

## Control Statements:-

Conditional expressions are mainly used for decision making. C++ provides multiple selection structures: if, if/else, else if, nested if and switch.

### 1. The Single If Statement Structure:

The IF statement is used to express conditional expression. If the given condition is true then it will execute the statements; otherwise it will execute the optional statements.

General Form of single-selection If statement:

```
if ( expression or condition )
```

```
statement1 ;
```

Example 1:

```
if ( avrg >= 3.5 )
```

```
cout << "good";
```

Example 2:

```
if ( x > 0.0 )
```

```
sum += x;
```

Example 3:

```
cin >> num;
```

```
if ( num == 0 )
```

```
zcount = zcount + 1;
```

Example 1

Write a C++ program to read any two numbers and print the largest value of it:

```
#include<iostream.h>
```

```
void main( )
```

```
{
```

```
Float x,y;
```

```
Cout<<"Enter any two numbers\n";
```

```
Cin>>x>>y;  
If (x>y)  
Cout << "largest value is"<<x<<endl;  
}
```

## 2. The Single Block If Statement Structure :

The block IF statement are enclosed in ({} and ()) to group declaration and statements into a compound statement or a block. These blocks are always considered as a single statement. The structure is:

General Form of single block selection If statement:

```
if ( expression or condition )  
{  
statement1 ;  
statement2 ;  
statement3 ;  
}
```

### Example 2

Write a C++ program to read a number and check if it's positive, if it's so print it, add it to a total, and decrement it by 2:

```
#include<iostream.h>  
  
void main( )  
{  
int num, total=0;  
cin >> num;  
if ( num >= 0 )  
{   cout << num <<" is a positive";
```

```
total += num;
```

```
num = num - 2; } }
```

### 3. The If/else Statement Structure:

The IF structure is

In this case, either of the two statements are executed depending upon the value of the expression. Note that there is a semicolon after each of the statement but not after the IF expression. Note that the else statement without braces leads to confusion so:

```
If (i>j)
```

```
{
```

```
    If (a>b)
```

```
temp=a;
```

```
}
```

```
Else
```

```
temp=b;
```

Example 1:

```
cin >> value;
```

```
if ( value >= 0 )
```

```
cout << "positive";
```

```
else
```

```
cout << "negative";
```

General Form of If/else statement:

```
if ( expression)
```

```
statement1 ;
```

```
else statement2 ;
```

Example 2:

```
cin >> num1 >> num2;
```

```
if ( num1 > num2 )
```

```
cout << num1;
```

```
else
```

```
cout << num2;
```

### Example 3

Write a C++ program to read a student degree, and check if it's degree greater than or equal to 50, then print pass, otherwise print fail:

```
#include<iostream.h>
```

```
void main( )
```

```
{
```

```
int degree;
```

```
cin >> degree;
```

```
if (degree >= 50 )
```

```
cout << "pass";
```

```
else
```

```
cout << "fail";
```

```
}
```

### Example 4

Write a C++ program to read a number, and check if it's even or odd:

```
#include<iostream.h>
```

```
void main( )
```

```
{
```

```
int num;
```

```
cin >> num;
```

```
if ( num % 2 == 0 )
```

```
cout << "even";  
else  
cout << "odd";  
}
```

#### **4. Else if Statements:**

General Form of else if statement:

```
if ( expression or condition 1 )  
    statement1 ;  
else if ( expression or condition 2 )  
    statement2 ;  
else if ( expression or condition 3 )  
    statement3 ;  
else if ( expression or condition n )  
    statement-n ;  
else    statement-e ;
```

Example 1:

```
if ( value == 0 )  
cout << "grade is A";  
else if ( value == 1 )  
cout << "grade is B";  
else if ( value == 2 )  
    cout << "grade is C";  
else    cout << "grade is X"; }
```

