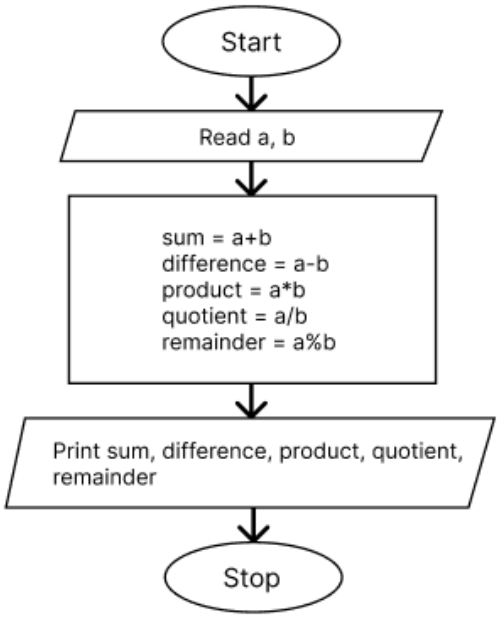
5. Write an algorithm and C program that accepts two integers from the user as input and calculates the sum, difference, product, quotient and remainder applying different arithmetic operators between two integers.

a) ALGORITHM

STEP 1: Start
STEP 2: Read a, and b
STEP 3: Calculate
Sum = a+b
Difference = a-b
Product = a*b
Quotient = a/b
Remainder = a%b
STEP 4: Print sum, difference, product, quotient and remainder
STEP 5: Stop

b) FLOWCHART



c) PROGRAM

```c
#include<stdio.h>

int main() {

    int a, b;

    printf("Enter two numbers: ");
    scanf("%d %d", &a, &b);

    printf("Sum: %d\n", a + b);
    printf("Difference: %d\n", a - b);
    printf("Product: %d\n", a * b);
    printf("Quotient: %d\n", a / b);
    printf("Remainder: %d\n", a % b);

    return 0;
}
```

d) OUTPUT

```
PS C:\Users\suresh\C programs\lab assignment 1> .\a.exe
Enter two numbers: 6 3
Sum: 9
Difference: 3
Product: 18
Quotient: 2
Remainder: 0
```

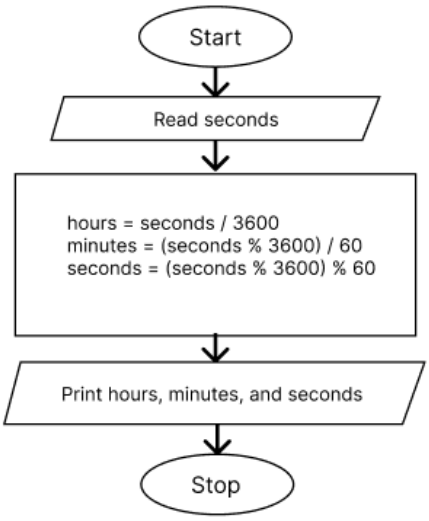
6. Write a C program to convert a given integer (in seconds) to hours, minutes and seconds.

a) ALGORITHM

STEP 1: Start
STEP 2: Read seconds
STEP 3: Calculate hours, minutes, and seconds as
Hours = seconds / 3600
Minutes = (seconds % 3600) / 60
Seconds = (seconds % 3600) % 60

STEP 4: Print hours, minutes and seconds
STEP 5: Stop

b) FLOWCHART



c) PROGRAM

```c
#include<stdio.h>

int main() {

    int seconds, hours, minutes;

    printf("Enter seconds: ");
    scanf("%d", &seconds);

    hours = seconds / 3600;
    minutes = (seconds % 3600) / 60;
    seconds = (seconds % 3600) % 60;

    printf("Hours: %d\n", hours);
    printf("Minutes: %d\n", minutes);
    printf("Seconds: %d\n", seconds);

    return 0;
}
```

d) OUTPUT

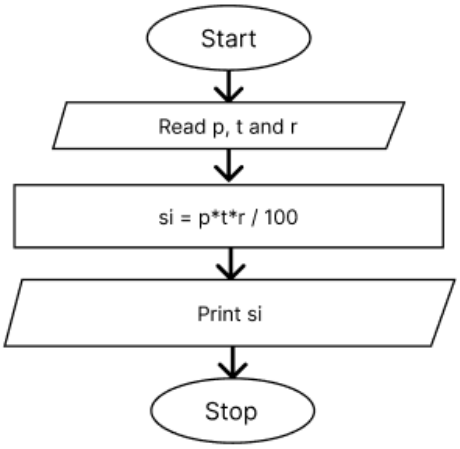
```
PS C:\Users\suresh\C programs\lab assignment 1> .\a.exe
Enter seconds: 3670
Hours: 1
Minutes: 1
Seconds: 10
```

7. Write a C program that accepts principle, rate of interest, time in years and computes the simple interest.

a) ALGORITHM

STEP 1: Start
STEP 2: Read p, t, and r
STEP 3: Calculate si = (p*t*r) / 100
STEP 4: Print si
STEP 5: Stop

b) FLOWCHART



c) PROGRAM

```
#include <stdio.h>
int main() {
    float p, t, r, si;

    printf("Enter principal, rate and time: ");
    scanf("%f %f %f", &p, &r, &t);

    si = (p * r * t) / 100;

    printf("Simple Interest: %.2f", si);

    return 0;
}
```

d) OUTPUT

```
PS C:\Users\suresh\C programs\lab assignment 1> .\a.exe
Enter principal, rate and time: 100 1 1
Simple Interest: 1.00
```

8. Write algorithm pseudo-code as well as draw flow chart to Compute the roots of the quadratic equation $ax^2+bx+c=0$ for given coefficient input a, b and c. Write C program.

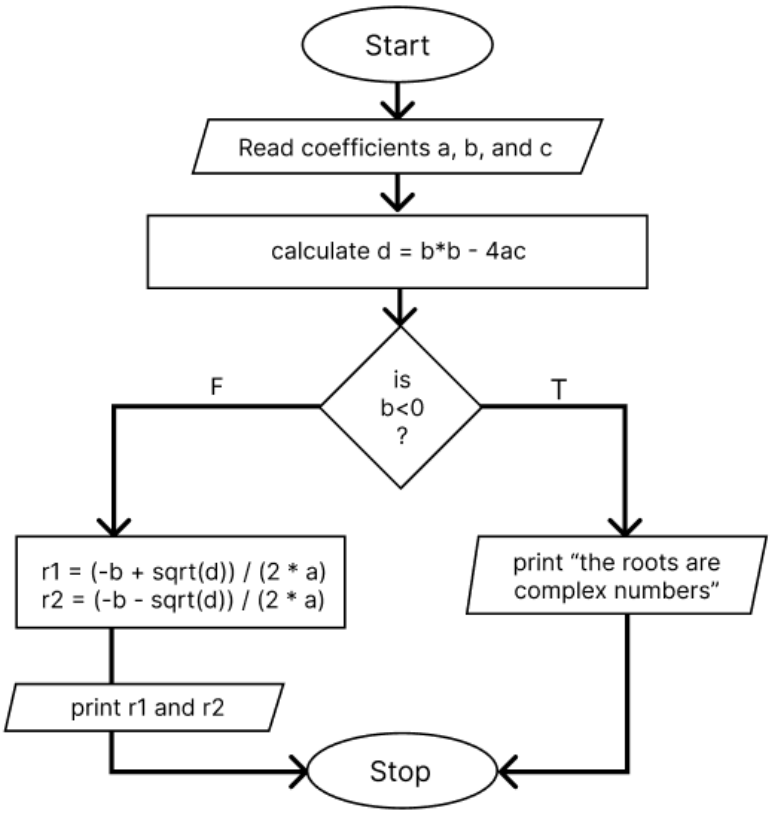
a) ALGORITHM

STEP 1: Start
STEP 2: Read coefficients a, b and c
STEP 3: Calculate d = b*b - 4ac
STEP 4: If d < 0
print the roots are complex numbers and end the program
Else
calculate roots
r_1 = (-b + sqrt(d)) / 2a and
r_2 = (-b – sqrt(d)) / 2a

and print the roots

STEP 5: Stop

b) FLOWCHART



c) PROGRAM

```c
#include <stdio.h>

int main()
{
    float a, b, c, d, r1, r2;

    printf("Enter coefficients a, b and c: ");
    scanf("%f %f %f", &a, &b, &c);

    d = b * b - 4 * a * c;

    if (d < 0)
    {
        printf("Roots are complex numbers.\n");

        return 0;
    }

    r1 = (-b + sqrt(d)) / (2 * a);
    r2 = (-b - sqrt(d)) / (2 * a);

    printf("Roots are: %.2f and %.2f", r1, r2);

    return 0;
}
```

d) OUTPUT

```
PS C:\Users\suresh\C programs\lab assignment 1> .\a.exe
Enter coefficients a, b and c: 1 3 2
Roots are: -1.00 and -2.00
```

