}
```

Output:

```
how many you want5
enter array elements:3 1 7 12 45
enter the searching elements12
Element is found
```

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ii) Binary search :

/*BINARY SEARCH USING RECURSSION */

#include<stdio.h>

main()

```
{
    int a[10],i,j,t,n,key,low,high,co;
    clrscr();
    printf("how many you want");
    scanf("%d",&n);
    printf("enter array elements:");
    for(i=0;i<n;i++)
    {
        scanf("%d",&a[i]);
    }
    for(i=0;i<n;i++)
    {
        for(j=0;j<n-i-1;j++)
        {
            if(a[j]>a[j+1])
            {
                t=a[j];
                a[j]=a[j+1];
                a[j+1]=t;
            }
        }
    }
```

```
low=0;
high=n-1;
printf("enter the searching elements");
scanf("%d",&key);
co=Rbinarysearch(a,low,high,key);
if(co==-1)
    printf("Not found");
else
    printf("Element is found");
getch();
}
```

Rbinarysearch(int a[10],int low,int high,int key)

```
{
    int mid;
    if(low>high)
        return(-1);
    mid=(low+high)/2;
    if(key==a[mid])
        return(mid);
    if(key<a[mid])
        return(Rbinarysearch(a,low,mid-1,key));
    else
        return(Rbinarysearch(a,mid+1,high,key));
}
```

Output:

```
how many you want5
enter array elements:32 1 45 67 98
enter the searching elements98
Element is found
```

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WEEK 15

AIM: Write C programs that implement the following sorting methods to sort a given list of integers in ascending order by using Bubble sort.

Algorithm for Bubble sort :

1. start
2. take list(array), num
3. readlist(list,num)
4. printlist(list,num)
5. bub_sort(list,num)
6. printlist(list,num)
7. stop

readlist (list, num)

1. for $j \leftarrow 0$ to num
2. read list[j].

printlist(list,num)

1. for $j \leftarrow 0$ to num
2. write list[j].

bub_sort(list,num)

1. for $i \leftarrow 0$ to num
2. for $j \leftarrow 0$ to (num - i)
3. if(list[j] > list[j+1])
4. swapList(address of list[j], address of list[j+1])

swapList(address of list[j], address of list[j+1])

1. temp \leftarrow value at list[j]
2. value at list[j] \leftarrow value at list[j+1]
3. value at list[j+1] \leftarrow temp

PROGRAM:

```
#include <stdio.h>
#define MAX 10
```

```
void swapList(int *m,int *n)
{
    int temp;
    temp = *m;
    *m = *n;
    *n = temp;
}
```

```
/* Function for Bubble Sort */
```

```
void bub_sort(int list[], int n)
{
    int i,j;
    for(i=0;i<(n-1);i++)
        for(j=0;j<(n-(i+1));j++)
            if(list[j] > list[j+1])
                swapList(&list[j],&list[j+1]);
}
```


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```
}

void readlist(int list[],int n)
{
    int j;
    printf("\nEnter the elements: \n");
    for(j=0;j<n;j++)
        scanf("%d",&list[j]);
}

/* Showing the contents of the list */
void printlist(int list[],int n)
{
    int j;
    for(j=0;j<n;j++)
        printf("%d\t",list[j]);
}

void main()
{
    int list[MAX], num;
    clrscr();
    printf("\n\n***** Enter the number of elements [Maximum 10] *****\n");
    scanf("%d",&num);
    readlist(list,num);
    printf("\n\nElements in the list before sorting are:\n");
    printlist(list,num);
    bub_sort(list,num);
    printf("\n\nElements in the list after sorting are:\n");
    printlist(list,num);
    getch();
}
```

Output:

Enter the number of elements [Maximum 10]: 5
Enter the elements:4 1 8 2 3
nElements in the list before sorting are: 4 1 8 2 3
Elements in the list after sorting are:1 2 3 4 8

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C PROGRAMMING LAB MANUAL

WEEK-16

AIM: Write a C program that uses functions to perform the following operations on singly linked list.

