**1. Overview of C and Basic Concepts**

**What is C?**

C is a general-purpose, procedure-oriented programming language that supports structured programming, lexical variable scopes, recursion and static typing. It is extremely popular and is machine independent so it is use to write various applications like System programs, Operating systems, Programming Languages and editing software. Some examples are Windows, Python, Oracle, Git and Adobe Products like Photoshop.

**How did C language come into existence? Why C language was initially developed?**

C language came into existence in 1972 to overcome the problems of all the previous languages like B, BCPL etc. The C language was initially developed to be used in UNIX Operating Systems.

**Character sets that are used in C**

There are 4 types of characters that can be used in C. They are as follows:

1. Letters
2. Digits
3. Special Characters
4. White Spaces

**Tokens in C**

Tokens are the smallest part of any programming language. In C there are 6 types of token. They are Keywords, identifiers, Constants, String, Special Characters, Operators.

**Keywords and Identifiers in C**

**Keywords:**

As the name suggests they play a key role in the program. In other words they have a pre-defined meaning that cannot be changed. It is not wrong if we say that keywords are the basic building blocks of the program. All keywords must be written in lowercase. Some examples of keywords are if, break, for, while, int etc.

**Identifiers:**

Identifiers refer to the names of variables, functions and arrays. They are user-defined names and they consist of a sequence of letters, digits and underscores. These can be written in both uppercase and lowercase.

**Variable and Constants in C**

**Variables:**

Variables as the name suggest are vary-able. In programing a variable is a container that holds or contains data that can be changed later. Each and every variable should be given a unique name (identifier). A variable will always be present on the left hand side of the assignment operator (=).

**Constants:**

Constants as the name suggests are constant that means the value of constants can’t be changed once defined or declared or in other words it has a fixed value throughout the program. A constant will always be on the right hand side of the assignment operator (=).

**How to declare Variables and Constants in C**

Syntax for declaring Variables:

<Data type> <Variable Name>;

<Data type> <Variable Name>=<Value>;

Syntax for declaring Constants

const <Data type> <Variable Name> = <Value>;

OR

#define <variable name> <value>

**Types of Constants in C**

There are two types of constants in C. they are numeric constants and character constants. Numeric constants contain integer constants, floating point constants. Character constants has two sub categories they are single character constants and string constants.

**Numeric Constants**

Numeric Constants as the name suggests is numeric in nature that means it has only numbers. The numbers can be signed or unsigned or the numbers can have a decimal point or it may not contain a decimal point. There are two types of numeric constants they are

1. Integer Constants
2. Floating Point Constants

**Integer Constants:**

Integer constants as the name suggests contain integer values as whole numbers. It can contain positive and negative numbers. Example 4, -90, 45, 23,-21 etc.

In integer constants even if you give a decimal value it will discard the value after the decimal part. For example if you give 55.6 it will take only 55 and it will discard 6 because it is after the decimal point.

**Floating Point Constants:**

Floating Point constants as the name suggests contain integers with floating points. Unlike integers floating point constants won’t discard the value after the decimal. As it also contains integers in can have positive as well as negative values. Example 66.5, -72.3, 0.0 etc.

**Character Constants**

Character constants as the name suggests contains all characters which are graphical and non-graphical. Graphical characters are those which can be typed directly through the keyboard like uppercase and lowercase alphabets, numbers and symbols. Whereas non-graphical characters are those which cannot be typed directly through the keyboard. There are three types of character constants they are:

1. Single Character Constants
2. String Constants
3. Back slashed Constants

**Single Character Constants:**

As the name suggests single character constants contain a single character. These characters can be alphabets lowercase or uppercase, digits and symbols. These characters are enclosed with single quotes (‘ ’). Example: ‘A’,’a’,’6’,’#’.

**String Constants:**

String constants are a finite sequence of characters. The characters include alphabets upper and lower case, digits and symbols. These characters are enclosed in double quotes (“ ”). Example: “Hello World”, ”+911234”, ”Hi!”

**Backslashed Constants:**

These constants as the name suggests start with a backslash (\).These are used to represent non-graphical characters which cannot be directly typed through the keyboard. Backslash is also used for escape sequence that means you are not printing the original value for example ‘n’ is the letter n but ‘\n’ is new line another example we try to print ‘r’ is the letter r but ‘\r’ is return in C language.

**Data Types in C**

C is really rich in its data types. Data types in c refer to an extensive system used for declaring variables of different type. The type of variable declared determines the amount of space taken in the memory. There are four types of Datatypes in C. They are:

1. Basic Types
2. Enumerated Types
3. Void Type
4. Derived Type

Here we are going to see more about Basic Types, Void types and Character types.

**Basic Datatype**

Basic datatypes are arithmetic types and further are classified into 3 categories. They are:

1. Integer Type
2. Floating Point Types

**Integer Type:**

Integer type as the name suggests contain integer values as whole numbers. It can contain positive and negative numbers. The range of integer type is limited to -32768 to +32767 which can be written as -215 to +215-1. We declare long int if we want to increase the range. We can use the ***int*** keyword to define and integer variable in C.

**Floating Point Type:**

Floating Point type as the name suggests contain integers with floating points. Unlike integers floating point type won’t discard the value after the decimal. As it also contains integers in can have positive as well as negative values. A floating point number can give 6 digit of precision after the decimal point. We can use the float keyword to declare a ***float*** variable in C.

**Void Type:**

The void type as the name suggests is void in nature that means it has no value. This type is usually used to specify that the function returns nothing. We use the ***void*** keyword before the function name to while defining a function.

**Character Type:**

Character type as the name suggest are characters that are enclosed in single quotes. To declare a character variable we can use the ***char*** keyword that C provides.