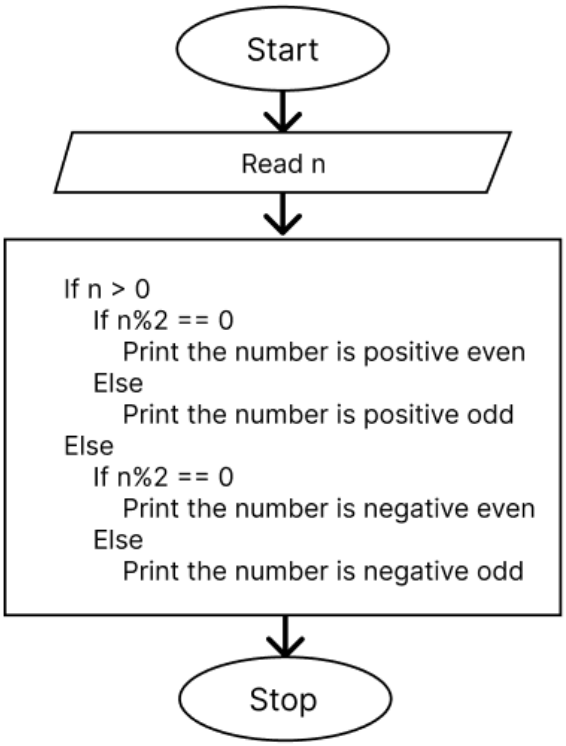
9. Write a C program to check a given integer is positive even, negative even, positive odd or negative odd.

a) ALGORITHM

STEP 1: Start
STEP 2: Read n
STEP 3: If n > 0
    If n%2 == 0
        Print the number is positive even
    Else
        Print the number is positive odd
Else
    If n%2 == 0
        Print the number is negative even
    Else
        Print the number is negative odd

STEP 4: Stop

b) FLOWCHART



c) PROGRAM

```c
#include <stdio.h>

int main()
{
    int n;

    printf("Enter a number: ");
    scanf("%d", &n);

    if (n > 0)
    {
        if (n % 2 == 0)
        {
            printf("%d is positive even\n", n);
        }
        else
        {
            printf("%d is positive odd\n", n);
        }
    }
    else
    {
        if (n % 2 == 0)
        {
            printf("%d is negative even\n", n);
        }
        else
        {
            printf("%d is negative odd\n", n);
        }
    }

    return 0;
}
```

d) OUTPUT

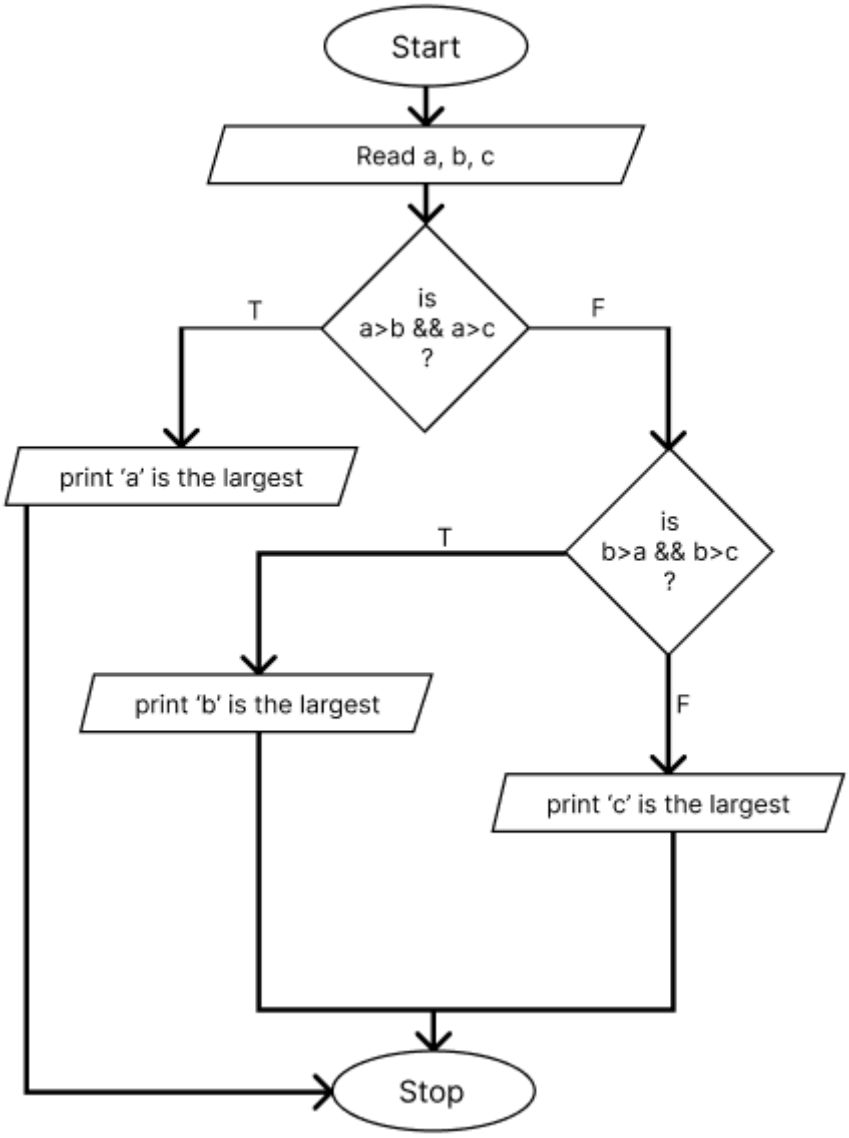
```
PS C:\Users\suresh\C programs\
Enter a number: -8
-8 is negative even
```

10. Draw a flow chart and write a C program that accepts three integers as input and find the largest of three.

a) ALGORITHM

STEP 1: Start
STEP 2: Read a, b and c
STEP 3: If a>b and a<c, print ‘a’ is the largest number
If b>c and b>a, print ‘b’ is the largest number
Else print ‘c’ is the largest number
STEP 4: Stop

b) FLOWCHART



c) PROGRAM

```c
#include<stdio.h>

int main() {
    int a, b, c;

    printf("Enter three numbers: ");
    scanf("%d %d %d", &a, &b, &c);

    if (a > b && a > c) {
        printf("%d is the largest number\n", a);
    } else if (b > a && b > c) {
        printf("%d is the largest number\n", b);
    } else {
        printf("%d is the largest number\n", c);
    }

    return 0;
}
```

d) OUTPUT

```
PS C:\Users\suresh\C programs\
Enter three numbers: 12 10 15
15 is the largest number
```

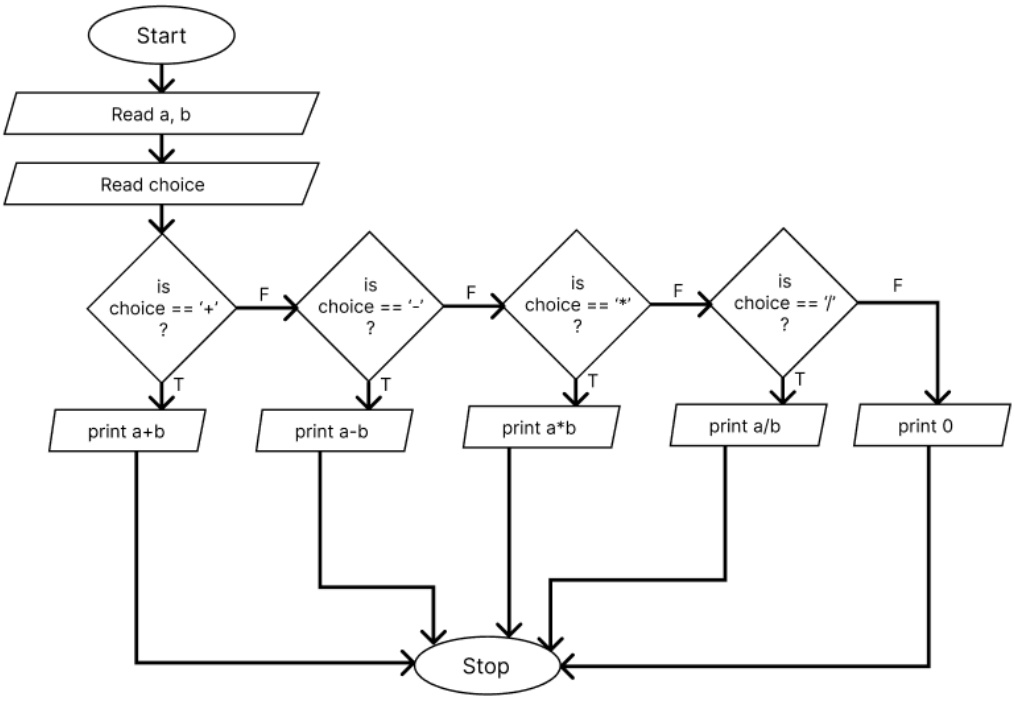
11. Write a program that takes input of two numbers and an operator in (+,-,*, /) as input and pass those numbers and an operator to the function. The function should calculate the result of two numbers as indicated by operator and return the result. Display the result of computation in your program.

