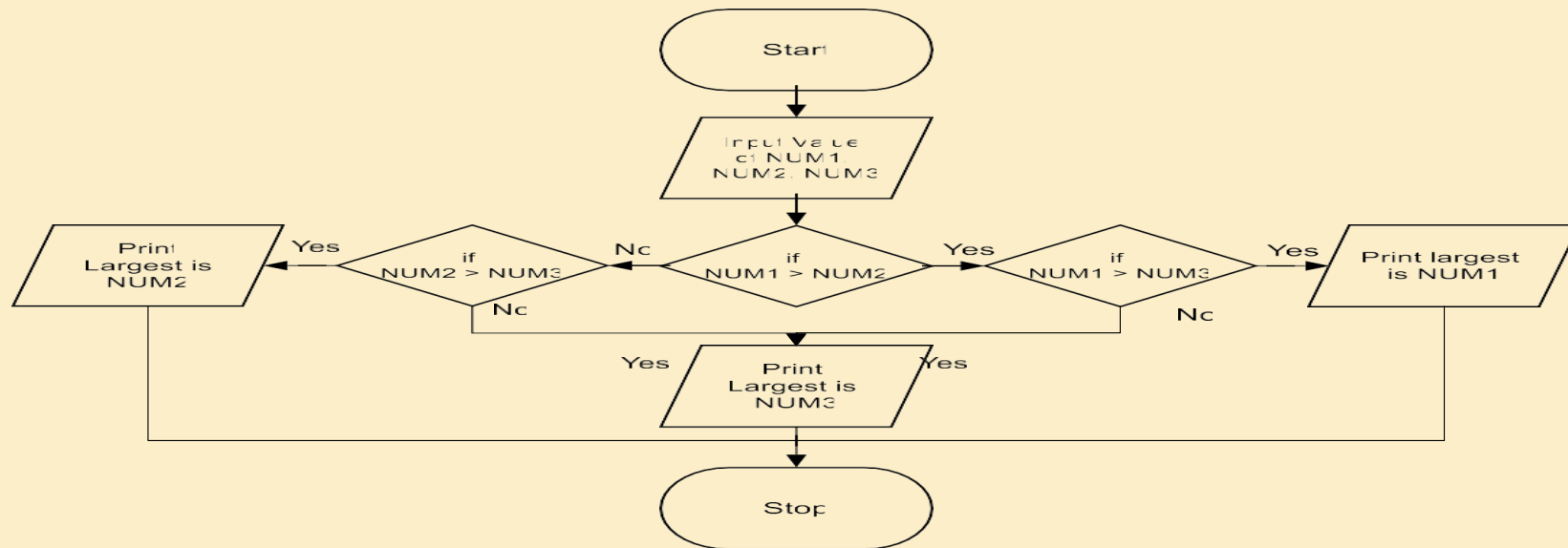


Control Statements

COMP101



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Introduction

Sometimes the program needs to be executed depending upon a particular condition. C++ provides the following statements for implementing the selection control structure.

