Chapter -3 : Introduction to 'C' Language

Expression and Operators

- The symbols which are used to perform logical and mathematical operations in a C program are called C operators.
- These C operators join individual constants and variables to form expressions.
- Operators, functions, constants and variables are combined together to form expressions.
- Consider the expression A + B * 5.
- Where, +, * are operators, A, B are variables, 5 is constant and A + B * 5 is an expression.

Types of C operators

- C language offers many types of operators.
- They are,
    - Arithmetic operators.
    - Assignment operators.
    - Relational operators.
    - Logical operators.
    - Bit wise operators.
    - Conditional operators (ternary operators).
    - Increment/decrement operators.
    - Special operators

Arithmetic Operators in C

Arithmetic operators are used to perform mathematical calculations like addition, subtraction, multiplication, division and modulus in C programs.

S.no	Arithmetic Operators	Operation	Example
1	+	Addition	A+B
2	-	Subtraction	A-B
3	*	Multiplication	A*B
4	/	Division	A/B
5	%	Modulus	A%B

Example program for C arithmetic operators

- In this example program, two values "40" and "20" are used to perform arithmetic operations such as addition, subtraction, multiplication, division, modulus and output is displayed for each operation.

```
#include <stdio.h>
int main()
{
   int a=40, b=20, add, sub, mul, div, mod;
   add = a+b;
   sub = a-b;
   mul = a*b;
   div = a/b;
   mod = a%b;
   printf("Addition of a, b is: %d\n", add);
   printf("Subtraction of a, b is: %d\n", sub);
   printf("Multiplication of a, b is: %d\n", mul);
   printf("Division of a, b is: %d\n", div);
   printf("Modulus of a, b is: %d\n", mod);
}
```

Output:

```
Addition of a, b is: 60
Subtraction of a, b is: 20
Multiplication of a, b is: 800
Division of a, b is: 2
Modulus of a, b is: 0
```

Assignment operators

- In C programs, values for the variables are assigned using assignment operators.
- For example, if the value "10" is to be assigned for the variable "sum", it can be assigned as "sum = 10;".
- Other assignment operators in C language are given below.

Operators		Example	Explanation
Simple assignment operator	=	sum=10	10 is assigned to variable sum
Compound assignment operators	+=	sum+=10	This is same as sum = sum+10
	-=	sum-=10	This is same as sum = sum-10
	*=	sum*=10	This is same as sum = sum*10
	/=	sum/=10	This is same as sum = sum/10
	%=	sum%=10	This is same as sum = sum%10
	&=	sum&=10	This is same as sum = sum&10
	^=	sum^=10	This is same as sum = sum^10

Example program for C assignment operators

- In this program, values from 0 – 9 are summed up and total "45" is displayed as output.
- Assignment operators such as "=" and "+=" are used in this program to assign the values and to sum up the values.

```
# include <stdio.h>
int main()
{
   int Total=0,i;
   for(i=0;i<10;i++)
   {
      Total+=i; // This is same as Total = Total+i
   }
   printf("Total = %d", Total);
}
```

Output:

```
Total = 45
```

Relational operators

- Relational operators are used to find the relation between two variables. i.e. to compare the values of two variables in a C program.

S.no	Operators	Example	Description
1	>	x > y	x is greater than y
2	<	x < y	x is less than y
3	>=	x >= y	x is greater than or equal to y
4	<=	x <= y	x is less than or equal to y
5	==	x == y	x is equal to y
6	!=	x != y	x is not equal to y

Example program for relational operators in C

- In this program, relational operator (==) is used to compare 2 values whether they are equal are not.
- If both values are equal, output is displayed as " values are equal".
- Else, output is displayed as "values are not equal".
- Note : double equal sign (==) should be used to compare 2 values.
- We should not single equal sign (=).

```
#include <stdio.h>
int main()
{
   int m=40, n=20;
   if(m == n)
   {
     printf("m and n are equal");
   }
   else
   {
     printf("m and n are not equal");
   }
}
```

Output:

```
m and n are not equal
```