a) ALGORITHM

STEP 1: Start
STEP 2: Read two integers a, b
STEP 3: Read a choice
STEP 4: if choice is '+' return a+b
if choice is '-' return a-b
if choice is '*' return a*b
if choice is '/' return a/b
else return 0

STEP 5: Stop

b) FLOWCHART



c) PROGRAM

```c
#include <stdio.h>

int calculate(int a, int b, char choice) {
    int result;

    switch (choice) {
    case '+':
        result = a + b;
        break;
    case '-':
        result = a - b;
        break;
    case '*':
        result = a * b;
        break;
    case '/':
        result = a / b;
        break;
    default:
        result = 0;
    }

    return result;
}
```

```c
int main() {

    int a, b, result;
    char choice;

    printf("Enter two numbers: ");
    scanf("%d %d", &a, &b);

    printf("Enter your choice +, - * or /: ");
    scanf(" %c", &choice);

    result = calculate(a, b, choice);

    printf("Result: %d\n", result);

    return 0;
}
```

d) OUTPUT

```
PS C:\Users\suresh\C programs\lab
Enter two numbers: 12 6
Enter your choice +, - * or /: *
Result: 72
```

12. Write a program to determine whether a given number is palindrome or not.

a) ALGORITHM

STEP 1: Start

STEP 2: Read n

STEP 3: temp = n

STEP 4: if temp != 0 go to step 5

Else go to step 6

STEP 5: rem = temp % 10

rev = rev * 10 + rem

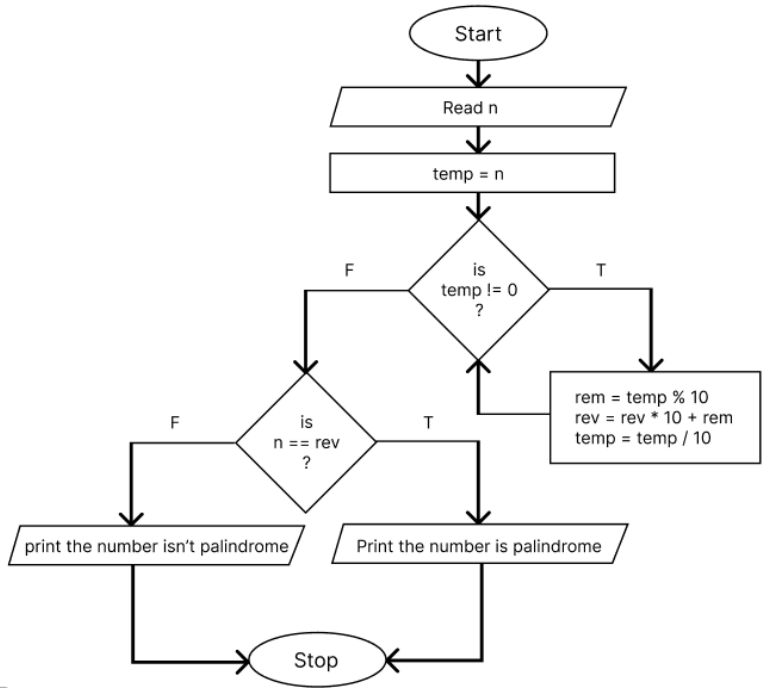
temp = temp / 10

STEP 6: if n == rev print “the number is palindrome”

else print “the number is not palindrome”

STEP 7: Stop

b) FLOWCHART



c) PROGRAM

```
#include<stdio.h>

int main() {
    int num, input, rem, rev = 0;

    printf("Enter a number: ");
    scanf("%d", &input);

    num = input;

    while(num != 0) {
        rem = num % 10;
        rev = rev * 10 + rem;
        num /= 10;
    }

    if(input == rev) {
        printf("%d is a palindrome number.", input);
    } else {
        printf("%d is not a palindrome number.", input);
    }

    return 0;
}
```

e) OUTPUT

```
PS C:\Users\suresh\C programs\lab
Enter a number: 141
141 is a palindrome number.
```

13. Write a program to determine whether a given number is Armstrong number or not.

a) ALGORITHM

STEP 1: Start
STEP 2: Declare `num, temp_num, input, result = 0, rem, num_of_digit = 0`
STEP 3: Read input

STEP 4: num = input
temp_num = input

STEP 5: if temp_num != 0 go to step 6
else go to step 7

STEP 6: num_of_digit++
temp_num = temp_num / 10
go to step 5

STEP 7: if num != 0 go to step 8
else go to step 12

STEP 8: rem = num % 10
int power = 1
int i = 1

STEP 9: if i < num_of_digit go to step 10
else go to step 11

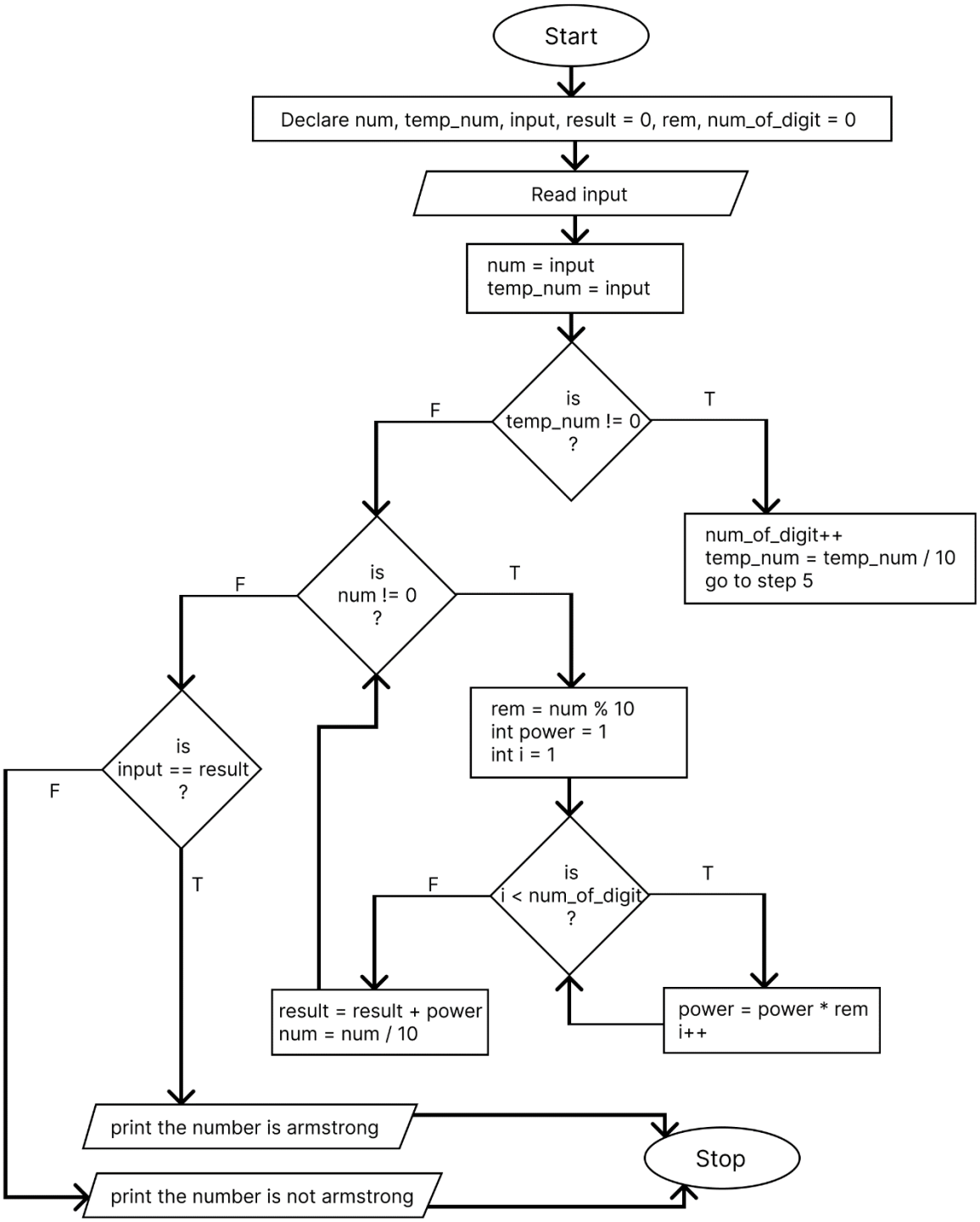
STEP 10: power = power * rem
i++
go to step 9

