VARIABLES AND DATA TYPES

Q. What is a Variable?

In Simple Language: -

A variable is a Container that stores a value that value can be any type like characters, decimal numbers, floating numbers etc. And these values can be changed during the execution of the program.

Example:

```
int var_name = 5 ;
```

Data Type | *Variable Name* | *Value Stored in Variable*

Ex. 1.1

- A name given to the **memory location**.
- Declared by writing **type variable_name;**
- Initialized and declared by **type variable_name = value;** as given in example.
  - **Declaration** means Reserving a location in memory for a variable.
    Example:

```
int var_name, var_name2, a, s;
```

  - **Initialization** means assigning a value after declaration of variable as example in **Ex. 1.1**.

Rules for defining variables: -

1. A variable can have alphabets, digits, and underscore.
2. A variable name can start with the alphabet, and underscore only. It can't start with a digit.
3. No whitespace is allowed within the variable name.
4. A variable name must not be any reserved word or keyword, e.g., int, goto, etc.
   - **Valid variable names: int ady, char aditya_shahi, float _aditya1233**
   - **Invalid variables name: int @aditya, int 12aditya, char long**

Q. What is Data Types?

Data types simply refers to **the type and size of data associated with variables**.

OR

A data type specifies the type of data that a variable can store such as integer, floating, character etc. Data types in C.

DATA TYPES IN C: -

- **Basic Data Types:** int, char, float, double
- **Derived Data Types:** array, pointer, structures, union
- **Enumeration data Type:** enum
- **Void Data Type:** void (means Empty)

Data Types	Memory Size	Range	Format Specifier
char	1 byte	−128 to 127	%c
signed char	1 byte	−128 to 127	%c
unsigned char	1 byte	0 to 255	%c
int	2 bytes	−32,768 to 32,767	%d
unsigned int	2 bytes	0 to 65,535	%u
short int	2 bytes	−32,768 to 32,767	%hd
signed short int	2 bytes	−32,768 to 32,767	%hi
unsigned short int	2 bytes	0 to 65,535	%hu
long int	4 bytes	-2,147,483,648 to 2,147,483,647	%ld
Long long int	8 bytes	-(2^63) to (2^63)-1	%lld
Unsigned long long int	8 bytes	0 to 18,446,774,073,709,551,615	%llu
unsigned long int	4 bytes	0 to 4,294,967,295	%lu
float	4 bytes		%f
double	8 bytes		%lf
long double	10 bytes		%Lf