11. What is C?

- C is a programming language developed at AT & T's Bell Laboratories of USA in 1972.
- It was developed and written by Dennis Ritchie.
- C is a High Level Language with some Low Level features. So it is called Middle Level Language.
- Major parts of popular operating systems like Windows, UNIX, Linux are still written in C.
- C is a case-sensitive language.

11.1 History of C:

- The root of all modern languages is ALGOL, introduced in early 1960s.
- In 1967, Martin Richards developed a language BCPL (Basic Combined Programming Language) especially for writing system software.
- In 1970, Ken Thompson created a language using many features of BCPL and called it simply B.
- C was evolved from ALGOL, BCPL, and B by Dennis Ritchie at the Bell Laboratories in 1972. C uses many concepts from these languages and added the concept of data types and other powerful features.

11.2 Structure of a C Program:

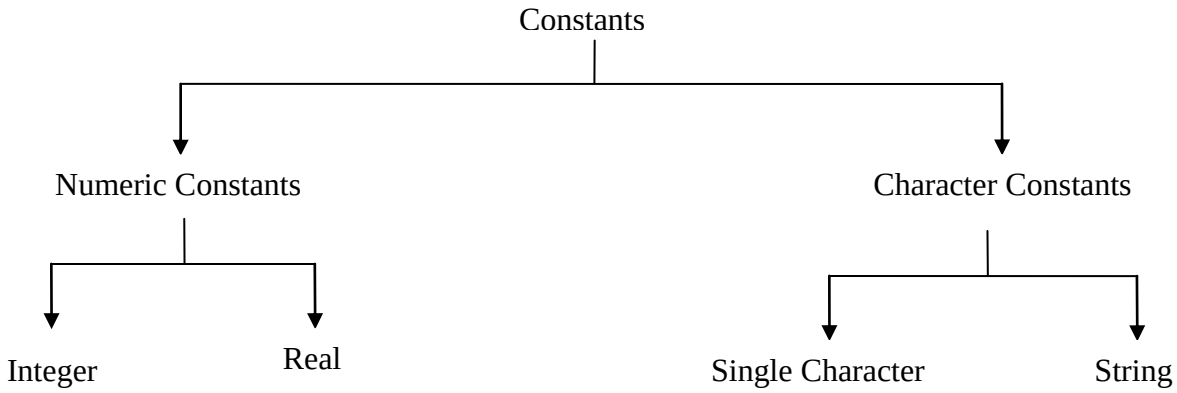
Preprocessor Directives
Global Declarations

main( )
{
Local Declarations
Statements
}

Other functions as required.

11.3 Constants:

Constants in C refer to fixed value that does not change during the execution of a program.



Integer→ 2, 4, -5, 89, -67, 2345
Real → 1.2, 3.89, -0.45
Single Character → '3', '4', 'a', 'A', 'z', ',', ' '
String → "Hello", "1984", "X"

11.3.1 Backslash Character Constants:

Character	Meaning
'\a'	Audible alert (bell)
'\b'	Back space
'\f'	Form feed
'\n'	New line
'\r'	Carriage return
'\t'	Horizontal tab
'\v'	Vertical tab
'\''	Single quote
'\"'	Double quote
'\?'	Question mark
'\\'	Backslash
'\0'	Null

11.4 Identifiers:

a) One feature present in all computer languages is the identifier.
b) Identifiers allow us to name variables, types, functions, and labels in the program.
c) Each identified object in the computer is stored at a unique address.

11.4.1 Rules for constructing identifiers:

a) First character must be alphabetic character or underscore.

b) Must consist only of alphabetic characters, digits, or underscores. It may not have a space or a hyphen.
c) In C, length of identifier is up to 63 characters.
d) Examples: num, sum_of_numbers, ab12, _add.

11.5 Variables: An entity that may vary during program execution is called a variable.

11.5.1 Variable Declaration: In variable declaration we define the type of variables.
Eg: int a; float b;

11.5.2 Variable Initialization: We can initialize the variable at the same time of declaration.
Eg: int a=0;

If variables are declared without initialization, they contain Garbage value (unpredictable value).

11.6 C Keywords:

- Keywords are the words whose meaning has already been explained to the C-compiler.
- The keywords cannot be used as variable names.
- The keywords are also called 'Reserved word'.
- There are only 32 keywords available in C.

auto	double	int	struct
break	else	long	switch
case	enum	register	typedef
char	extern	return	union
const	float	short	unsigned
continue	for	signed	void
default	goto	sizeof	volatile
do	if	static	while

11.7 Comments:

- Comments are merely internal program documentation.
- The compiler ignores the comments when it translates the program into executable code.
- C uses two different formats:
    - Block comments
    - Line comments

11.7.1 Block Comment:
- A block comment is used when the comment will contain several lines.
- The opening token is /* and the closing token is */ .
- Eg: /* C program for calculating area of circle.
  The formula of area is 3.14 *r*r. */

11.7.2 Line Comment:

- The line comment uses // to identify a comment.
- Eg: // C program for adding two numbers.

11.8 Simple C programs:

1. **C program for printing Hello on user-screen.**

```
#include<stdio.h>

void main()
{
        printf("Hello");
}
```

2. **C program for printing Hello on user-screen using clrscr() and getch() function.**

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

void main()
{
        clrscr();
        printf("Hello");
        getch();
}
```

Note:

- printf() function is defined in 'stdio' header file.
- clrscr() and getch() are defined in 'conio' header file.
- clrscr() is used to clear the user screen.
- getch() is used to get one character.
- If we run the 1st program on windows, we cannot see output directly after the execution the program. For seeing output we have to go User-screen by another way (Alt+F5). But when we run the 2nd program on windows, output will be shown directly after execution the program. The reason is that we used getch() function, its work is to get character from user on user-screen. It always used at the last line of main function. So we can see the output before giving any character.
- There is no use of conio.h on Linux.

11.9 Types of Errors in C:

- Syntax Error
- Logical Error
- Runtime Error

11.9.1 Syntax Error:

- Syntax error occurs when the statement is not typed according to the syntax of the C language.
- Syntax errors are detected by compiler during compile time.
- Eg:
    - printf(“hello”) [syntax error- semicolon missing]
    - printf(“hello); [syntax error- inverted comma is not closed]

11.9.2 Logical Error:

- This error occurs because of logically incorrect statement in the program.
- Eg:
    - If we want to add two numbers and we are using minus operator (c= a – b;) in place of plus operator.

11.9.3 Runtime Error:

- These errors occur during the execution of the program.
- Eg:
    - If we write “print” in place of “printf”, the function prototype error will be shown during execution of the program.