STEP 11: result = result + power
num = num / 10

STEP 12: if input == result
print the number is armstrong
else
print the number is not Armstrong

STEP 13: Stop

b) FLOWCHART


Start
Declare num, temp_num, input, result = 0, rem, num_of_digit = 0
Read input
num = input
temp_num = input
is
temp_num != 0
?
F
T
num_of_digit++
temp_num = temp_num / 10
go to step 5
is
num != 0
?
F
T
rem = num % 10
int power = 1
int i = 1
is
input == result
?
F
T
is
i < num_of_digit
?
F
T
result = result + power
num = num / 10
power = power * rem
i++
print the number is armstrong
Stop
print the number is not armstrong

c) PROGRAM

```c
#include <stdio.h>

int main()
{
    int num, temp_num, input, result = 0, rem, num_of_digit = 0;

    printf("Enter a number: ");
    scanf("%d", &input);

    num = input;
    temp_num = input;

    while (temp_num != 0)
    {
        num_of_digit++;
        temp_num /= 10;
    }

    while (num != 0)
    {
        rem = num % 10;

        int power = 1;
        for (int i = 0; i < num_of_digit; i++)
        {
            power *= rem;
        }
        result += power;

        num /= 10;
    }

    if (input == result)
        printf("%d is an Armstrong number.", input);
    else
        printf("%d is not an Armstrong number.", input);

    return 0;
}
```

d) OUTPUT

```
PS C:\Users\suresh\C programs\lab
Enter a number: 153
153 is an Armstrong number.
```

14. Write a C program to find the eligibility of admission for a professional course based on the following criteria:

Marks in Maths >=65

Marks in Phy >=55

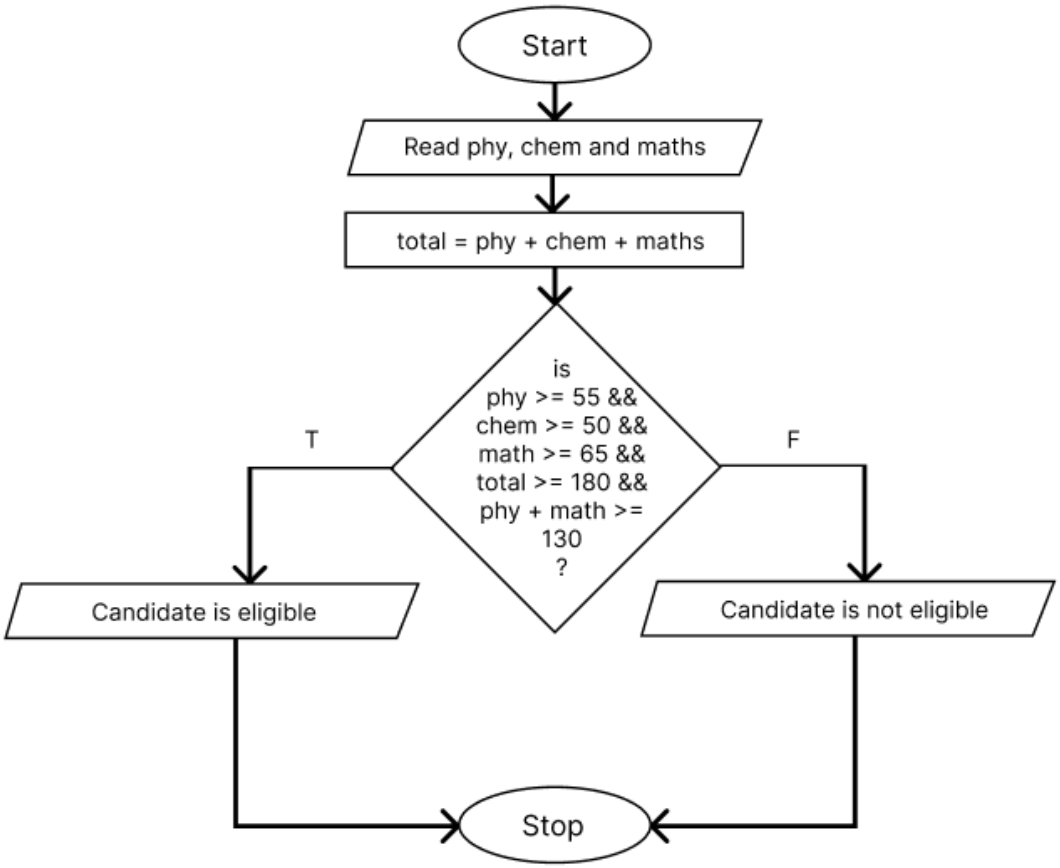
Marks in Chem>=50

Total in all three subject >=180 or Total in Math and physics Subjects >=130

a) ALGORITHM

STEP 1: Start
STEP 2: Read marks of math, physics and chemistry
STEP 3: Find total marks total = math+physics+chemistry
STEP 4: if phy >= 55 && chem >= 50 && math >= 65 && total >= 180 && phy + math >= 130
Print the candidate is eligible for admission
else
print the candidate is not eligible for admission
STEP 5: Stop

b) FLOWCHART



c) PROGRAM

```c
#include<stdio.h>

int main() {
    float phy, chem, math, total;

    printf("Enter the marks of Physics, Chemistry and Mathematics: ");
    scanf("%f %f %f", &phy, &chem, &math);

    total = phy + chem + math;

    if (
         phy >= 55 &&
         chem >= 50 &&
         math >= 65 &&
         total >= 180 &&
         phy + math >= 130
        )
   {
         printf("The candidate is eligible for admission.");
    } else {
         printf("The candidate is not eligible for admission.");
    }

    return 0;
}
```

d) OUTPUT

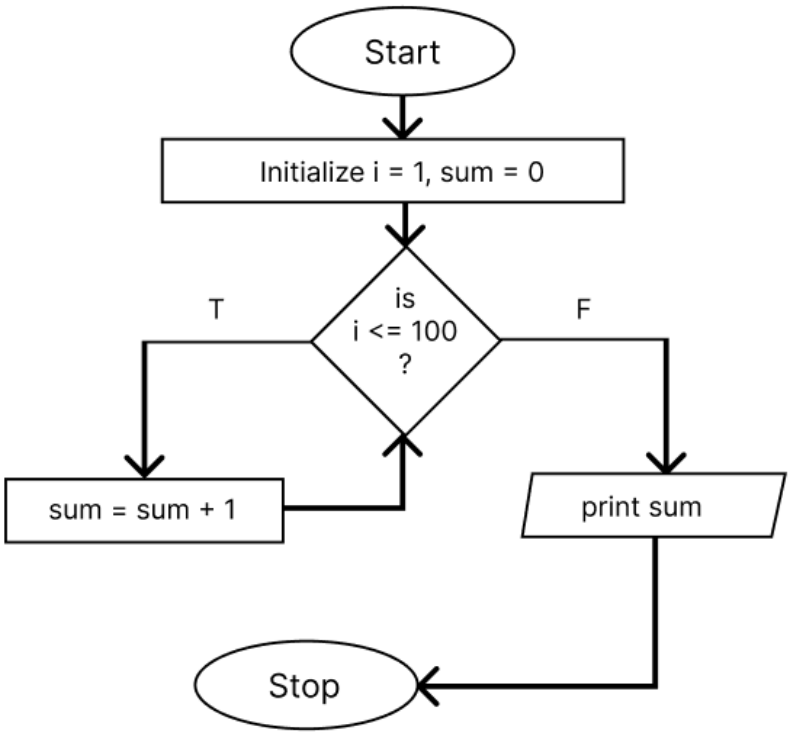
```
PS C:\Users\suresh\C programs\lab assignment 1> .\a.exe
Enter the marks of Physics, Chemistry and Mathematics: 45 25 20
The candidate is not eligible for admission.
```