Example 5

Write a C++ program to read a number, and print the day of the week:

```
#include<iostream.h>

void main( )

{

int day;

cin >> day;

if ( day == 1 )

cout << "Sunday";

else if (day == 2 )

cout << "Monday";

else if (day == 3 )

cout << "Tuesday";

else if (day == 4 )

cout << "Wednesday";

else if (day == 5 )

cout << "Thursday";

else if (day == 6 )

    cout << "Friday";

else if (day == 7 )

cout << "Saturday";

else

cout << "Invalid day number";

}
```

#### Example 6

Write C++ program to compute the value of Z according to the following equations:

$$x + 5 : x < 0$$

```

Z = cos(x) + 4 : x = 0
√ x : x > 0

#include<iostream.h>

void main( )

{

int Z, x;

cout << "Enter X value \n";

cin >> x;

if ( x < 0 )

    Z= x + 5;

else if ( x == 0 )

    Z= cos(x) + 4;

Else

    Z= sqrt(x);

cout << "Z is " << Z;

}

```

**5. Nested If Statements:**

Some of the samples of NESTED if-else constructions are shown below:

|   |  |  |
|---|--|--|
| <pre> If (exp.)     { Statements } Else     { Statements } </pre> | <pre> If (exp.) {     If (exp.)         {Statements}     Else         { Statements} } Else     {Statements} </pre> | <pre> If (exp.) {     If (exp.)         {Statements}     Else         { Statements} } Else { If (exp)   {Statements}   Else   {Statement} } </pre> |
|---|--|--|

### Example 7

Write C++ program to find a largest value among three numbers:

```
#include<iostream.h>

void main( )
{
#include<iostream.h>

void main( )
{
Float x,y,z;

Cout<<"Enter any two numbers\n";

Cin>>x>>y,z;

If (x>y) {

If (x>z)

Cout << "largest value is"<<x<<endl;

Else

Cout << "largest value is"<<z<<endl;

}

Else If (y>z)

Cout << "largest value is"<<y<<endl;

Else

Cout << "largest value is"<<z<<endl;

}
```

#### **1. The Switch Selection Statement (Selector):**

The switch statement is a special multi way decision maker that tests whether an expression matches one of the number of constant values, and braces accordingly.



General Form of Switch Selection statement:

```
switch ( selector )  
{  
  case label1 :  
    statement1 ; break;  
  case label2 :  
    statement2 ; break;  
  case label3 :  
    statement3 ; break;  
  :  
  case label-n :  
    statement-n ; break;  
  default :  
    statement-e ; break;  
}
```

Example 1:

```
switch (value)  
{  
  case 0:  cout << "grade is A";  
  break;  
  case 1:  cout << "grade is B";  
  break;  
  case 2:  cout << "grade is C";  
  break;  
  default: cout << "grade is X";
```

```
break;
```

```
}
```

### Example 1

Write C++ program to read integer number, and print the name of the day in a week:

```
#include<iostream.h>
```

```
void main( )
```

```
{
```

```
int day;
```

```
cout << "Enter the number of the day \n";
```

```
cin >> day;
```

```
switch (day)
```

```
{
```

```
case 1: cout << "Sunday"; break;
```

```
case 2: cout << "Monday"; break;
```

```
case 3: cout << "Tuesday"; break;
```

```
case 4: cout << "Wednesday"; break;
```

```
case 5: cout << "Thursday"; break;
```

```
case 6: cout << "Friday"; break;
```

```
case 7: cout << "Saturday"; break;
```

```
default: cout << "Invalid day number"; break;
```

```
}
```

```
}
```

### Example 2

Write C++ program to read two integer numbers, and read the operation to perform on these numbers:

```
#include<iostream.h>

void main( )

{

int a, b;

char x;

cout << “Enter two numbers \n”;

cin >> a >> b;

cout << “+ for addition \n”;

cout << “- for subtraction \n”;

cout << “* for multiplication \n”;

cout << “/ for division \n”;

cout << “enter your choice \n”;

cin >> x;

switch ( x )

{

case ‘+’:  cout << a + b;

break;

case ‘-’:  cout << a - b;

break;

case ‘*’:  cout << a * b;

break;

case ‘/’:  cout << a / b;

break;

default:  break;

}

}
```

```
}
```