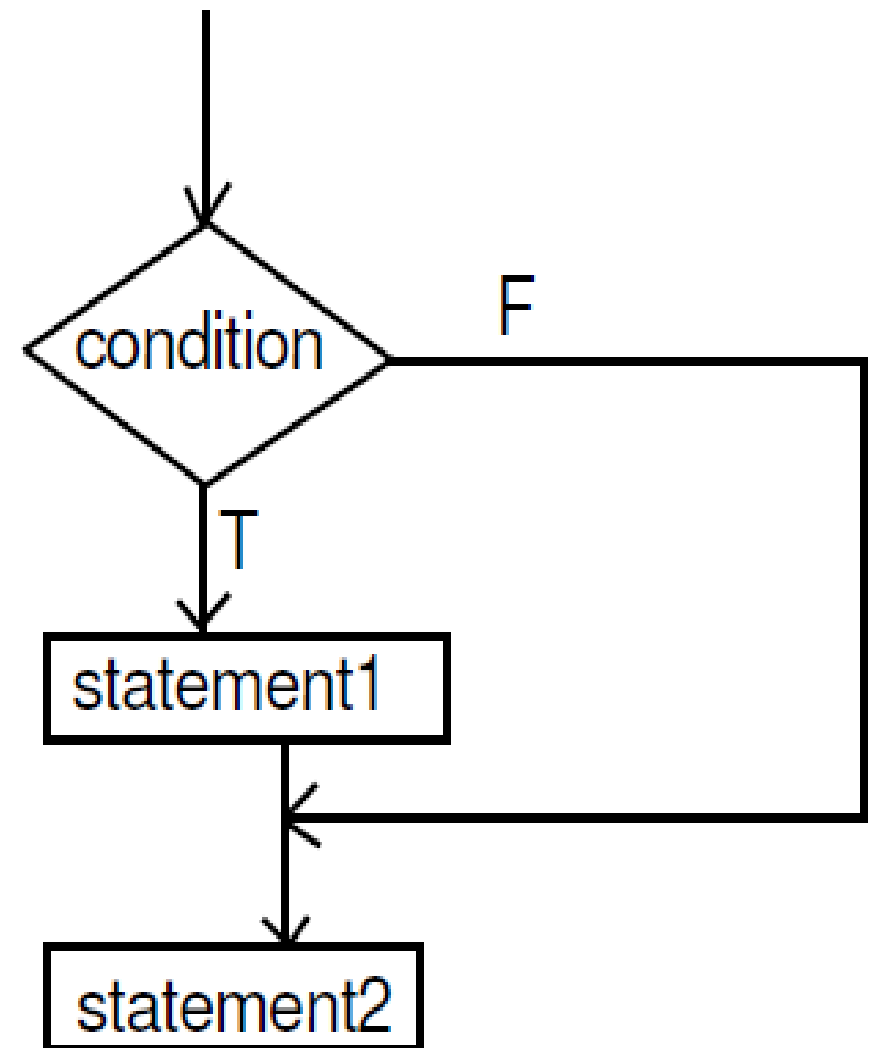
- 'if' statement
- 'if else' statement
- 'nested if' statement
- 'switch' statement

'if' statement

Syntax of the 'if' statement:

```
if (condition)
{
statement(s);
}
```

From the flowchart it is clear that if the 'if condition' is true, statement 1 is executed; otherwise it is skipped. The statement 1 may either be a single or compound statement.



Examples

1) Write C++ program to enter integer number and then check this number if great than 100?

```
#include <iostream>
using namespace std;
int main()
{
    int x;
    cout << "Enter a number: ";
    cin >> x;
    If( x > 100 )
    cout << "That number is greater than 100\n";
    return 0;
}
```

2) Write a program that asks the user to enter two integers, obtains the numbers from the user, then prints the larger number followed by the words "is larger." If the numbers are equal, print the message "These numbers are equal."

```
#include <iostream.h>
int main()
{
    int num1, num2; // declaration
    cout << "Enter two integers: "; // prompt
    cin >> num1 >> num2; // input to numbers
    if (num1 == num2 )
        cout << "These numbers are equal." << endl;
    if ( num1 > num2 )
        cout << num1 << " is larger." << endl;
    if ( num2 > num1 )
        cout << num2 << " is larger." << endl;
    return 0;
}
```

3) Write a program that inputs three integers from the keyboard and prints the sum, average, product, smallest and largest of these numbers. The screen dialogue should appear as follows:

Input three different integers: 13 27 14

Sum is 54

Average is 18

Product is 4914

Smallest is 13

Largest is 27

```
#include <iostream.h>

int main()
{
    int num1, num2, num3, smallest, largest; //
    declaration
    cout << "Input three different integers: ";
    // prompt
    cin >> num1 >> num2 >> num3; // input
    largest = num1; // assume first number
    is largest
    if ( num2 > largest ) // is num2 larger?
        largest = num2;
    if ( num3 > largest ) // is num3 larger?
        largest = num3;
```

```
smallest = num1; // assume first number
is smallest
if ( num2 < smallest )
    smallest = num2;
if ( num3 < smallest )
    smallest = num3;

cout << "Sum is " << num1 + num2 + num3
    << "\n Average is " << (num1 + num2 + num3) / 3;
    << "\n Product is " << num1 * num2 * num3;
    << "\n Smallest is " << smallest;
    << "\n Largest is " << largest << endl;
return 0;
}
```


4) Write a program that reads an integer and determines and prints whether it is odd or even. (Hint: Use the modulus operator. An even number is a multiple of two. Any multiple of two leaves a remainder of zero when divided by 2.)

```
#include <iostream.h>
int main()
{
    int num;
    cout << "Enter a number: ";
    cin >> num;

    if ( num % 2 == 0 )
        cout << "The number " << num << " is even." << endl;

    if ( num % 2 != 0 )
        cout << "The number " << num << " is odd." << endl;
    return 0;
}
```

5) Write a program that reads in two integers and determines and prints if the first is a multiple of the second. (Hint: Use the modulus operator.)

```
#include <iostream.h>
int main()
{
    int num1, num2;
    cout << "Enter two integers: ";
    cin >> num1 >> num2;

    if ( num1 % num2 == 0 )

        cout << num1 << " is a multiple of " << num2 << endl;

    if ( num1 % num2 != 0 )

        cout << num1 << " is not a multiple of " << num2 << endl;

    return 0;
}
```

Notes

H.W : Write a program that inputs a five-digit number, separates the number into its individual digits and prints the digits separated from one another by three spaces each. (Hint: Use the integer division and modulus operators.) For example, if the user types in 42339 the program should print

4 2 3 3 9.