15. Write a C program to find the sum of first 100 natural numbers using loop.

a) ALGORITHM

STEP 1: Start
STEP 2: Initialize i = 1, sum = 0
STEP 3: if i <= 100 go to step 4
else go to step 5
STEP 4: sum = sum + 1
STEP 5: Print sum
STEP 6: Stop

b) FLOWCHART



c) PROGRAM

```
#include<stdio.h>
int main() {
    int sum = 0;

    for (int i = 1; i <= 100; i++) {
        sum += i;
    }

    printf("The sum of first 100 natural numbers is %d.", sum);

    return 0;
}
```

d) OUTPUT

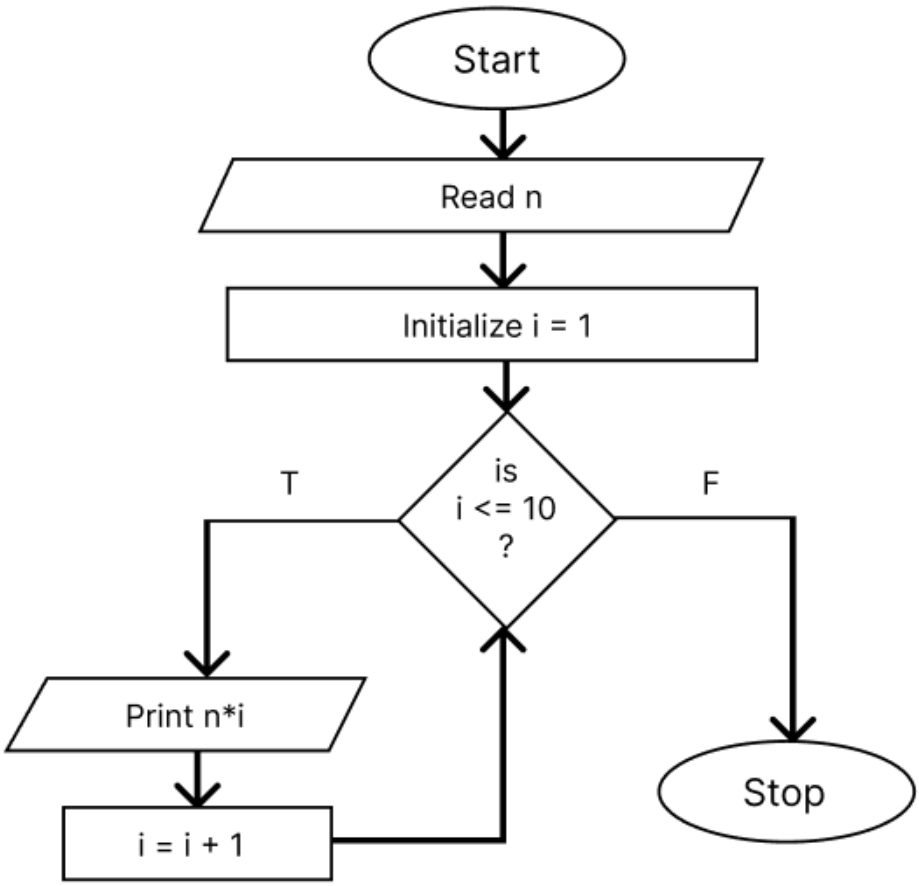
```
PS C:\Users\suresh\C programs\lab assignment 1> .\a.exe
The sum of first 100 natural numbers is 5050.
```

16. Write a program in C to display the multiplication table of a given integer.

a) ALGORITHM

STEP 1: Start
STEP 2: Read an integer n
STEP 3: Initialize i = 1
STEP 4: if i<=10 go to step 5
else go to step 6
STEP 5: print n * i
STEP 6: Stop

b) FLOWCHART



c) PROGRAM

```c
#include<stdio.h>

int main() {
    int n;

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

    for (int i = 1; i <= 10; i++) {
        printf("%d x %d = %d\n", n, i, n * i);
    }

    return 0;
}
```

d) OUTPUT

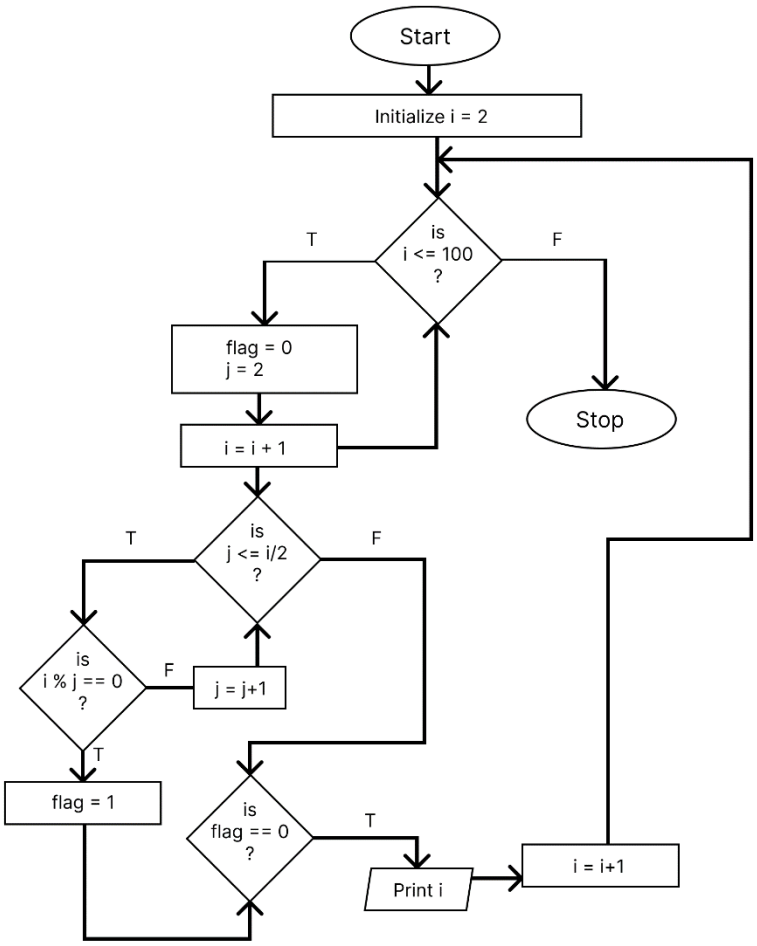
```
PS C:\Users\suresh\C programs\lab assignment 1> .\a.exe
Enter the number: 12
12 x 1 = 12
12 x 2 = 24
12 x 3 = 36
12 x 4 = 48
12 x 5 = 60
12 x 6 = 72
12 x 7 = 84
12 x 8 = 96
12 x 9 = 108
12 x 10 = 120
```

17. Write an algorithm/ program to print the prime numbers up to 100.

a) ALGORITHM

STEP 1: Start
STEP 2: Initialize i = 2
STEP 3: If i<=100 go to step 4
Else go to step 5
STEP 4: Initialize flag = 0, j = 2
STEP 5: If j<=i/2 go to step 6
Else go to step 7
STEP 6: if i % j == 0
Assign 1 to flag variable
j = j+1
Go to step 7
STEP 7: if flag == 0
print i
i = i+1
go to step 3
STEP 8: Stop

b) FLOWCHART



c) PROGRAM

```c
#include<stdio.h>

int main() {
    int n, flag;

    printf("Prime numbers between 1 to 100 are:\n");

    for (int i = 2; i <= 100; i++) {
        flag = 0;

        for (int j = 2; j <= i / 2; j++) {
            if (i % j == 0) {
                flag = 1;
                break;
            }
        }

        if (flag == 0) {
            printf("%d, ", i);
        }
    }

    return 0;
}
```

d) OUTPUT

```
PS C:\Users\suresh\C programs\lab assignment 1> .\a.exe
Prime numbers between 1 and 100 are:
2, 3, 5, 7, 11, 13, 17, 19, 23, 29, 31, 37, 41, 43, 47, 53, 59, 61, 67, 71, 73, 79, 83, 89, 97,
```