i) creation

ii) Traversal

Program:

```
#include <stdio.h>
#include <stdlib.h>
#define NULL 0

struct linked_list
{
    int number;
    struct linked_list *next;
};
typedef struct linked_list node; /* node type defined */

main()
{
    node *head;
    int opt;
    void create(node *p);
    node *insert(node *head);
    node *delete(node *head);
    int count(node *p);
    void print(node *p);
    clrscr();
    head = (node *)malloc(sizeof(node));
    create(head);
    printf("\n");
    print(head);
    printf("\n");
    printf("\nNumber of items = %d \n", count(head));

    while(1)
    {
        printf("Enter 1. insertion\n"
               " 2. deletion \n"
               " 3. traversal \n"
               " 4. exit:");
        scanf("%d",&opt);
        switch(opt)
        {
            case 1: head=insert(head);
                    break;
            case 2: head= delete(head);
                    break;
            case 3: print(head);
                    break;
            case 4: exit(0);
        }
    }
}
```

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```
    }
}
void create(node *list)
{
    printf("Input a number\n");
    printf("(type -999 at end): ");
    scanf("%d", &list->number); /* create current node */

    if(list->number == -999)
    {
        list->next = NULL;
    }
    else
    {
        list->next = (node *)malloc(sizeof(node));
        create(list->next);
    }
    return;
}

void print(node *list)
{
    if(list->next != NULL)
    {
        printf("%d-->", list->number); /* print current item */

        if(list->next->next == NULL)
            printf("%d", list->next->number);

        print(list->next); /* move to next item */
    }
    return;
}

int count(node *list)
{
    if(list->next == NULL)
        return (0);
    else
        return(1+ count(list->next));
}

node *delete(node *head)
{
    node *find(node *p, int a);
    int key; /* item to be deleted */
    node *n1; /* pointer to node preceding key node */
    node *p; /* temporary pointer */
    printf("\n What is the item (number) to be deleted?");
    scanf("%d", &key);
    if(head->number == key) /* first node to be deleted */
    {
        p = head->next; /* pointer to 2nd node in list */
        free(head); /* release space of key node */
        head = p; /* make head to point to 1st node */
    }
}
```

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```
}
else
{
    n1 = find(head, key);
    if(n1 == NULL)
        printf("\n key not found \n");
    else
        /* delete key node */
        {
            p = n1->next->next;      /* pointer to the node
                                     following the keynode */

            free(n1->next);          /* free key node */
            n1->next = p;           /* establish link */
        }
}
return(head);
}
node *insert(node *head)
{
    node *find(node *p, int a);
    node *new;
    node *n1;
    int key;
    int x;

    printf("Value of new item?");
    scanf("%d", &x);
    printf("Value of key item ? (type -999 if last) ");
    scanf("%d", &key);

    if(head->number == key)
    {
        new = (node *)malloc(sizeof(node));
        new->number = x;
        new->next = head;
        head = new;
    }
    else
    {
        n1 = find(head, key);

        if(n1 == NULL)
            printf("\n key is not found \n");
        else
        {
            new = (node *)malloc(sizeof(node));
            new->number = x;
            new->next = n1->next;
            n1->next = new;
        }
    }
    return(head);
}
node *find(node *list, int key)
{
    if(list->next->number == key)      /* key found */
```

