Complete Python Notes for Beginners

# 1. Introduction to Python

Python is a high-level, interpreted, object-oriented programming language with dynamic semantics. Its simple syntax makes it perfect for both beginners and experts.

Features of Python:

- Easy to Learn: Clean and simple syntax (similar to English).

- Interpreted: Executes code line-by-line using an interpreter (no need for compilation).

- Dynamically Typed: No need to declare variable data types.

- Cross-Platform: Works on Windows, macOS, Linux, etc.

- Extensive Libraries: Libraries like NumPy, Pandas, Matplotlib, TensorFlow, etc.

- Supports Multiple Paradigms: Procedural, Object-Oriented, Functional Programming.

- Open Source: Free to use and distribute.

Applications: Web development, Data Science, Scripting, AI, IoT, etc.

# 2. Python Variables

A variable is a name that refers to a memory location used to store data.

Example: x = 10, name = 'Alice'

Rules for naming variables:

- Must start with a letter or underscore (\_)

- Can contain letters, digits, underscores

- Case-sensitive (age ≠ Age)

- Cannot use Python keywords (e.g., if, class, def)

Multiple assignment is allowed in Python (e.g., x, y, z = 1, 2, 3)

# 3. Python Data Types

Python has several built-in data types categorized as follows:

- Basic Data Types: int, float, complex, str, bool, NoneType

- Sequence Types: list, tuple, range

- Set Types: set, frozenset

- Mapping Type: dict

Example: type(5) => <class 'int'>

# 4. Type Casting in Python

Type casting means converting one data type to another.

Implicit Casting: Automatically converts types (e.g., int to float).

Explicit Casting: Manually using functions like int(), float(), str(), etc.

Examples:

- int('10') => 10

- float('3.14') => 3.14

- str(100) => '100'

# 5. Python Data Structures

Data structures are containers used to store, organize, and manage data efficiently.

List: Ordered, mutable. E.g., fruits = ['apple', 'banana']

Tuple: Ordered, immutable. E.g., coordinates = (10, 20)

Set: Unordered, no duplicates. E.g., colors = {'red', 'blue'}

Dictionary: Key-value pairs. E.g., student = {'name': 'Alice', 'age': 22}

Range: Immutable sequence used in loops. E.g., range(0, 5)