18. Write algorithm and program to compute the followings using for, do while and while loop separately.

a. factorial of an integer N

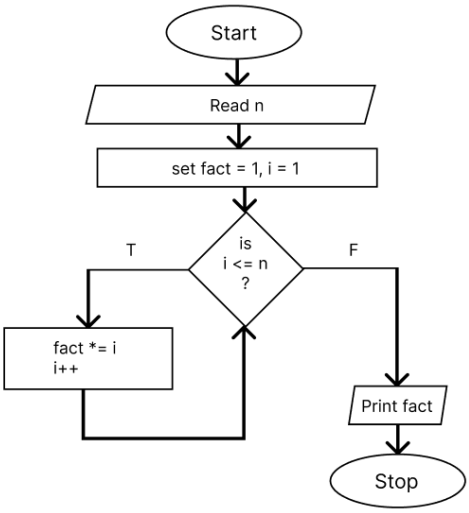
b. computation of a^b(a raised to power b)

A. factorial of an integer using for loop

a) ALGORITHM

STEP 1: Start
STEP 2: Read n, set fact = 1, i = 1
STEP 3: if i<=n go to step 4 else go to step 5
STEP 4: fact = fact * i
i++
STEP 5: Print fact
STEP 6: Stop

b) FLOWCHART



c) PROGRAM

```c
#include<stdio.h>

int main() {
    int n, fact = 1;

    printf("Enter a number: ");
    scanf("%d", &n);

    for (int i = 1; i <= n; i++) {
        fact *= i;
    }

    printf("Factorial is %d", fact);
    return 0;
}
```

d) OUTPUT

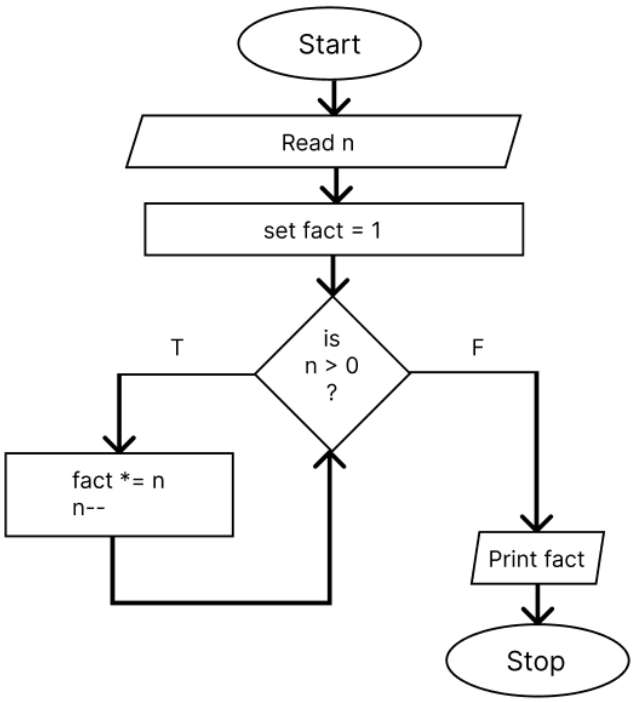
```
PS C:\Users\suresh\C programs\lab
Enter a number: 6
Factorial is 720
```

B. factorial of an integer using while loop

a) ALGORITHM

STEP 1: Start
STEP 2: Read n, set fact = 1
STEP 3: if n > 0 go to step 4 else go to step 5
STEP 4: fact = fact * n
n = n - 1
STEP 5: Print fact
STEP 6: Stop

b) FLOWCHART



c) PROGRAM

```
#include<stdio.h>
int main() {
    int n, fact = 1;

    printf("Enter a number: ");
    scanf("%d", &n);

    while(n > 0) {
        fact *= n;
        n--;
    }

    printf("Factorial is %d", fact);
    return 0;
}
```

d) OUTPUT

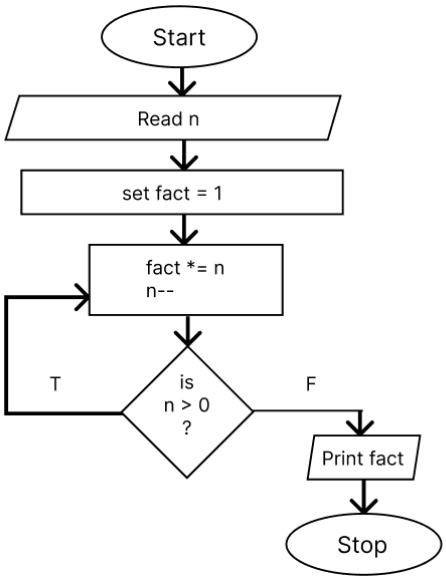
```
PS C:\Users\suresh\C programs\lab
Enter a number: 6
Factorial is 720
```

C. factorial of an integer using do while loop

a) ALGORITHM

STEP 1: Start
STEP 2: Read n, set fact = 1
STEP 3: fact = fact * n
n = n - 1
STEP 4: if n > 0 go to step 3 else go to step 5
STEP 5: Print fact
STEP 6: Stop

b) FLOWCHART



c) PROGRAM

```
#include<stdio.h>

int main() {
    int n, fact = 1;

    printf("Enter a number: ");
    scanf("%d", &n);

    do {
        fact *= n;
        n--;
    } while (n > 0);

    printf("Factorial is %d", fact);

    return 0;
}
```

d) OUTPUT

```
PS C:\Users\suresh\C programs\lab
Enter a number: 6
Factorial is 720
```

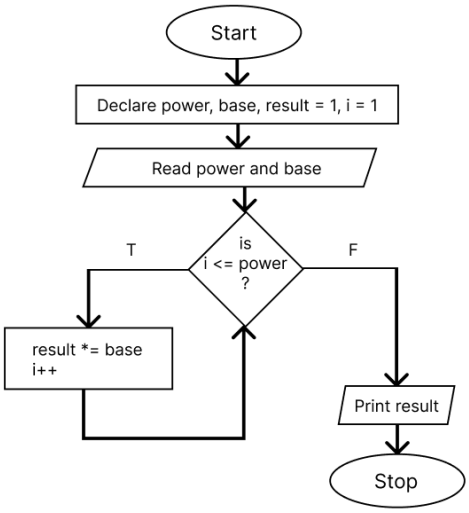
b. computation of a^b(a raised to power b)

A. Computation of a^b using for loop

a) ALGORITHM

STEP 1: Start
STEP 2: Declare power, base, result = 1
STEP 3: Read power and base
STEP 4: if i <= power go to step 5 else go to step 6
STEP 5: result = result * base
STEP 6: Print result
STEP 7: Stop

b) FLOWCHART



c) PROGRAM

```c
#include<stdio.h>

int main() {
    int power, base, result = 1;

    printf("Enter a number and its power: ");
    scanf("%d %d", &base, &power);

    for (int i = 1; i <= power; i++) {
        result *= base;
    }

    printf("%d ^ %d is %d", base, power, result);
    return 0;
}
```

d) OUTPUT

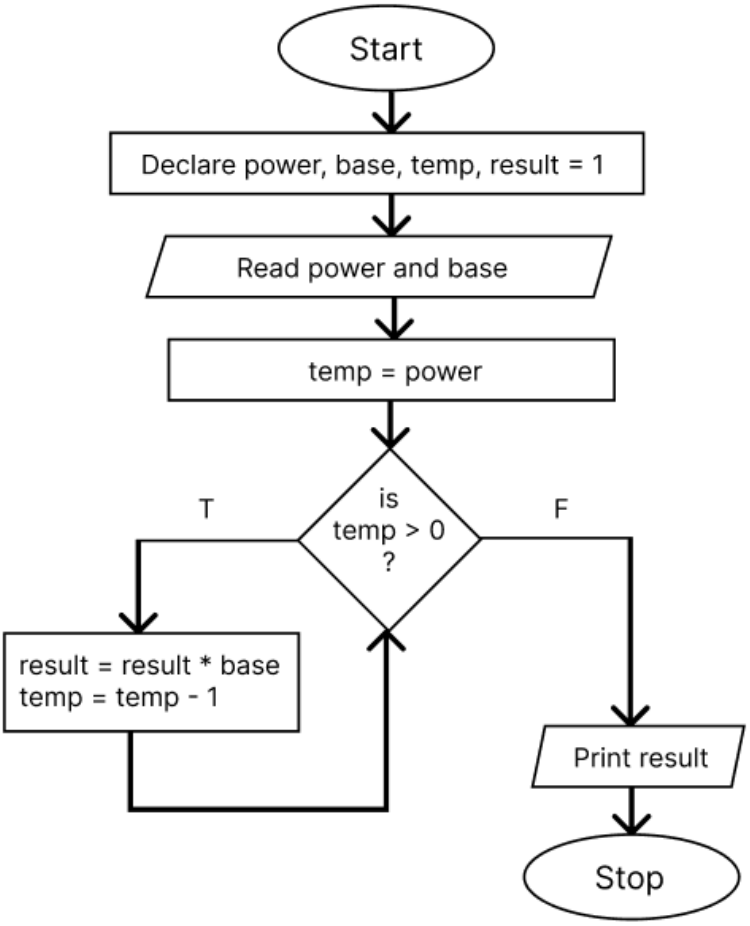
```
PS C:\Users\suresh\C programs\lab
Enter a number and its power: 2 3
2 ^ 3 is 8
```