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```
        return(list);
    else
        if(list->next->next == NULL)    /* end */
            return(NULL);
    else
        find(list->next, key);    }
```

Result:

1. Create
2. Insert
3. Delete
4. Display
5. Exit

Enter Choice : 1

Enter the List of no.s and stop with 100

25 36 45 69 100

Count = 4

1. Create
2. Insert
3. Delete
4. Display
5. Exit

Enter Choice : 2

Enter the no you want to insert : 3

Enter the position you want to insert : 3

Count = 5

The inserted element is : 3

1. Create
2. Insert
3. Delete
4. Display
5. Exit

Enter Choice : 3

Enter position do you want to delete : 3

Count = 3

Deleted element is : 3

1. Create
2. Insert
3. Delete
4. Display
5. Exit

Enter Choice : 4

Null ->25->36->45->69->NULL

1. Create
2. Insert
3. Delete
4. Display
5. Exit

Enter Choice : 5

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WEEK-17

AIM: Write a C program that implements stack (its operations) using Arrays

Program:

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

int st_arr[20];
int t=-1;

void push_ele(int ele);
int pop_ele();
void display_ele();

void main()
{
    char choice,num1=0,num2=0;
    while(1)
    {
        clrscr();
        printf("=====");
        printf("\n\t\t MENU ");
        printf("\n=====");
        printf("\n[1] Using Push Function");
        printf("\n[2] Using Pop Function");
        printf("\n[3] Elements present in Stack");
        printf("\n[4] Exit\n");
        printf("\n\tEnter your choice: ");
        fflush(stdin);
        scanf("%c",&choice);

        switch(choice-'0')
        {
            case 1:
            {
                printf("\n\tElement to be pushed: ");
                scanf("%d",&num1);
                push_ele(num1);
                break;
            }

            case 2:
            {
                num2=pop_ele(1);
                printf("\n\tElement to be popped: %d\n\t",num2);
                getch();
                break;
            }

            case 3:
            {
                display_ele();
                getch();
                break;
            }
        }
    }
}
```

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```
    }

    case 4:
        exit(1);
        break;

    default:
        printf("\nYour choice is invalid.\n");
        break;
    }
}
}

/*Implementing the push() function. */
void push_ele(int ele)
{
    if(t==99)
    {
        printf("STACK is Full.\n");
        getch();
        exit(1);
    }
    st_arr[++t]=ele;
}

/*Implementing the pop() function. */
int pop_ele()
{
    int ele1;
    if(t== -1)
    {
        printf("\n\tSTACK is Empty.\n");
        getch();
        exit(1);
    }
    return(st_arr[t--]);
}

/*Implementing display() function. */
void display_ele()
{
    int k;
    printf("\n\tElements present in the stack are:\n\t");
    for(k=0;k<=t;k++)
        printf("%d\t",st_arr[k]);
}
```

Result:

```
Enter size of stack: 4
Enter option push,pop & display 1
Enter element to push: 3
Enter option push,pop & display 1
Enter element to push: 5
Enter option push,pop & display 2
Element 5 deleted
Enter option push,pop & display 3
Elements in stack are: 3
```

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C PROGRAMMING LAB MANUAL

WEEK-18

AIM: Write a C program that implements Queue (its operations) using Arrays.

Program:

```
#include<stdio.h>
#include<alloc.h>
#include<conio.h>
#define size 10
#define true 1
#define false 0

struct q_arr
{
    int f,r;
    int num;
    int a[size];
};

void init(struct q_arr* queue);
int e_que(struct q_arr* queue);
int f_que(struct q_arr* queue);
int add_ele(struct q_arr* queue,int);
int rem_ele(struct q_arr* queue);
void display_ele(struct q_arr* queue);

/*main function*/
void main()
{
    int ele,k;
    int ch;

    struct q_arr *queue = (struct q_arr*)malloc(sizeof(struct q_arr));
    init(queue);

    while(1)
    {
        clrscr();
        printf("\n\n****IMPLEMENTATION OF QUEUE USING ARRAYS****\n");
        printf("=====");
        printf("\n\t\tMENU\n");
        printf("=====");
        printf("\n\t[1] To insert an element");
        printf("\n\t[2] To remove an element");
        printf("\n\t[3] To display all the elements");
        printf("\n\t[4] Exit");
        printf("\n\n\tEnter your choice: ");
        scanf("%d",&ch);

        switch(ch)
        {
            case 1:
            {
                printf("\nElement to be inserted:");
```


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```
        scanf("%d",&ele);
        add_ele(queue,ele);
        break;
    }

    case 2:
    {
        if(!e_que(queue))
        {
            k=rem_ele(queue);
            printf("\n%d element is removed\n",k);
            getch();
        }
        else
        {
            printf("\tQueue is Empty. No element can be removed.");
            getch();
        }
        break;
    }

    case 3:
    {
        display_ele(queue);
        getch();
        break;
    }

    case 4:
        exit(0);

    default:
        printf("\tInvalid Choice.");
        getch();
        break;
    }
}
}
/*end main*/

void init(struct q_arr* queue)
{
    queue->f = 0;
    queue->r = -1;
    queue->num = 0;
}

/* Function to check is the queue is empty*/
int e_que(struct q_arr* queue)
{
    if(queue->num==0)
        return true;
    return false;
}

/* Function to check if the queue is full*/
```

