

Programming in C

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Control Structures:

Control Statements:

- Control statements are used to alter the flow of execution of a program
- We do not need to use control statements to execute the instructions sequentially
- However, in practice, we may have to perform certain tasks if one condition is true and an entirely different task in another situation
- Similarly, there may be a situation to perform repeated actions or skip some instructions
- This kind of situation is dealt using control statements

Types of Control Statement:

1. Decision control statements
2. Loop control statements
3. Switch statement
4. Break statement
5. Continue statement
6. Go to statement

1. Decision Control Statements:

- We may have to perform certain task depending upon on whether a condition is true or false i.e. we may have to perform certain tasks if one condition is true and an entirely different task in another situation
- This type of situation is performed using decision control statements
- Decision control statements are used in program when the decision is to be made.
- Classified into
 1. if statement
 2. if else statement
 3. nested if else statement
 4. else if ladder

if statement :

- if statement is used together with an expression called test condition
- if statement evaluates the test condition first and if the condition is true the statements inside its block is executed
- if the condition is false, then the statement inside the if block is not executed and program control is passed to the statement immediately following the if block

if statement :

- Syntax:

if (test expression)

{

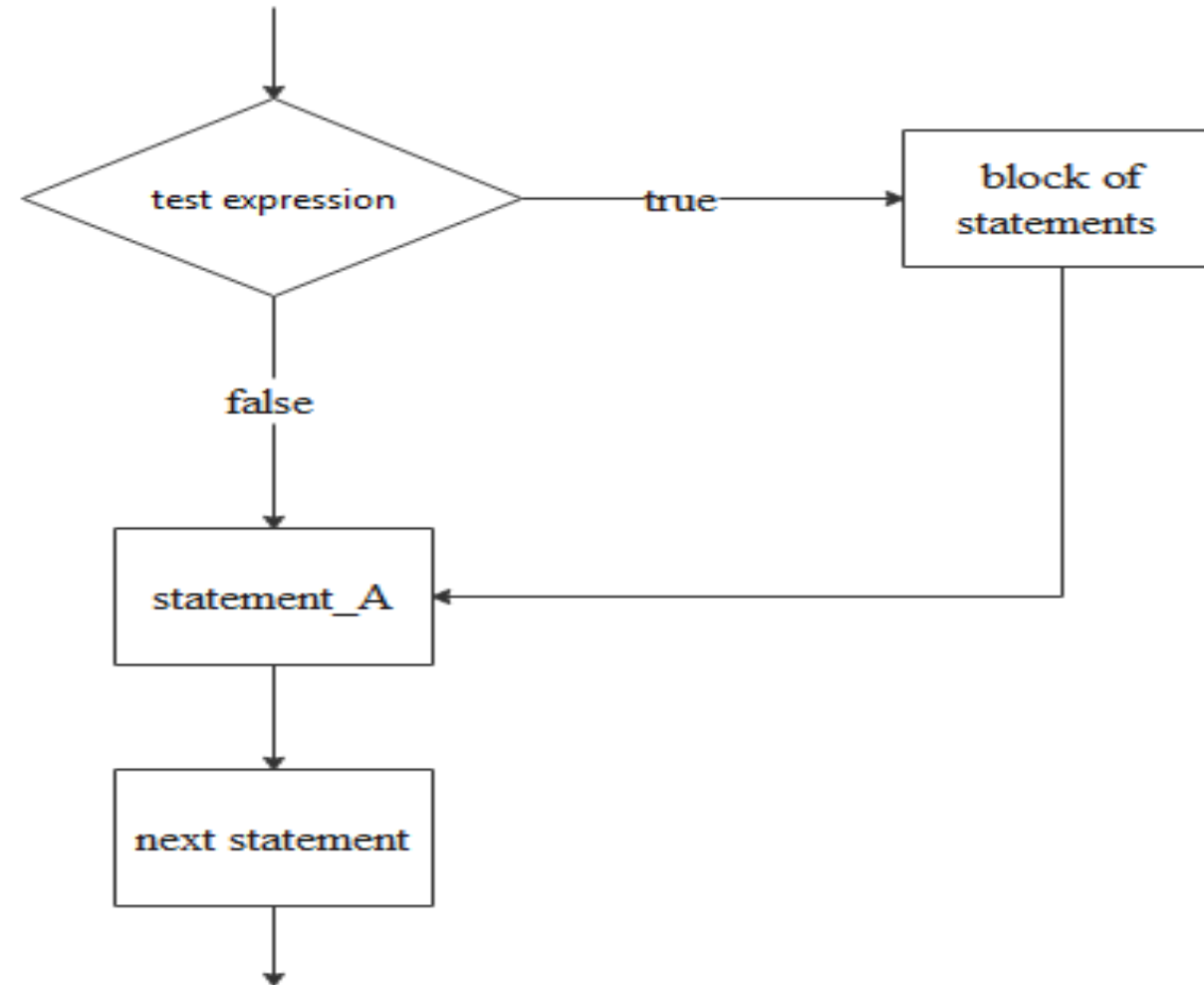
statement / block of statement ;