B. Computation of a^b using while loop

a) ALGORITHM

STEP 1: Start
STEP 2: Declare power, base, temp, result = 1
STEP 3: Read power and base
STEP 4: temp = power
STEP 5: if temp > 0 go to step 6 else go to step 7
STEP 6: result = result * base
temp = temp - 1
STEP 7: Print result
STEP 8: Stop

b) FLOWCHART



c) PROGRAM

```c
#include<stdio.h>

int main() {
    int base, temp_exponent, exponent, result = 1;

    printf("Enter base: ");
    scanf("%d", &base);

    printf("Enter exponent: ");
    scanf("%d", &exponent);

    temp_exponent = exponent;

    while (temp_exponent > 0) {
        result *= base;
        temp_exponent--;
    }

    printf("%d^%d = %d", base, exponent, result);

    return 0;
}
```

d) OUTPUT

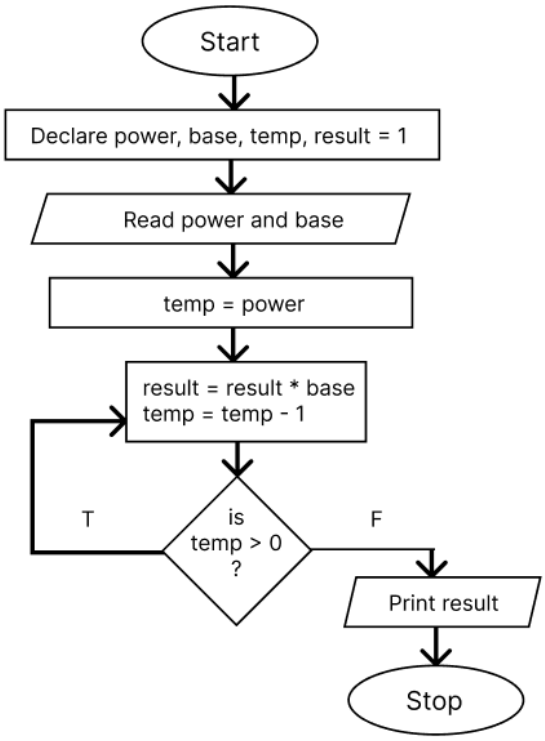
```
PS C:\Users\suresh\C programs\lab
Enter a number and its power: 2 3
2 ^ 3 is 8
```

C. Computation of a^b using do while loop

a) ALGORITHM

STEP 1: Start
STEP 2: Declare power, base, temp, result = 1
STEP 3: Read power and base
STEP 4: temp = power
STEP 5: result = result * base
temp = temp - 1
STEP 6: if temp > 0 go to step 5 else go to step 7
STEP 7: Print result
STEP 8: Stop

b) FLOWCHRT



c) PROGRAM

```c
#include<stdio.h>

int main() {
    int base, temp_exponent, exponent, result = 1;

    printf("Enter a number and its power: ");
    scanf("%d %d", &base, &exponent);

    temp_exponent = exponent;

    do {
        result *= base;
        temp_exponent--;
    } while (temp_exponent > 0);

    printf("%d^%d = %d", base, exponent, result);

    return 0;
}
```

d) OUTPUT

```
PS C:\Users\suresh\C programs\lab
Enter a number and its power: 2 3
2 ^ 3 is 8
```

19. Write a program in C to make such a pattern of astrisk(*) below using loop.

*****

*** ***

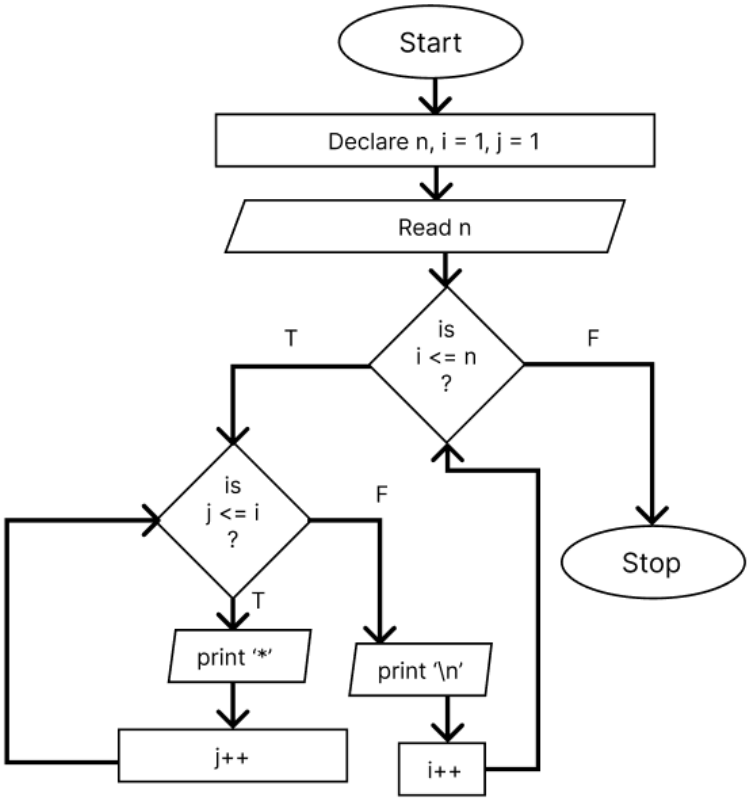
*** * ***

*** * * *** **up to n lines where n is an integers**

a) ALGORITHM

STEP 1: Start
STEP 2: Declare n, i = 1, j = 1
STEP 3: Read n
STEP 4: If i <= n
go to step 5
else go to step 8
STEP 5: If j <= i
print '*'
j++
else go to step 6
STEP 6: Print "\n"
STEP 7: i++ and go to step 4
STEP 8: Stop

b) FLOWCHART



c) PROGRAM

```c
#include<stdio.h>

int main() {
    int n, i, j;

    printf("Enter a number: ");
    scanf("%d", &n);

    for (i = 1; i <= n; i++) {
        for (j = 1; j <= i; j++) {
            printf("*");
        }
        printf("\n");
    }

    return 0;
}
```

d) OUTPUT

```
PS C:\Users\suresh\C programs\lab
Enter a number: 6
*
**
***
****
*****
******
```

20. Write a program using loop to print the following Floyd's triangle as given below when input is n.

1

2 3

4 5 6

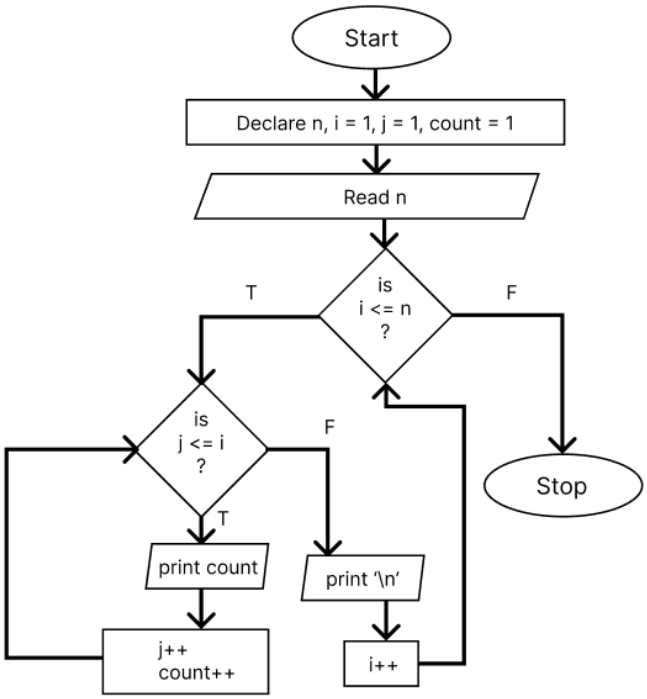
7 8 9 10

11 12 13 14 up to n rows

a) ALGORITHM

STEP 1: Start
STEP 2: Declare n, i = 1, j = 1, count = 1
STEP 3: Read n
STEP 4: If i <= n
go to step 5
else go to step 8
STEP 5: If j <= i
print count
count++
j++
else go to step 6
STEP 6: Print "\n"
STEP 7: i++ and go to step 4
STEP 8: Stop

