C Language Programming Fundamentals

1. Introduction to C Language

C is a high-level, general-purpose programming language developed by Dennis Ritchie in 1972.

It combines the features of both low-level and high-level languages and is the foundation of many modern languages like C++, Java, and Python.

C ek high-level aur general-purpose language hai jo 1972 me Dennis Ritchie ne banayi thi. Ye low-level aur high-level dono features provide karti hai.

Bahut si modern languages jaise C++, Java, Python ka base bhi C language hi hai.

2. Structure of a C Program

A C program generally consists of:

1. Preprocessor Directives

2. main() function

3. Variable Declarations

4. Statements and Expressions

5. return Statement

Sample Program:

#include <stdio.h>

```
int main() {
    printf("Hello, World!");
    return 0;
}
```

Output:

Hello, World!

C program ka basic structure hota hai:

1. Preprocessor directives jaise #include

2. main() function jahan se program start hota hai

3. Variable declarations

4. Statements aur expressions

5. return statement (program exit ke liye)

3. Keywords and Identifiers

Keywords are reserved words in C with special meaning. Examples: int, float, return, if, else.

Identifiers are names given by the user to variables, functions, arrays, etc.

Keywords C ke predefined words hote hain jinka specific use hota hai, jaise: int, float, return.

Identifiers user ke diye gaye naam hote hain, jaise variable ka naam, function ka naam, etc.

Example:

int age; // 'int' is a keyword, 'age' is an identifier

4. Data Types and Variables

C has several data types:

- int: for integers (e.g., 10, -5)

- float: for decimal numbers (e.g., 3.14)

- char: for single characters (e.g., 'A')

Variables are used to store data.

C me kuch basic data types hain:

- int: poore number ke liye

- float: decimal value ke liye

- char: ek character ke liye

Example:

int a = 5;

float pi = 3.14;

char grade = 'A';

5. Operators in C

Types of operators in C:

- Arithmetic: +, -, *, /, %

- Relational: ==, !=, >, <

- Logical: &&, ||, !

- Assignment: =, +=, -=

C me operators ka use calculations aur comparisons ke liye hota hai.

Example:

int a = 5, b = 10;

printf("%d", a + b); // Output: 15

6. Control Statements

Used to control the flow of a program.

- if, if-else

- switch-case

- loops: for, while, do-while

Control statements program ke flow ko decide karte hain.

Example:

```
if (a > b) {
    printf("A is greater");
} else {
    printf("B is greater");
}
```

7. Functions in C

Functions help in dividing code into modules.

Syntax:

```
return_type function_name(parameters) {
    // code
}
```

Example:

```
int add(int a, int b) {
    return a + b;
}
```

Functions code ko manageable banate hain. Reusability badhti hai.

8. Arrays in C

An array is a collection of similar data types stored in contiguous memory locations.

Syntax:

```
int arr[5] = {1, 2, 3, 4, 5};
```

Array ek hi type ke data ka collection hota hai.

Example:

```
for (int i = 0; i < 5; i++) {
    printf("%d ", arr[i]);
}
```

9. Pointers (Intro)

A pointer stores the address of another variable.

Syntax:

```
int *p, a = 10;
```

p = &a;

Pointer ek variable ka address store karta hai.

Example:

printf("Value: %d", *p); // Output: 10

10. Input/Output in C

Input: scanf()

Output: printf()

Example:

int age;

scanf("%d", &age);

printf("Age is: %d", age);

Input lene ke liye scanf aur output ke liye printf ka use hota hai.

11. Sample Program - Sum of Two Numbers

```c
#include <stdio.h>

int main() {
    int a, b, sum;
    printf("Enter two numbers: ");
    scanf("%d %d", &a, &b);
    sum = a + b;
    printf("Sum = %d", sum);
    return 0;
}
```

Output:

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Enter two numbers: 5 7

Sum = 12