}

statement_A ;

if statement:

Flowchart:



Example: Write a program to check if a number is positive.

Algorithm:

Step 1 : start

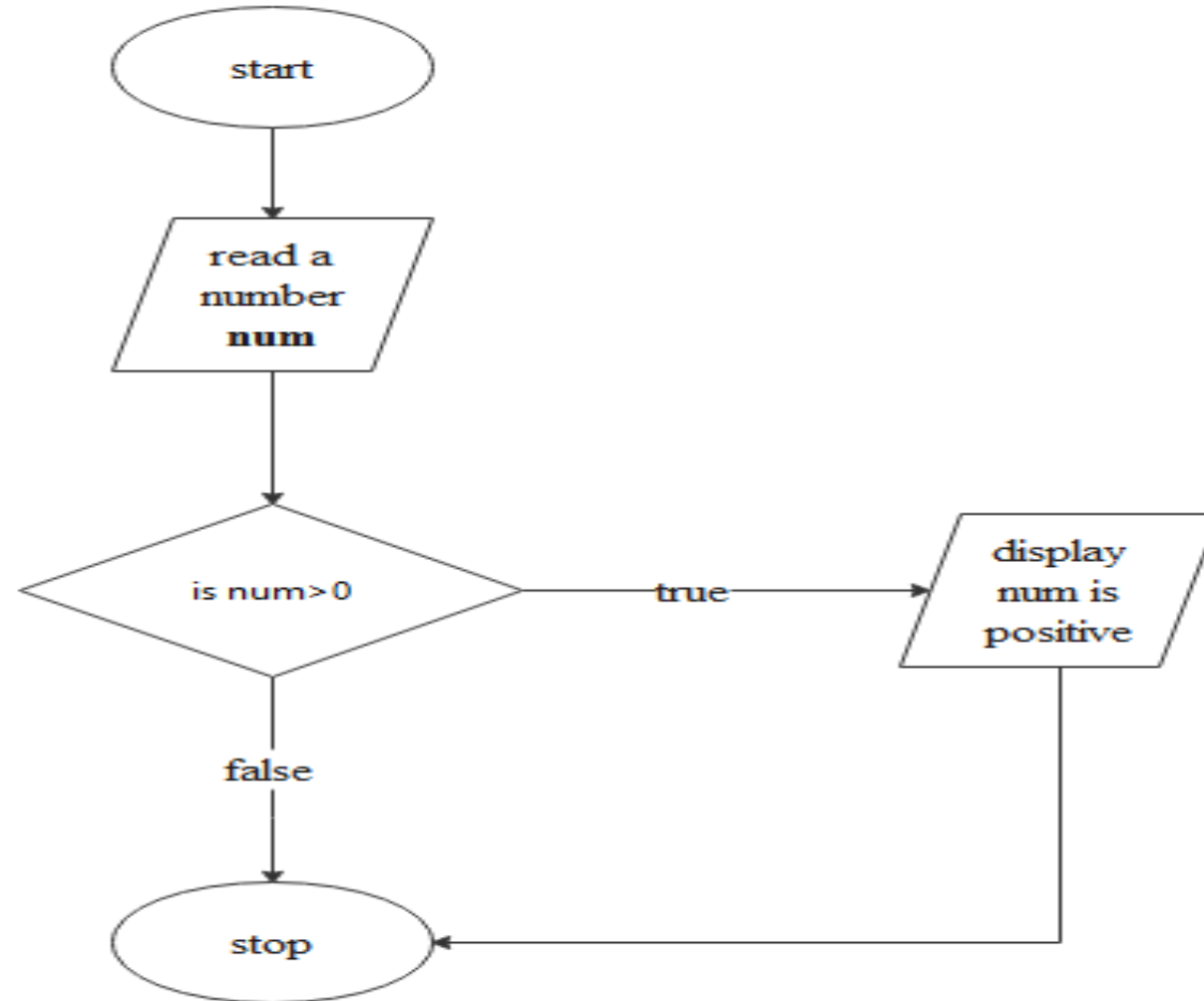
Step 2 : read a number

Step 3 : check if number read in step 2 is greater than zero

Step 4 : if test expression in step 3 is true display message
 “ number is positive”

Step 5: stop

Flowchart:



Write a program to check if a number is positive.

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

int main()
{
    int num;
    printf("Enter a number : ");
    scanf("%d",&num);
    if ( num > 0)
    {
        printf("\n%d is positive",num);
    }
    getch();
    return 0;
}
```