b) FLOWCHART



c) PROGRAM

```c
#include<stdio.h>

int main() {
    int n, i, j, count = 1;

    printf("Enter a number: ");
    scanf("%d", &n);

    for (i = 1; i <= n; i++) {
        for (j = 1; j <= i; j++) {
            printf("%d ", count);
            count++;
        }
        printf("\n");
    }

    return 0;
}
```

d) OUTPUT

```
PS C:\Users\suresh\C programs\lab
Enter a number: 5
1
2 3
4 5 6
7 8 9 10
11 12 13 14 15
```

21. Write a program in C to make such a pattern like a pyramid with numbers increased by 1.

1

2 3

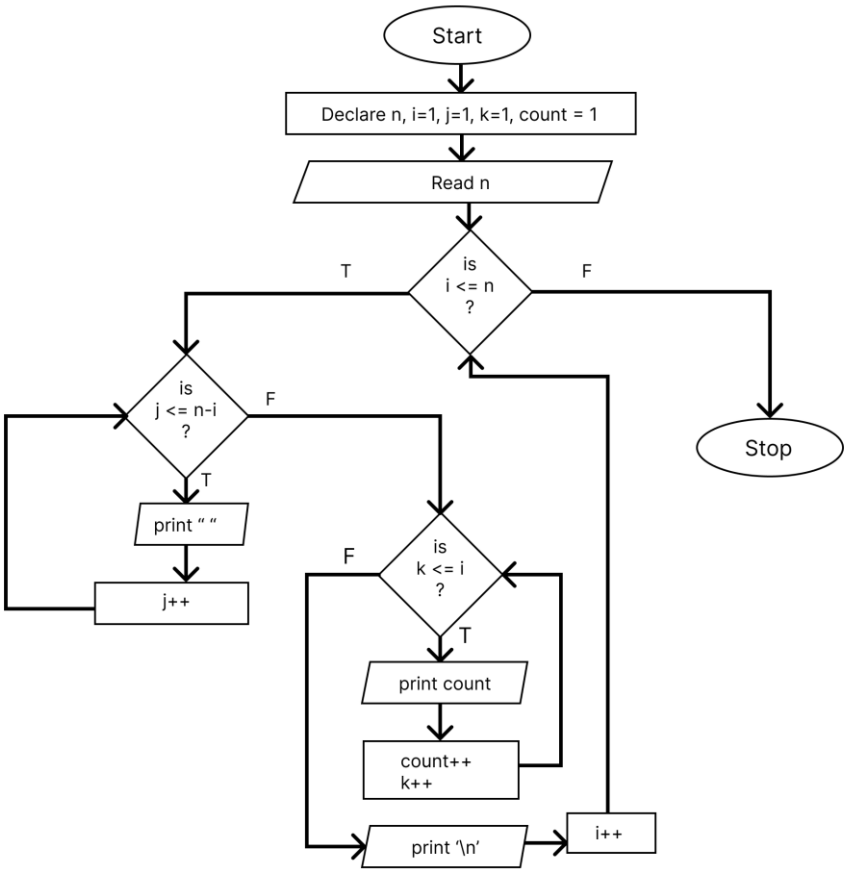
4 5 6

7 8 9 10

a) ALGORITHM

STEP 1: Start
STEP 2: Declare n, i=1, j=1, k=1, count = 1
STEP 3: Read n
STEP 4: If i <= n go to step 5 else go to step 8
STEP 5: If j <= n-i
print a white space
j++
STEP 6: If k <= i
print count
count++
k++
STEP 7: Print '\n'
STEP 8: i++ and go to step 4
STEP 9: Stop

b) FLOWCHART



c) PROGRAM

```
#include<stdio.h>

int main() {
    int n, i, j, k, count = 1;

    printf("Enter a number: ");
    scanf("%d", &n);

    for (i = 1; i <= n; i++) {
        for (j = 1; j <= n-i; j++) {
            printf(" ");
        }
        for (k = 1; k <= i; k++) {
            printf("%d ", count);
            count++;
        }
        printf("\n");
    }

    return 0;
}
```

d) OUTPUT

```
PS C:\Users\suresh\C programs\lab
Enter a number: 4
   1
  2 3
 4 5 6
7 8 9 10
```

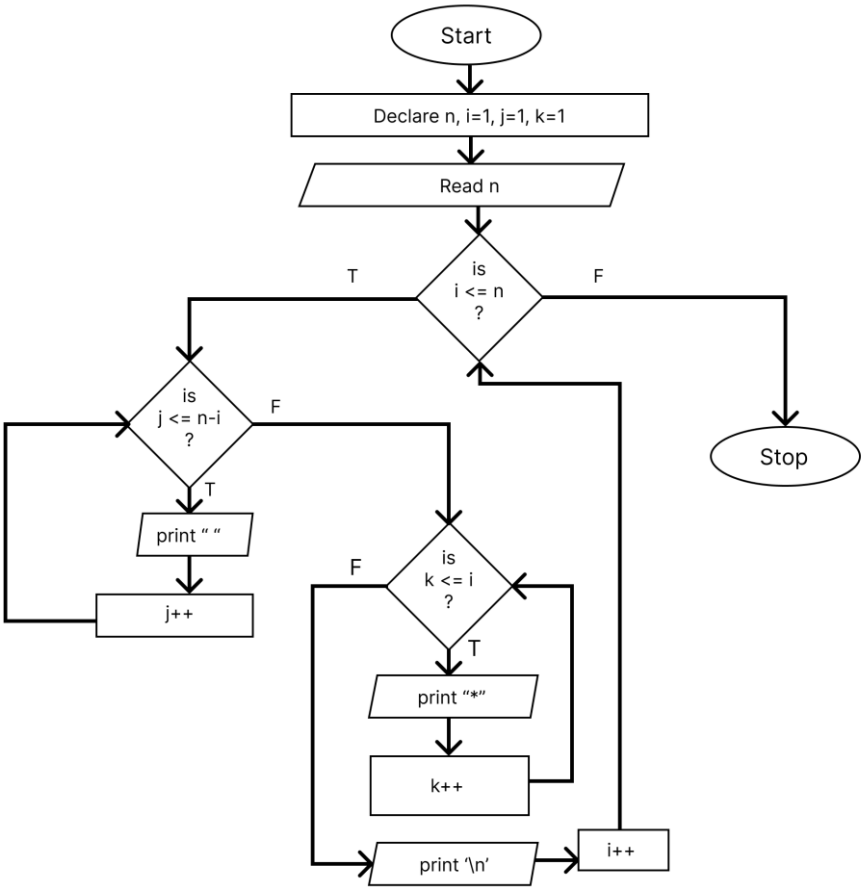
22. Write a program in C to make such a pattern like a pyramid with an asterisk.

```
  *

 * *

* * *

* * * *
```

a) ALGORITHM

STEP 1: Start
STEP 2: Declare n, i=1, j=1, k=1
STEP 3: Read n
STEP 4: If i <= n go to step 5 else go to step 8
STEP 5: If j <= n-i
print a white space
j++
STEP 6: If k <= i
print "*"
k++
STEP 7: Print '\n'
STEP 8: i++ and go to step 4
STEP 9: Stop

b) FLOWCHART



d) PROGRAM

```
#include <stdio.h>
int main() {
    int n, i, j, k;

    printf("Enter a number: ");
    scanf("%d", &n);

    for (i = 1; i <= n; i++) {
        for (j = 1; j <= n - i; j++) {
            printf(" ");
        }
        for (k = 1; k <= i; k++) {
            printf("* ");
        }
        printf("\n");
    }

    return 0;
}
```

d) OUTPUT

```
PS C:\Users\suresh\C programs\lab
Enter a number: 4
   *
  * *
 * * *
* * * *
```