if else' statement

if else' statement

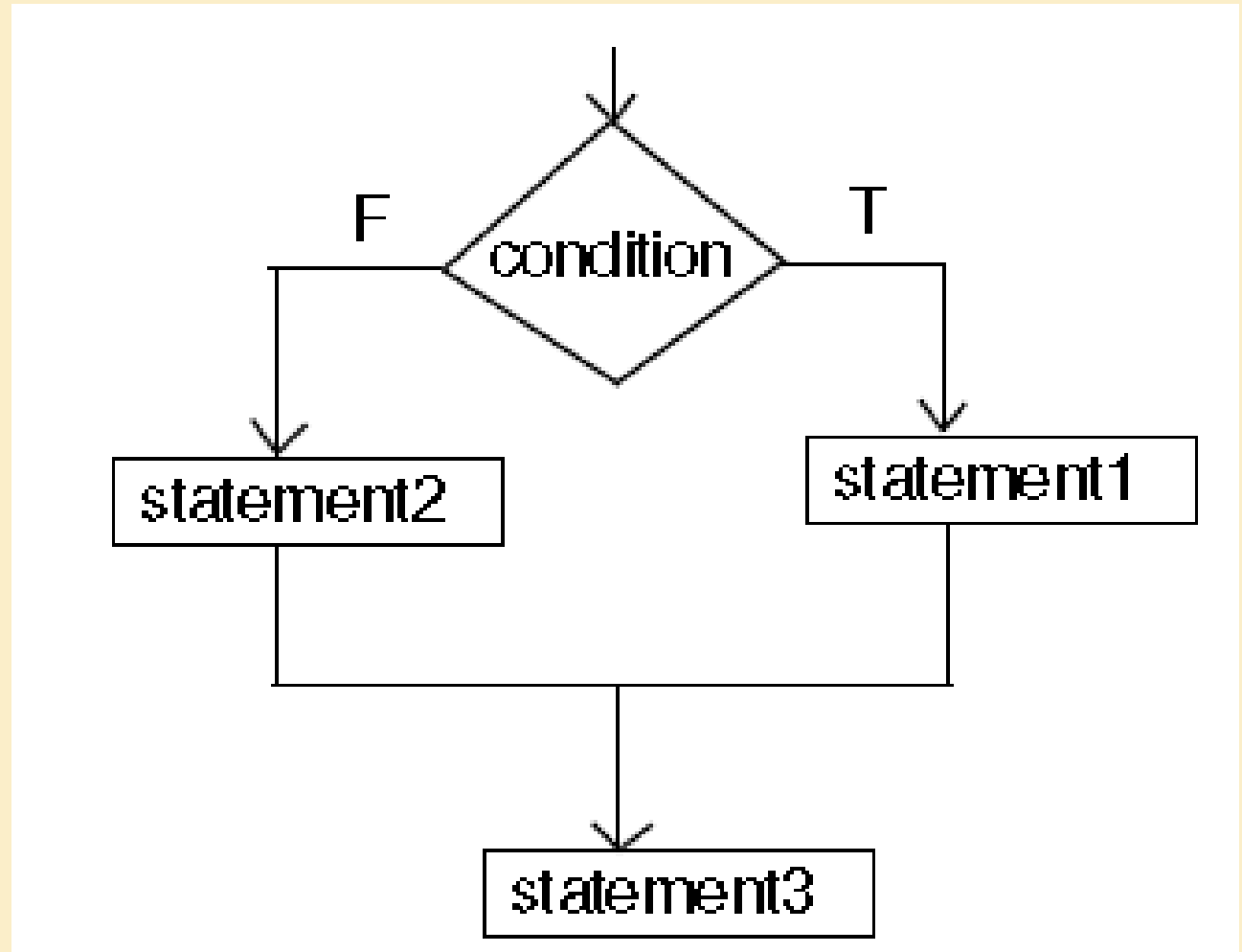
syntax of the if- else statement

if (condition)

statement1;

else

statement2;



From the above flowchart it is clear that the given condition is evaluated first. If the condition is true, statement1 is executed, followed by statement3. If the condition is false, statement2 is executed, followed by statement 3. It should be kept in mind that statement1 and statement2 can be single or compound statement.

Examples

7) Write a program that will print the greatest of two numbers.

```
# include <iostream.h>
void main ()
{
    int x, y;
    cout << "Enter two numbers" << "\n";
    cin >> x >> y ;
    if ( x > y)
        cout << "The bigger number is " << X;
    else
        cout << "The bigger number is" << y;
}
```

8) Write a program that will print the greatest of three numbers.

```
# include <iostream.h>
void main ()
{
    int x, y, z, l;
    cout << "Enter three numbers" << "\n";
    cin >> x >> y >> z;
    if (x > y )
        l = x ;
    else
        l = y ;

    if (l > z)
        cout << "The greatest number is " << l;
    else
        cout << "The greatest number is " << z;
}
```

9) Write a program that will enter two numbers and then print “Equal” if the first number is equal second one. Otherwise; print “not equal”.

