Python Key Concepts with Examples

1. Key Features of Python that Make It Popular

- Easy Syntax: Python's syntax is designed to be easy to read and write.
- Interpreted Language: Python executes code line by line, making debugging easier.
- Dynamic Typing: Variables do not need explicit data type declaration.
- Extensive Libraries: Python has a vast collection of libraries for different tasks.
- Cross-platform Support: Python code runs on multiple platforms without changes.
- Community Support: Python has a large and active developer community.

2. Role of Predefined Keywords in Python

Predefined keywords are reserved words that perform specific functions in Python.

Examples:

- if: Used for conditional statements.

```
if x > 5:
    print("x is greater than 5")
```

- for: Used for loops.

```
for i in range(5):
    print(i)
```

- def: Used to define a function.

```
def greet():
    print("Hello")
```

3. Mutable vs Immutable Objects in Python

- Mutable Objects: Can be modified after creation (e.g., lists, dictionaries).

```
my_list = [1, 2, 3]
```

```
my_list.append(4)
```

- Immutable Objects: Cannot be modified after creation (e.g., strings, tuples).

```
my_string = "Hello"
my_string[0] = 'h'  # Error
```

4. Types of Operators in Python

- Arithmetic Operators: Perform mathematical operations.

```
result = 5 + 3
```

- Comparison Operators: Compare values.

```
print(5 == 5)
```

- Logical Operators: Combine conditional statements.

```
if x > 0 and y > 0:
    print("Both are positive")
```

- Assignment Operators: Assign values to variables.

```
x = 5
x += 3
```

5. Type Casting in Python

Type casting is the conversion of one data type to another.

Examples:

- Implicit Casting: Done automatically by Python.

```
x = 5
y = 2.5
result = x + y  # Python converts 'x' to float
```

- Explicit Casting: Done using functions like int(), float(), str().

```
x = 5
```

```
y = "10"
result = x + int(y)
```

6. Conditional Statements in Python

Conditional statements allow code execution based on conditions.

Example:

```
x = 10
if x > 5:
    print("x is greater than 5")
elif x == 5:
    print("x is equal to 5")
else:
    print("x is less than 5")
```

7. Types of Loops in Python

- for Loop: Iterates over a sequence.

```
for i in range(5):
    print(i)
```

- while Loop: Runs as long as a condition is true.

```
x = 0
while x < 5:
    print(x)
    x += 1
```