Classwork:

1. Write a program to check if the input number is greater than 15 and exactly divisible by 5 and 3.

if else statement:

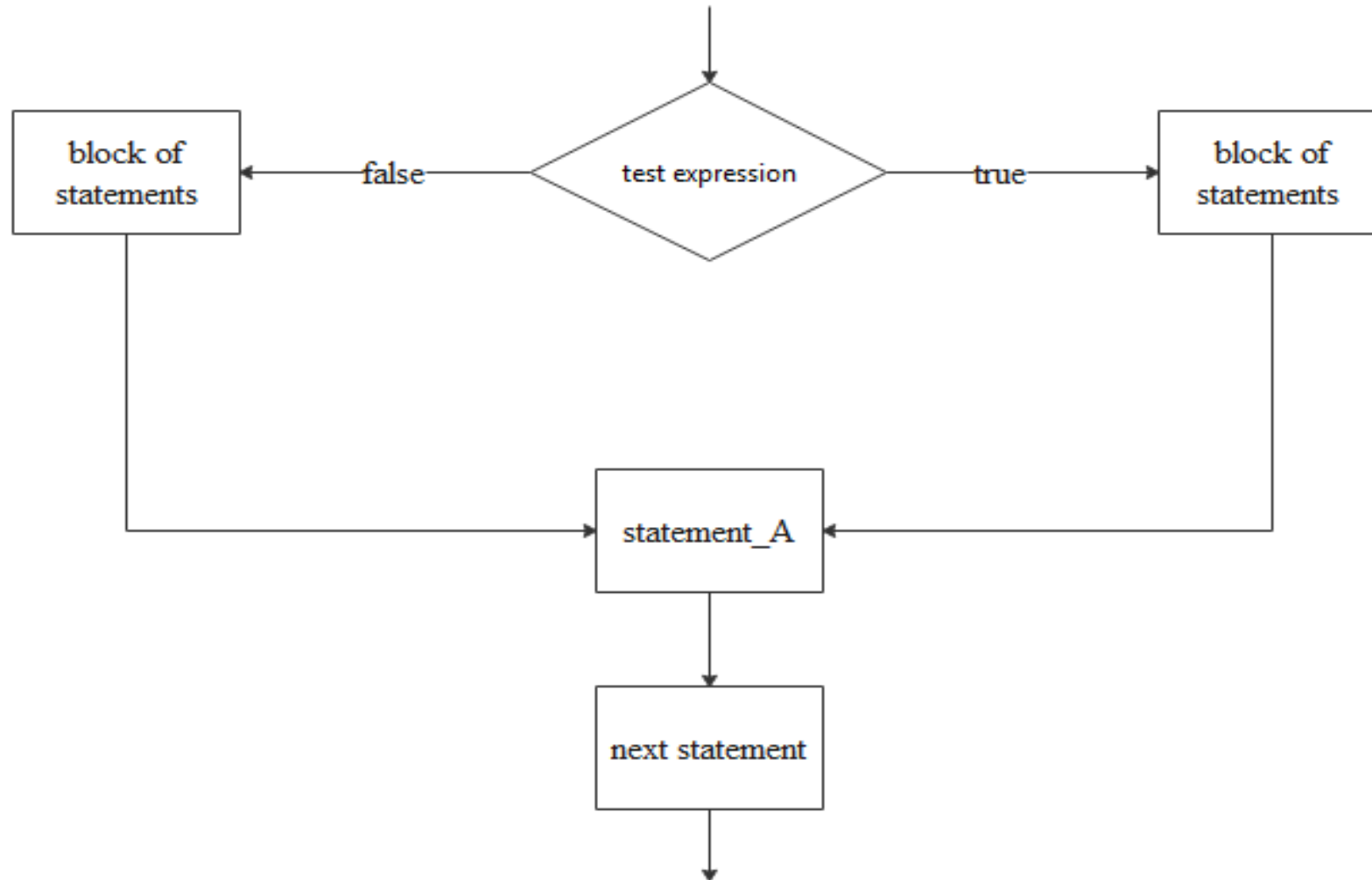
- it is possible to execute one group of statements if the test expression evaluates true and another group of statements if the expression evaluates false using if else statement
- In this decision control statement, we have two blocks of statements.
- If the test expression is true, then the statements inside if block gets executed
- If the test expression is false, then the statements inside else block gets executed
- else cannot exist without if statement

if else statement:

- Syntax:

```
if ( test expression)
{
    statement / block of statements ;
}
else
{
    statement / block of statements;
}
statement_A;
```

Flowchart:



Example: Write a program to check whether a number is positive or negative.

Algorithm:

Step 1 : start

Step 2 : read a number

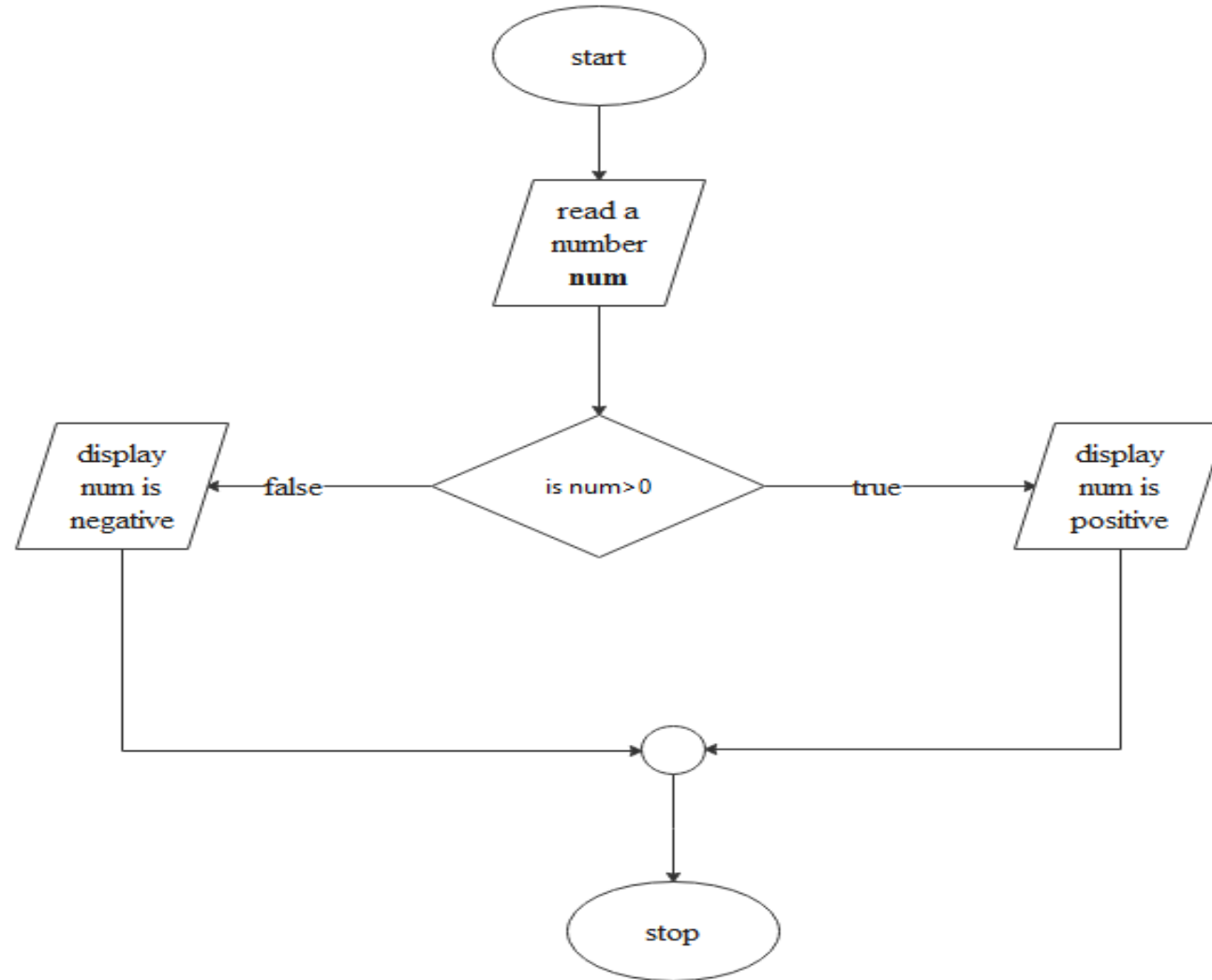
Step 3 : check if number read in step 2 is greater than zero

Step 4 : if test expression in step 3 is true display message
“ number is positive”

Step 5 : if test expression in step 3 is false display message
“ number is negative”

Step : stop

Flowchart:



Write a program to check whether a number is positive or negative.

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

int main()
{
    int num;
    printf("Enter a number : ");
    scanf("%d",&num);
    if (num>0)
    {
        printf("\n%d is positive",num);
    }
    else
    {
        printf("\n%d is negative",num);
    }

    getch();
    return 0;
}
```