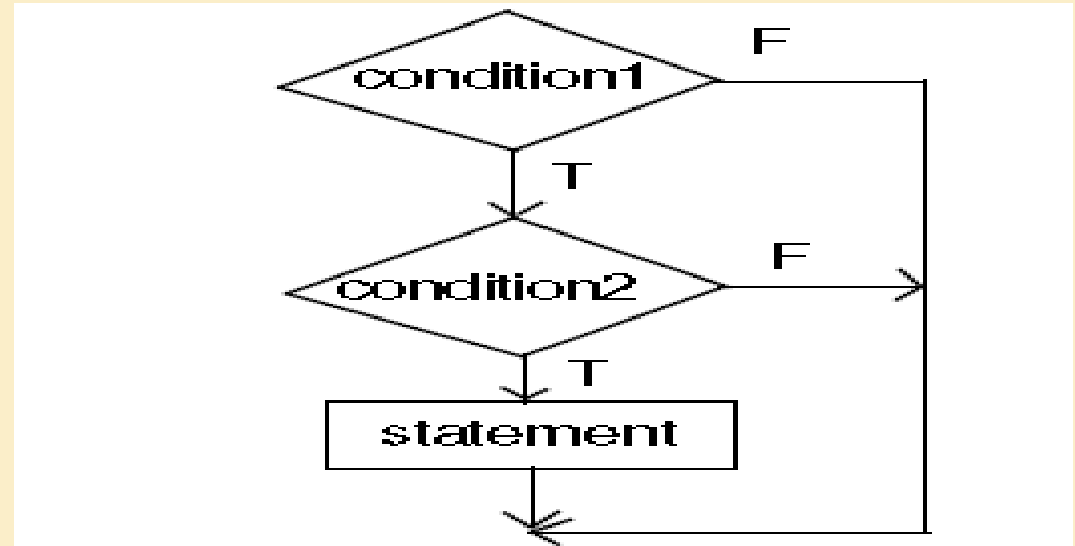
```
# include <iostream.h>
void main ()
{
    int x, y;;
    cout << “Enter two numbers” <<“\n”;
    cin >> x >> y;
    if (x == y )
        cout<<”Equal”;
    else
        cout<<”Not Equal”;
}
```

'Nested if' statement

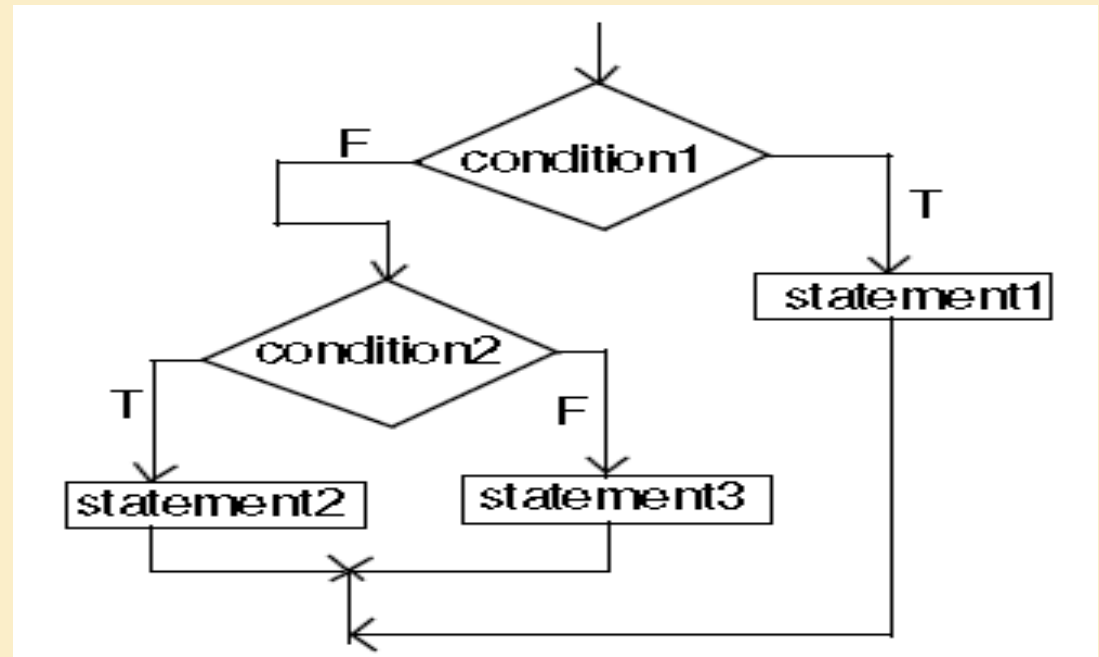
Syntax of the nested if statement

- (i) The if block may be nested in another if or else block. This is called nesting of if or else block.

```
If (condition1)
{
  if (condition2)
  {
    statement(s);
  }
}
```