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```
int f_que(struct q_arr* queue)
{
    if(queue->num == size)
        return true;
    return false;
}

/* Function to add an element to the queue*/
int add_ele(struct q_arr* queue,int j)
{
    if(f_que(queue))
        return false;

    if(queue->r == size - 1)
        queue->r = -1;
    queue->a[++queue->r] = j;
    queue->num++;
    return true;
}

/* Function to remove an element of the queue*/
int rem_ele(struct q_arr* queue)
{
    int j;
    if(e_que(queue))
        return -9999;
    j = queue->a[queue->f++];
    if(queue->f == size)
        queue->f = 0;
    queue->num--;
    return j;
}

/* Function to display the queue*/
void display_ele(struct q_arr* queue)
{
    int j;
    if(e_que(queue))
    {
        printf("Queue is Empty. No records to display.");
        return;
    }
    printf("\nElements present in the Queue are: ");
    for(j=queue->f;j<=queue->r;j++)
        printf("%d\t",queue->a[j]);
    printf("\n");
}
```

Result:

```
Enter queue size: 3
Enter add,delete & display 1
Enter element to add: 3
Enter add,delete & display 1
Enter element to add: 5
Enter add,delete & display 3
Elements in queue are: 3 5
```

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AIM: Write a C program that implements Queue (its operations) using Pointers.

Program:

```
#define true 1
#define false 0

#include<stdio.h>
#include<conio.h>
#include<process.h>

struct q_point
{
    int ele;
    struct q_point* n;
};

struct q_point *f_ptr = NULL;

int e_que(void);
void add_ele(int);
int rem_ele(void);
void show_ele();

/*main function*/
void main()
{
    int ele,choice,j;
    while(1)
    {
        clrscr();
        printf("\n\n****IMPLEMENTATION OF QUEUE USING POINTERS****\n");
        printf("=====");
        printf("\n\t\t MENU\n");
        printf("=====");
        printf("\n\t[1] To insert an element");
        printf("\n\t[2] To remove an element");
        printf("\n\t[3] To display all the elements");
        printf("\n\t[4] Exit");
        printf("\n\n\tEnter your choice:");
        scanf("%d", &choice);

        switch(choice)
        {
            case 1:
            {
                printf("\n\tElement to be inserted:");
                scanf("%d",&ele);
                add_ele(ele);
                getch();
                break;
            }

            case 2:
            {
                if(!e_que())
```

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```
{
    j=rem_ele();
    printf("\n\t%d is removed from the queue",j);
    getch();
}
else
{
    printf("\n\tQueue is Empty.");
    getch();
}
break;
}

case 3:
    show_ele();
    getch();
    break;

case 4:
    exit(1);
    break;

default:
    printf("\n\tInvalid choice.");
    getch();
    break;
}

}
}

/* Function to check if the queue is empty*/
int e_que(void)
{
    if(f_ptr==NULL)
        return true;
    return false;
}

/* Function to add an element to the queue*/
void add_ele(int ele)
{
    struct q_point *queue = (struct q_point*)malloc(sizeof(struct q_point));
    queue->ele = ele;
    queue->n = NULL;
    if(f_ptr==NULL)
        f_ptr = queue;
    else
    {
        struct q_point* ptr;
        ptr = f_ptr;
        for(ptr=f_ptr ;ptr->n!=NULL; ptr=ptr->n);
        ptr->n = queue;
    }
}
```

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```
/* Function to remove an element from the queue*/
int rem_ele()
{
    struct q_point* queue=NULL;
    if(e_que()==false)
    {
        int j = f_ptr->ele;
        queue=f_ptr;
        f_ptr = f_ptr->n;
        free (queue);
        return j;
    }
    else
    {
        printf("\n\tQueue is empty.");
        return -9999;
    }
}