Classwork:

1. Write a program to find the maximum of two input numbers.
2. Write a program to check whether the input number is odd or even.
3. Write a program to calculate real and imaginary roots of quadratic equation.

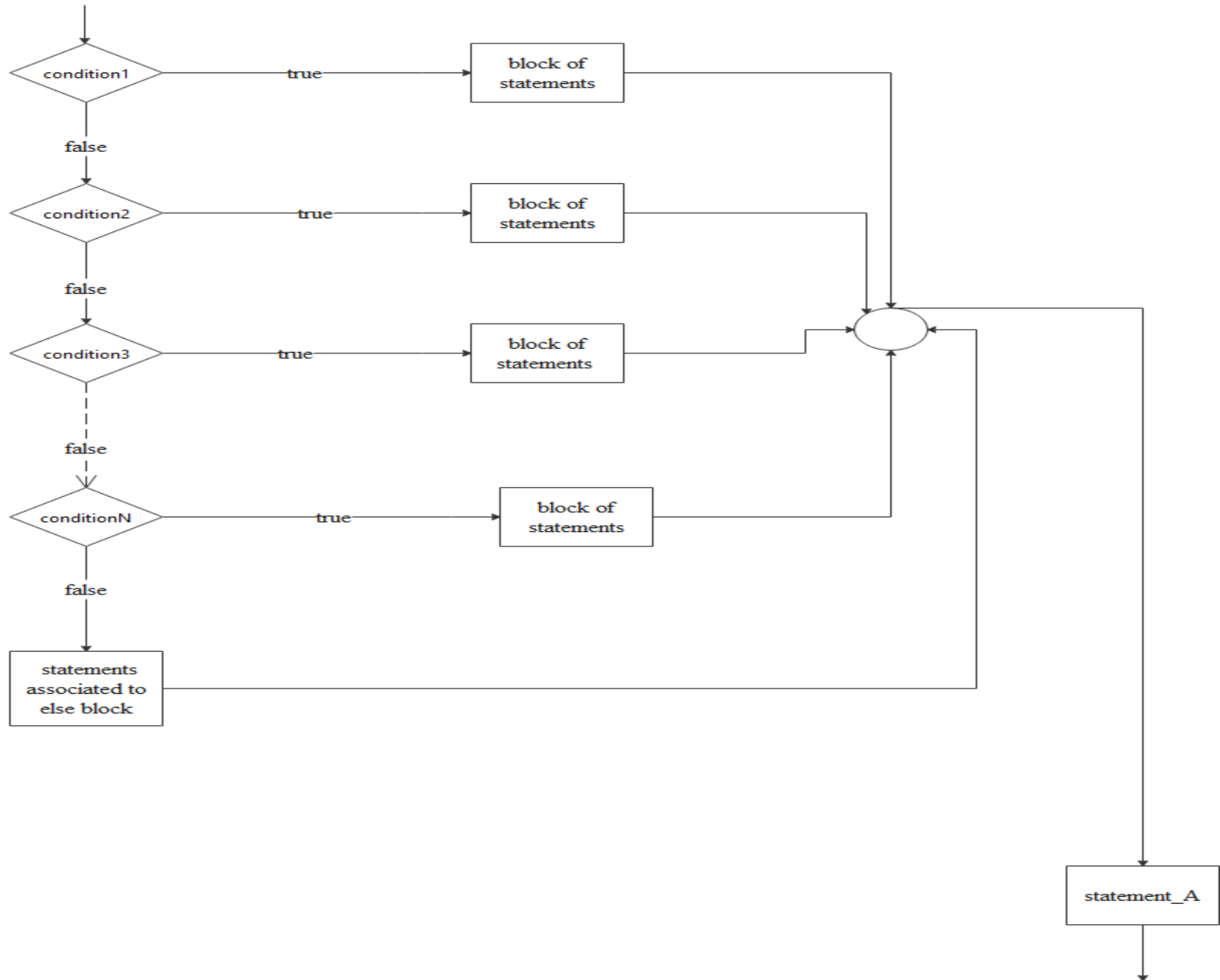
else if ladder :