- (ii) if (condition 1)
statement1;
else if (condition2)
statement2;
else
statement 3;



10) Write a program that will find the greatest of three numbers.

```
# include < iostream.h>
void main ( )
{
    int x, y, z;
    cout << "Enter three numbers" << "\n";
    cin >> x >> y >> z ;
    if ( x > y )

        {
            if (x >z)
                cout << "The greatest number is " << x;
            else
                cout << "The greatest number is " << z;
        }
    Else
    {
        if (y > z)
            cout << "The greatest number is " << y;
        else
            cout "The greatest number is " << z;
    }
}
```

Logical Expression

11) Write a program using nested if condition that will enter total marks and assign grades according to the following:

Mark Grade

≥ 90 A

≥ 80 and < 90 B

≥ 70 and < 80 C

≥ 60 and < 70 D

< 60 Fail

```
# include <iostream.h>
void main ( )
{
    int marks;

    cout << "Enter total marks" << "\n";
    cin >> marks;
    if (marks > = 90)
        cout << "A Grade";
    else if (marks > = 80)
        cout << "B Grade";
    else if (marks > = 70)
        cout << "C Grade";
    else if (marks > = 60)
        cout << "D Grade";
    else
        cout << "Failed";
}
```

12) A Program to check number is positive and how many digits number have.

```
#include<iostream>
```

```
using namespace std;
```

```
int main()
```

```
{int num;
```

```
cout<<" Enter Number btween 1 to 999 ";
```

```
cin>>num;
```

```
if(num>0)
{
    cout<<num<<" is a Positive Number "<<endl;
    if(num<10)
    {
        cout<<num<<" is a ONE digit Number ";
    }
    else if(num<100)
    {
        cout<<num<<" is a TWO digit Number ";
    }
    else if(num<1000)
    {
        cout<<num<<" is a Three digit Number ";
    }
}
return 0;}
```

13) H. W: A General Service company hired you to write a program to compute the total charge for the services rendered to their client. The program will ask first if there is a material needed or not. If there is, the program will ask if what material is needed. The program will then ask for the cost of that materials entered and the number of hours of the services rendered. Finally, the program will compute for the labour cost and the total charge.

Assumption:

Rate \$45.00 per hour

Computation:

Labour : Rate * hours work

Total Charge : Labour + Cost of Materials

Materials:

1.) Electricals

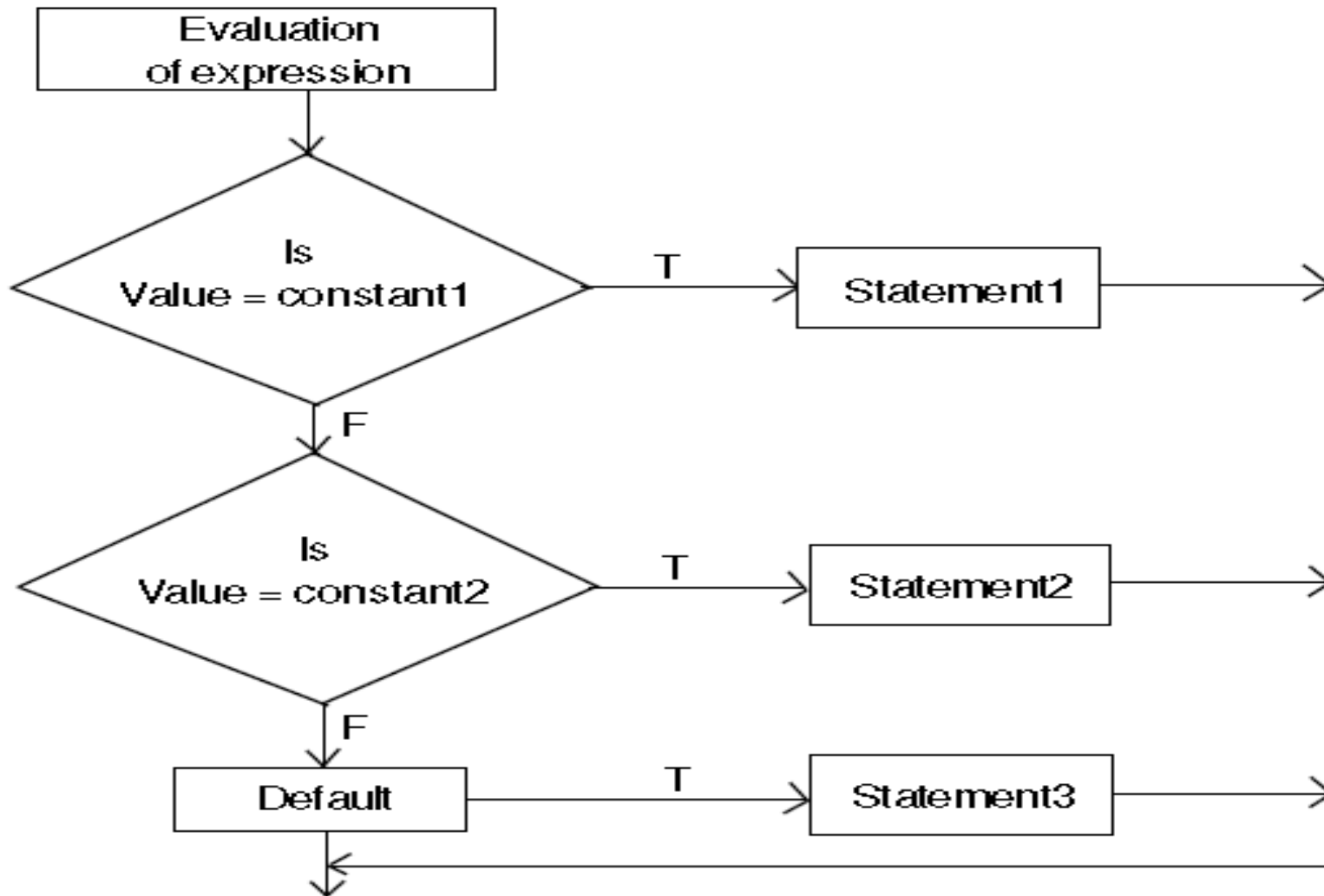
2.) Electronics

3.) Construction

4.) Sanitary

Switch statement

The execution of switch statement begins with the evaluation of expression. If the values of expression matches with the constant then the statements following this statement execute sequentially till it executes break. The break statement transfers control to the end of the switch statement. If the value of expression does not match with any constant, the statement with default is executed.



14) Write a program in C++ to enter letter and then check it if vowel or not vowel.

```
#include <iostream.h>
void main ( )
{
    char ch;
    cout << "Enter a character";
    cin >> ch;
    switch (ch)
    {
        case 'a' : cout << "vowel a";
        break ;
        case 'e' : cout << "vowel e";
        break ;
        case 'o' : cout << "vowel o";
        break ;
        case 'i' : cout << "vowel i";
        break ;
        case 'u' : cout << "vowel u";
        break;
        default : cout << "not a vowel";
    }
}
```

The program needs the break statement to confine execution to particular portion of switch. If the break statement is removed from the above program then it starts executing the statements associated with case labels specified till it comes across either the break statement or end of switch statement. The above switch statement can be written as:

The program needs the break statement to confine execution to particular portion of switch. If the break statement is removed from the above program then it starts executing the statements associated with case labels specified till it comes across either the break statement or end of switch statement. The above switch statement can be written as:

```
switch (ch)
{
    case 'a' :
    case 'A' : cout << "vowel a";
    case 'e' :
    case 'E' : cout << "vowel e";
    case 'i' :
    case 'I' : cout << "vowel i";
    break;
    case 'o' :
    case 'O' : cout << "vowel o";
    break;
    default : cout << "not a vowel";
}
```

The input character either in small letter or capital will be accepted.

