# LAB 4: Decision Making

## OBJECT

To study programming control constructions used for decision making in C.

## THEORY

In C, a program may require a logical test on the basis of which the program statement will execute. This decision is based on the truth or falsity of a statement called as *Condition*.

There are three major decision making structures the if statement, if-else statement and switch case. In continuation of these structures, we shall also see a decision making operator called as *conditional operator* (? :).

### The *if* Statement:

The if statement enables you to test for a condition (such as whether two variables are equal) and branch to different parts of your code, depending on the result or the conditions with relational and logical operators. The simplest form of if statement is:

***if (expression)***
***statement;***

In this form, the *statement* will be executed only if the *expression* is evaluated to a non zero value (i.e. if the expression is true).

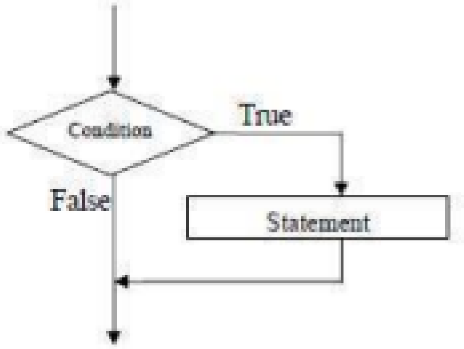

**Fig: If statement flow chart**

```
/* if statement */
void main(void)
{

    int number =
    5; int guess;
    clrscr();
    printf("I am thinking of a number between 1
    and 10\n"); printf("Enter your guess, please
    \n"); scanf("%d",&guess);
    if (guess == number)
    {
        printf("Incredible, you are correct\n");
    }

    getche();
}
```

The "= =" is called a relational operator. Relational operators, ==, !-, >, >=, <, and <=, are used to compare two operands. The program works, but it needs some improvements. If the user enters 5 as a choice, he gets back a nice message, "Incredible, you are correct". But what happens if the user puts in an incorrect choice? Nothing. No message, no suggestions, nothing.

### The if-else Statement:

The *if* single-selection statement performs an indicated action only when the condition is true; otherwise the action is skipped. The if-else double-selection statement allows the programmer to specify an action to perform when the condition is true and a different action to perform when the condition is false. The simplest form of if-else statement is:

***if (expression)***

***{***
  ***statements;***
***}***
***else***
***{***
  ***statements;***
***}***

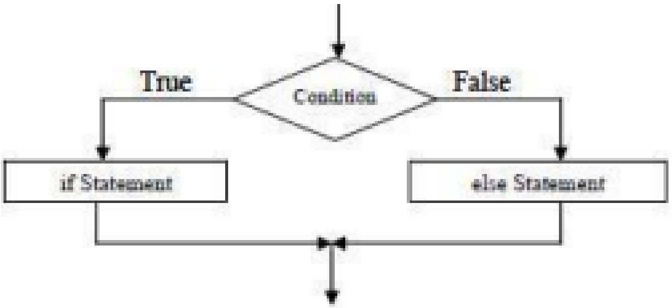

***Fig: if else flow control***

***An Example:***

```
                                                        /*
                                         if-else */ void
main (void) /* Defining main function*/
 {
   int grade;
   clrscr(); /* Clears previous contents
   of screen*/ printf( Enter your grade );
   scanf( %d ,&grade);
   if ( grade >= 60 )
   printf("Passed");
   else
   printf("Failed");
   getch();
 }
```

Another example of the if else statement is:

```
       /*if..else */
void main(void)
{

int number =
5; int guess;
clrscr();
```

```
    printf("I am thinking of a number between 1
    and 10\n"); printf("Enter your guess,
    please\n"); scanf("%d",&guess);
    if (guess == number)
     {
        printf("Incredible, you are correct\n");
     }
   else
     {
        printf("Sorry, try again\n");
     }
    getch();
}
```

**EXERCISE**

1. Write a program using if else if statements that gets an operator(+,-,*,/) and two operands (num1,num2) from the user and depending on the operator entered perform the operation.

2. Write a mark sheet program using if else if statements that gets marks of five subjects from the user, calculates percentage and grade obtained by the user.

3. Write a program using if else statement that input your age and display your age group e.g, young or old accordingly

Answer no 1

```
#include <stdio.h>

int main() {
    char operator;
    double num1, num2;

    printf("Enter an operator (+, -, *, /): ");
    scanf(" %c", &operator);

    printf("Enter two numbers: ");
    scanf("%lf %lf", &num1, &num2);

    if (operator == '+')
        printf("Result: %.2f\n", num1 + num2);
    else if (operator == '-')
        printf("Result: %.2f\n", num1 - num2);
    else if (operator == '*')
        printf("Result: %.2f\n", num1 * num2);
    else if (operator == '/')
        printf("Result: %.2f\n", num1 / num2);
    else
        printf("Invalid operator.\n");

    return 0;
}
```

Answer no 2

```
#include <stdio.h>



int main() {

    int marks[5], total = 0;

    float percentage;

    char grade;
```

```
printf("Enter marks of 5 subjects: ");
for (int i = 0; i < 5; i++) {
    scanf("%d", &marks[i]);
    total += marks[i];
}

percentage = (total / 5.0);

if (percentage >= 90) {
    grade = 'A';
} else if (percentage >= 80) {
    grade = 'B';
} else if (percentage >= 70) {
    grade = 'C';
} else if (percentage >= 60) {
    grade = 'D';
} else {
    grade = 'F';
}
```

```
    printf("Total Marks: %d\n", total);
    printf("Percentage: %.2f%%\n", percentage);
    printf("Grade: %c\n", grade);

    return 0;
}
```

Answer no 3

```
#include <stdio.h>

int main() {
    int age;

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

    if (age < 13) {
        printf("You are a Child.\n");
    } else if (age >= 13 && age < 20) {
        printf("You are a Teenager.\n");
    } else if (age >= 20 && age < 60) {
        printf("You are an Adult.\n");
    } else {
        printf("You are an Elderly.\n");
    }

    return 0;
}
```