- When we have more than two conditions to be evaluated, we use else if ladder
- Evaluation of test expression starts from top to bottom in sequential manner
- If the test expression becomes true then associated statement or block of statements are executed and rest of the conditions are skipped and the program control transfers to the statement immediately following the else if structure
- if all conditions are false then final else block will be executed

- Syntax:

```
if (test expression1)
{
    statement / block of statements ;
}
else if (test expression2)
{
    statement / block of statements ;
}
else if (test expression3)
{
    statement / block of statements ;
}
.
.
.
else if (test expressionN )
{
    statement / block of statements ;
}
else
{
    statement / block of statements ;
}
statementA ;
```

Flowchart:



Example: Write a program to find if the input number is positive, negative or zero.

Algorithm:

Step 1: start

Step 2: read a number

Step 3: check if number read in step 2 is greater than zero

Step 3.1 : display message “ number is positive”

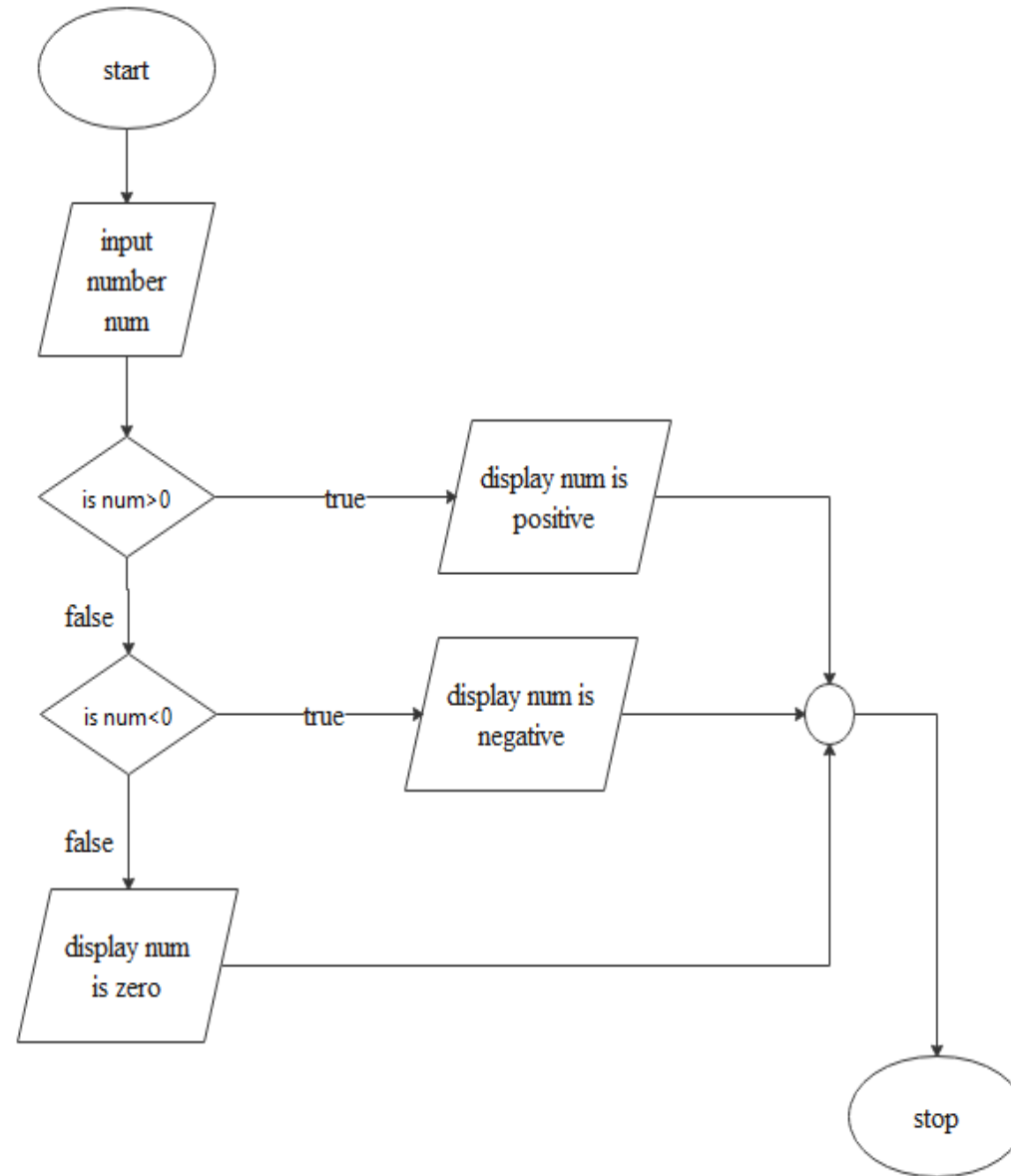
Step 4 : check if number read in step 2 is less than zero