15) Write a program that will accept a one character grade code and depending on what grade code is input, display the Basic salary according to the table given below:

Grade	Basic salary
A	15000
B	12000
C	10000
D	9000

```
# include < iostream.h>
void main ( )
{
    char grade;
    cout << "Enter Grade" << "\n";
    cin >> grade;
    switch (grade)
    {
        case 'A' : cout << "Basic salary is 15000";
        break;
        case 'B' : cout << "Basic salary is 12000;";
        break;
        case 'C' : cout << "Basic salary is 10000";
        break;
        case 'D' : cout << "Basic salary is 9000";
        break;
        default : cout << "Invalid grade code";
    }
}
```

1) Identify the error(s), if any, in the following programs and write them in correct format.

a)

```
# include <iostream.h>
void main ( )
    int a, b;
    cin << b; <<a;
    if (a > b) Max = a
    }
```

b)

```
# include <iostream.h>
void main( )
{
    int x, y;
    cin >> x ;
    for (y = 0 ; y < 10, y ++ )
    if x == y
        cout << y + x ;
    else
        cout >> y;
}
```

2) What will be the output of the following program segments.

a)

```
cin >> x;
if ( x == 10 )
    cout << "x is 10" ;
else
    cout << " x is not 10" ;
```

if the input given is
(i) 11 (ii) 10

b)

```
int year ;
cin >> year ;
if (year % 100 == 0)
    if (year % 400 == 0)
        cout << "Leap" ;
    else
        cout << "Not century year" ;
```

if the input is
(i) 2000 (ii) 1971

c)

```
int year ;
cin >> year ;
if (year % 100 == 0)
    {
        if (year % 400 == 0)
            cout << "Leap" ;
    }
else
    cout << "Not century year" ;
```

if the input given is
(i) 2000 (ii) 1971

3) Write equivalent switch statement for the following:

```
if (code == 'a')
    cout << "season is summer" ;
else
    if (code == 'r')
        cout << "season is rainy" ;
    else
        if (code == 'w')
            cout << "season is winter";
        else
            cout << "wrong code" ;
```

4) What would be the value of c?

```
{
    int c;
    float a, b;
    a = 245.05;
    b = 40.02 ;
    c = a + b;
}
```

a) 285.09 b) 2850 c) 285 d) 285.0

3) Write equivalent switch statement for the following:

```
if (code == 'a')
    cout << "season is summer" ;
else
    if (code == 'r')
        cout << "season is rainy" ;
    else
        if (code == 'w')
            cout << "season is winter";
        else
            cout << "wrong code" ;
```

4) What would be the value of c?

```
{
    int c;
    float a, b;
    a = 245.05;
    b = 40.02 ;
    c = a + b;
}
```

a) 285.09 b) 2850 c) 285 d) 285.0

5) What would be the value of i and k?

```
{  
    int i, j, k ;  
    j = 5 ;  
    i = 2 * j / 2 ;  
    k = 2 * (j/2) ;  
}
```

a) i=4, k=4 b) i=4, k=5 c) i=5, k=4 d) i=5, k=5

6) What is the output of the following program?

```
void main ( )  
{  
    int x = 5, y = 6, z = 7;  
    if (x < y + z)  
        cout << "Hello \n" ;  
    else  
    {  
        cout << "How \n" ;  
        cout << "Are you \n";  
    }  
}
```

a) Hello b) How c) Are you d) None of the above

7) Consider the program fragment.

```
switch (choice)  
{  
    case 'W' : cout << "WHITE" ; case 'R' : cout << "RED" ; case 'B' : cout <<  
        "BLUE" ; default : cout << "error" ; break ;  
}
```

What would be the output if choice = 'R'?

a) RED b) RED BLUE error c) RED error d) WHITE RED BLUE