

## **1) What is a variable in Python Programming Language and explain the rules to declare a variable.**

Ans. In Python, a variable is a name that refers to a value stored in memory. It acts as a container to hold data that can be manipulated and referenced within a program. Variables allow programmers to work with data in a flexible and dynamic manner. Here are the key characteristics of variables in Python:

**Assignment:** Variables are created and assigned values using the assignment operator `=`. For example:

```
x = 10
```

**Dynamic Typing:** Python is dynamically typed, meaning you don't need to declare the data type of a variable explicitly. The data type of a variable is determined by the value it holds. For example:

```
x = 10      # x is an integer  
y = "Hello" # y is a string
```

**Naming Convention:** Variables must follow certain rules for naming: Variable names can contain letters (both uppercase and lowercase), digits, and underscores `_`. Variable names cannot start with a digit. Variable names are case-sensitive (`myVar` and `MyVar` are considered different). It's recommended to use descriptive names that convey the purpose of the variable.

**Scope:** The scope of a variable refers to the region of code where the variable is accessible. Python supports local and global scopes for variables: Variables defined inside a function have local scope and can only be accessed within that function. Variables defined outside of any function have global scope and can be accessed throughout the entire program.

**Reassignment:** Variables can be reassigned to new values at any point in the program. For example:

```
x = 10  
x = 20 # x is reassigned to a new value
```

**Here are the rules to declare a variable in Python:** Variable names must start with a letter (a-z, A-Z) or an underscore `_`. After the first character, variable names can contain letters (a-z, A-Z), digits (0-9), or underscores `_`. Variable names cannot contain spaces or any special characters (except underscore `_`). Variable names cannot be Python keywords or reserved words.

Example of Valid Variable Names:

```
my_var = 10
```

```
MyVar = 20
```

```
_my_var = "Hello"
```