/* Function to display the queue*/
void show_ele()
{
    struct q_point *ptr=NULL;
    ptr=f_ptr;
    if(e_que())
    {
        printf("\n\tQUEUE is Empty.");
        return;
    }
    else
    {
        printf("\n\tElements present in Queue are:\n\t");
        while(ptr!=NULL)
        {
            printf("%d\t",ptr->ele);
            ptr=ptr->n;
        }
    }
}
```

Result:

Enter queue size: 3
Enter add,delete & display 1
Enter element to add: 3
Enter add,delete & display 1
Enter element to add: 5
Enter add,delete & display 3
Elements in queue are: 3 5

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C PROGRAMMING LAB MANUAL

WEEK 19**Aim:** Write C programs to implement the linear regression algorithms.**Program:**

```
#include<math.h>
#include<stdio.h>
#include<conio.h>
main()
{
    int n,i;
    float x,y,m,c,d;
    float sumx=0,sumxsq=0,sumy=0,sumxy=0;
    clrscr();
    printf("enter the number of values for n:");
    scanf("%d",&n);
    for(i=0;i<n;i++)
    {
        printf("enter values of x and y");
        scanf("%f%f",&x,&y);
        sumx=sumx+x;
        sumxsq=sumxsq+(x*x);
        sumy=sumy+y;
        sumxy=sumxy+(x*y);
    }
    d=n*sumxsq-sumx*sumx;
    m=(n*sumxy-sumx*sumy)/d;
    c=(sumy*sumxsq-sumx*sumxy)/d;
    printf("M=%f\tC=%f\n",m,c);
    getch();
}
```

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C PROGRAMMING LAB MANUAL

WEEK 20**Aim:** Write C programs to implement the polynomial regression algorithms.**Program:**

```
#include<math.h>
#include<stdio.h>
#include<conio.h>
main()
{
    int i,j,k,m,n;
    float x[20],y[20],u,a[10],c[20][20],power,r;
    clrscr();
    printf("enter m,n:");
    scanf("%d%d",&m,&n);
    for(i=1;i<=n;i++)
    {
        printf("enter values of x and y");
        scanf("%f%f",&x[i],&y[i]);
    }
    for(j=1;j<=m+1;j++)
    for(k=1;k<=m+1;k++)
    {
        c[j][k]=0;
        for(i=1;i<=n;i++)
        {
            power=pow(x[i],j+k-2);
            c[j][k]=c[j][k]+power;
        }
    }
    for(j=1;j<=m+1;j++)
    {
        c[j][m+2]=0;
        for(i=1;i<=n;i++)
        {
            r=pow(x[i],j-1);
            c[j][m+2]=c[j][m+2]+y[i]*r;
        }
    }

    for(i=1;i<=m+1;i++)
    {
        for(j=1;j<=m+2;j++)
        {
            printf("%.2f\t",c[i][j]);
        }
        printf("\n");
    }
    for(k=1;k<=m+1;k++)
    for(i=1;i<=m+1;i++)
    {
        if(i!=k)
        {
            u=c[i][k]/c[k][k];
            for(j=k;j<=m+2;j++)
```

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```
{
    c[i][j]=c[i][j]-u*c[k][j];
}
}
}
for(i=1;i<=m+1;i++)
{
    a[i]=c[i][m+2]/c[i][i];
    printf("a[%d]=%f\n",i,a[i]);
}
getch();
}
```

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C PROGRAMMING LAB MANUAL

WEEK 21**Aim:** Write C programs to implement the Lagrange interpolation**Program:**

```
main()
{
    int i,j,k,n;
    float term,sum,x1,x[20],f[20];
    textcolor(LIGHTCYAN);
    clrscr();
    printf("enter n value");
    scanf("%d",&n);
    for(i=0;i<n;i++)
    {
        printf("enter the values for x,f[x]");
        scanf("%f%f",&x[i],&f[i]);
    }
    printf("enter the value");
    scanf("%f",&x1);
    sum=0;
    for(k=1;k<=n;k++)
    {
        term=1;
        for(j=1;j<=n;j++)
        {
            if(j!=k)
                term=term*((x1-x[j])/(x[k]-x[j]));
        }
        sum=sum+term*f[k];
    }
    printf("%f=%f",x1,sum);
    getch();
}
```