Step 4.1 : display message “ number is negative”

Step 5 : if conditions in step 3 and 4 are false display message “ number is zero”

Step : stop

Flowchart:



Write a program to find if the input number is positive, negative or zero.

```
#include<stdio.h>

#include<conio.h>


int main()
{
    int num;
    printf("Enter a number : ");
    scanf("%d",&num);
    if (num>0)
    {
        printf("\n%d is positive",num);
    }
    else if (num<0)
    {
        printf("\n%d is negative",num);
    }
    else
    {
        printf("\n%d is zero ",num);
    }

    getch();
    return 0;
}
```

Classwork:

1. Write a program to find maximum of three numbers.
2. Write a program to find maximum of four numbers.
3. Write a program to find maximum of five numbers.
4. Write a program to check whether input character is lowercase character, uppercase character, digits or special symbols.
5. Write a program to input a number and display which day of the week on the basis of input number. Example 1 is Sunday, 2 is Monday

Class Work:

6. Write a program that reads marks of student in seven subjects. Calculate the percentage if the student has achieved greater than 45 in each subject and use these conditions

- Percentage greater than equals to 80 is distinction
- Percentage from 60 to 79 is first division
- Percentage from 45 to 59 is seconds division

Nested if else statement:

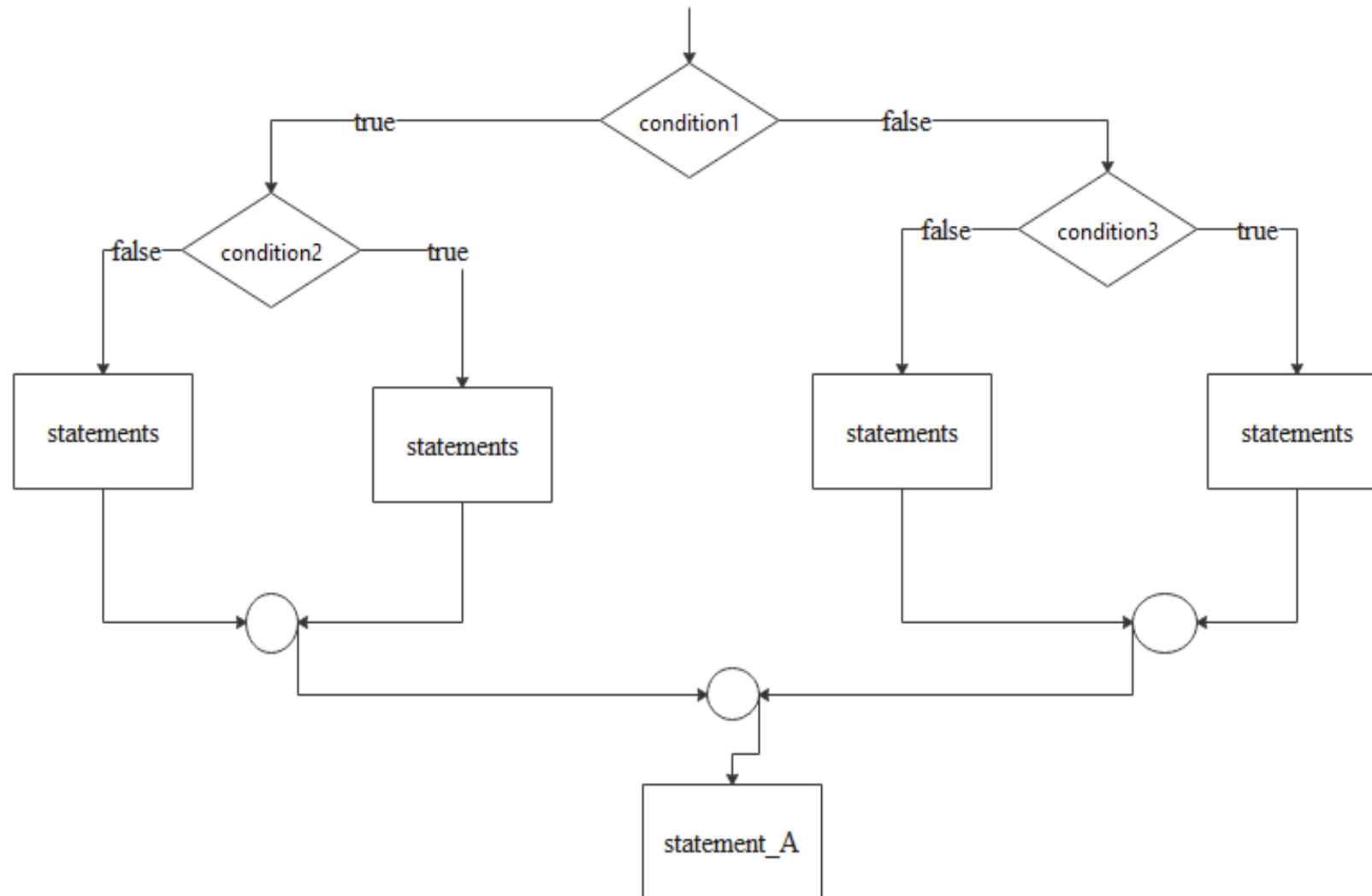
- If one or more if else statement is written inside body of if statement or the body of an else statement, then it is called nested if else statement