## 2. Nested Switch Selection Statement:

General Form of Nested Switch Selection statement:

```
switch ( selector1 )  
{  
  case label1 :  statement1 ; break;  
  case label2 :  statement2 ; break;  
  case label3 :  switch ( selector2 )  
  {  
    case label1 :  statement1 ; break;  
    case label2 :  statement2 ; break;  
    :  
  }  
  case label-n :  statement-n ; break;  
  default :  statement-e ; break;  
}
```

### Example 3

Write C++ program to read integer number, and print the name of the computerized department:

```
#include<iostream.h>  
  
void main( )  
{  
  int i,j;  
  cout << "Enter the number for the department name \n";  
  cin >> i>>j;
```

```

switch (i)
{
case 1:  cout << "Software Engineering Department"; break;
case 2:  cout << "Control and computers Department"; break;
case 3:  cout << "Computer Sciences Department";
cout<<"Enter the no. of branch";

switch(j)
{
case 1:  cout << "Software"; break;
case 2:  cout << "Information system"; break;
case 3:  cout << "Security";
case 4:  cout << "AI";
}
default: cout << "Invalid day number"; break;
}
}

```

### 3. Conditional Statement:

General Form of Conditional statement:

( condition ? True : False )

Example 1: cin >> value;

cout << (value >= 0 ? "positive" : "negative");

Example 2: cin >> x >> y;

cout << ( x < y ? -1 : (x == y ? 0 : 1) );

Example 4

Write C++ program to read integer number, and print if its even or odd:

```
#include<iostream.h>

void main( )

{

int value;

cout << "Enter the number \n";

cin >> value;

cout<<(value%2==0?"even":"odd");

}
```

## WORK SHEET (3)

### Control Statements

Q1: Write C++ program to read two integer numbers then print “multiple” or “not” if one number is a multiple to another number.

Q2: Write C++ program to read integer number and print the equivalent string.

e.g:

0 → Zero

1 → One

2 → Two

:

Q3: Write C++ program to read a score of student and print the estimation to refer it.

e.g:

100 - 90 → Exultant

89 - 80 → Very good

79 - 70 → Good

69 - 60 → Middle

59 - 50 → Accept

49 - 0 → Fail

Q4: Write C++ program to represent a simple nested case (selector).

Q5: Write C++ program to compute the area of circle if the radius  $r=2.5$ .

Note: area of circle is  $r * r * \pi$ ,  $\pi$  is 3.14

Q6: Write C++ program to read an integer number and check if it is positive or negative, even or odd, and write a suitable messages in each case.

Q7: Write a program to read 3 numbers, and write the largest and smallest numbers.

Q8: Write C++ program to read an integer from 1 to 12, and print out the value of the corresponding month of the year.

Q9: Write C++ program to reads a character and print if it is digit (0..9), capital letter (A,B, ... ,Z), small letter (a, b, ... ,z), special character ( +, !, @, #, , {, >, ... ).

Q10: Write C++ program to read  $x$  and compute the following:

$$Y = \begin{cases} \frac{x^2 + 5x - 20}{\sqrt{2x}} & \text{if } x > 0 \\ 0 & \text{if } x = 0 \\ x^2 + (5x)^2 - 10 & \text{if } x < 0 \end{cases}$$

Q11: Write C++ program to read 5 numbers and determine if the numbers sorted ascending or not.

Q12: Write C++ program to read two integer numbers, and read the operation to perform on these numbers.

Q13: Write a program to read  $X$  and print  $\sin X$  if  $X>0$ , square root  $X$  if  $X<0$  and absolute  $X$  if  $X/2$  is integer.