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C PROGRAMMING LAB MANUAL

WEEK 22**Aim:** Write C programs to implement Newton Gregory Forward Interpolation**Program:**

```
#include<math.h>
#include<stdlib.h>
main()
{
    int i,j,k,n;
    float h,u,f,x[100],fx[100],term,xx;
    clrscr();
    printf("enter the no.of values");
    scanf("%d",&n);
    for(i=0;i<n;i++)
    {
        printf("enter the values x,fx");
        scanf("%f%f",&x[i],&fx[i]);
    }
    printf("enter the values xx");
    scanf("%f",&xx);
    h=x[2]-x[1];
    u=(xx-x[0])/h;
    for(i=1;i<=n;i++)
    {
        for(j=n-1;j>=i;j--)
        {
            fx[j]=fx[j]-fx[j-1];
        }
    }
    k=1;f=0;term=1;
    for(i=0;i<n;i++)
    {
        f=f+term*fx[i];
        term=term*(u-k+1)/k;
        k++;
    }
    printf("the value is:%f",f);
    getch();
}
```

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C PROGRAMMING LAB MANUAL

WEEK 23**Aim:** Write C programs to implement Trapezoidal method.**Program:**

```
#include<math.h>
#include<stdio.h>
main()
{
    int i,n;
    float sum,s1,s2,h,x0,xn,fn,f0;
    clrscr();
    printf("enter the values x0,xn,n:");
    scanf("%f%f%d",&x0,&xn,&n);
    s1=s2=0;
    h=(xn-x0)/n;
    f0=x0*x0;
    fn=xn*xn;
    s1=f0+fn;
    for(i=1;i<=n-1;i++)
    {
        x0=x0+h;
        f0=x0*x0;
        s2=s2+f0;
        printf("x[%d]=%f\tf[%d]=%f\n",i,x0,i,f0);
    }
    sum=(h*(s1+2*s2))/2;
    printf("\nThe intergal value is:%f",sum);
    getch();
}
```

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C PROGRAMMING LAB MANUAL

WEEK 24**Aim:** Write C programs to implement Simpsons method.**Program:**

```
/*          SIMPSONS 1/3rd RULE          */
#include<math.h>
#include<stdio.h>
main()
{
    int i,n;
    float sum,s0,s1,s2,h,x0,xn,fn,f0;
    clrscr();
    printf("enter the values x0,xn,n:");
    scanf("%f%f%d",&x0,&xn,&n);
    s0=s1=s2=0;
    h=(xn-x0)/n;
    f0=x0*x0;
    fn=xn*xn;
    s0=f0+fn;
    for(i=1;i<=n-1;i++)
    {
        x0=x0+h;
        f0=x0*x0;
        if(i%2!=0)
            s1=s1+f0;
        else
            s2=s2+f0;
        printf("x[%d]=%f\t f[%d]=%f\n",i,x0,i,f0);
    }
    sum=(h*(s0+4*s1+2*s2))/3;
    printf("\nThe intergal value is:%f",sum);
    getch();
}

/*          SIMPSONS 3/8th RULE          */
#include<math.h>
#include<stdio.h>
main()
{
    int i,n;
    float sum,s0,s1,s2,h,x0,xn,fn,f0;
    clrscr();
    printf("enter the values x0,xn,n:");
    scanf("%f%f%d",&x0,&xn,&n);
    s0=s1=s2=0;
    h=(xn-x0)/n;
    f0=x0*x0;
    fn=xn*xn;
    s0=f0+fn;
    for(i=1;i<=n-1;i++)
    {
        x0=x0+h;
        f0=x0*x0;
        if(i%3==0)
```

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```
    s1=s1+2*f0;
else
    s2=s2+3*f0;
printf("x[%d]=%f\t f[%d]=%f\n",i,x0,i,f0);
}
sum=(3*h*(s0+s1+s2))/8;
printf("\tThe intergal value is:%f",sum);
getch();
}
```

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