- In nested form, the condition for inner if is evaluated only if the condition for the outer if is satisfied, otherwise it is skipped and else part of the outer if is executed

Nested if else statement:

Syntax:

```
if (condition1)
{
    if (condition2)
    {
        statements;
    }
    else
    {
        statements;
    }
}
else
{
    if (condition3)
    {
        statements;
    }
    else
    {
        statements;
    }
}
statement_A;
```

Flowchart:



Example: Write a program to find the maximum of three numbers using nested if else statement

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

int main()
{
    int num1,num2,num3;
    printf("Enter three number :");
    scanf("%d%d%d",&num1,&num2,&num3);
    if (num1>num2)
    {
        if(num1>num3)
        {
            printf("\nThe number: %d is maximum",num1);
        }
        else
        {
            printf("\nThe number: %d is maximum",num3);
        }
    }
}
```

```
else
{
    if(num2>num3)
    {
        printf("\nThe number: %d is maximum",num2);
    }
    else
    {
        printf("\nThe number: %d is maximum",num3);
    }
}

getch();
return 0;
}
```


Example: Program to check if number read is positive, negative or zero.

```
#include<stdio.h>

#include<conio.h>

int main()
{
    int num;
    printf("Enter a number :");
    scanf("%d",&num);
    if (num>=0)
    {
        if(num==0)
        {
            printf("\nThe number: %d is zero",num);
        }
        else
        {
            printf("\nThe number: %d is positive",num);
        }
    }
    else
    {
        printf("\nThe number: %d is negative",num);
    }

    getch();
    return 0;
}
```