

Loop Control Statements :-

Loop control structures are used to execute and repeat a block of statements depending on the value of a condition. There are three types of loop control structures / statements in C language.

- (i) for statement or for loop.
- (ii) while statement or while loop.
- (iii) do-while statement or do-while loop.

for Statement or for loop :- A for loop is used to execute and repeat a block of statements depending on a condition. It has the following form:

```
for (<initial value>; <condition>; <increment>)  
{  
    ...  
    <statement block>  
    ...  
}
```

Where, <initial value> is the assignment of a variable. <condition> is a relation or logical expression which will have the value true or false. <increment> is the increment value of the variable which will be added every time.

Q. Write a C program to find factorial of a given integer n . (2014)

Soln: /* program to find factorial of a positive integer n */
#include <stdio.h>

```

#include <conio.h>
main()
{
    int k, kfact, i;
    clrscr();
    printf("\n Enter the number: ");
    scanf("%d", &k);
    kfact = 1;
    /* loop to generate numbers from 1 to n */
    for (i = 1; i <= k; i++)
        kfact = kfact * i;
    printf("\n %d factorial is %d", k, kfact);
    getch();
}

```

Nested for Statement or Nested for Loop:-

The statement block of a for loop lies completely inside the block of another for loop. This is referred as nested for loop or nested for statement. Any no. of for statements can be nested.

Q. Write a C program to sum the following series:

$$S = 1 + (1+2) + (1+2+3) + \dots + (1+2+3+\dots+N) \quad (2012)$$

```

Soln:- /* program to find sum of series */
#include <stdio.h>
#include <conio.h>
main()
{
    int i, j, n, s, term;
    clrscr();
    printf("\n Enter value to N: ");
    scanf("%d", &n);
}

```

```

s = 0;
/* outer loop to find sum of series s */
for (i = 1; i <= n; i++)
{
    /* inner loop to find the terms */
    term = 0;
    for (j = 1; j <= i; j++)
    {
        term = term + j;
    }
    s = s + term;
}
printf (" \n sum of the series S = %d", s);
getch ();
}

```

while Statement or while Loop:- (2012)

A while loop is used to execute and repeat a block of statements depending on a condition. It has the following form.

```

while (<condition>)
{
    ...
    <statement block>
}

```

example:-

```

i = 1;
while (i <= 10)
{
    s = s + i;
    p = p * i;
    i++;
}

```

do-while Statement or do-while Loop :- (ans, 2018)

A do-while statement is also used to execute and repeat a block of statements depending on a condition. It has the following form.

```
do  
{  
    < statement block >  
}
```

```
while (< condition >);
```

example :-

```
i = 1;
```

```
do
```

```
{
```

```
s = s + i;
```

```
p = p * i;
```

```
i++;
```

```
}
```

```
while (i <= 10);
```

Comparison of the loop control structures :-

for loop

1. A for loop is used to execute and repeat a statement block depending on a condition which is evaluated at the beginning of the loop.

2. A variable value is initialized at the beginning of the loop and is

while loop

A while loop is used to execute and repeat a statement block depending on a condition which is evaluated at the beginning of the loop.

A variable value is initialized at the beginning or before the loop and is

do-while loop

A do-while loop is used to execute and repeat a statement block depending on a condition which is evaluated at the end of the loop.

A variable value is initialized before the loop or assigned inside the loop and

used in the condition.

3. A statement to change the value of the condⁿ or to increment the value of the variable is given at the beginning of the loop.

4. The statement block will not be executed when the value of the condⁿ is false.

5. A for loop is commonly used by many programmers.

used in the condⁿ.

A statement to change the value of the condⁿ or to increment the value of the variable is given inside the loop.

The statement block will not be executed when the value of the condⁿ is false.

A while loop is also widely used by many programmers.

is used in the condition.

A statement to change the value of the condⁿ or to increment the value of the variable is given inside the loop.

The statement block will not be executed when the value of the condⁿ is false, but the block is executed at the value of the condⁿ.

A do-while loop is used in some cases where the condⁿ need to be checked at the end of the loop.

goto Statement:-

The goto statement is an unconditional transfer of control statement. It is used to transfer the control from one part of the program to another.

break Statement:- The break statement is used to transfer the control to the end of a statement block in a loop. It is an unavoidable statement to transfer the control to the end of a switch.