Python Study Notes
Lists, Tuples, Dictionary, For Loop, While Loop

1 LIST

Definition: List ek ordered aur mutable (changeable) data structure hai jisme hum multiple values ek variable me store kar sakte hain. List square brackets [] me likhi jati hai. Ordered ka matlab hai ke har element ka index hota hai (0 se start hota hai). Mutable ka matlab hai ke hum baad me values change kar sakte hain.

Example 1

```
numbers = [10, 20, 30]
print(numbers)
```

Explanation: Yahan ek list banai jisme 3 numbers hain.

Example 2

```
print(numbers[0])
```

Explanation: Index 0 ka element print hoga yani 10.

Example 3

```
numbers[1] = 50
print(numbers)
```

Explanation: List mutable hai is liye value change ho gayi.

Example 4

```
numbers.append(100)
print(numbers)
```

Explanation: append() end me value add karta hai.

Example 5

```
numbers.insert(1, 15)
print(numbers)
```

Explanation: Index 1 par 15 insert hoga.

Example 6

```
numbers.remove(30)
print(numbers)
```

Explanation: Specific value remove hoti hai.

Example 7

```
print(len(numbers))
```

Explanation: Total elements count karta hai.

Example 8

```
numbers.sort()
print(numbers)
```

Explanation: Ascending order me arrange karta hai.

Example 9

```
numbers.reverse()
print(numbers)
```

Explanation: Order reverse karta hai.

Example 10

```
for num in numbers:
    print(num)
```

Explanation: Har element ko ek ek karke print karta hai.

2 TUPLE

Definition: Tuple ek ordered lekin immutable data structure hai. Immutable ka matlab hai ke values change nahi ho sakti. Tuple parentheses () me likha jata hai.

Example 1

```
t = (1, 2, 3)
print(t)
```

Explanation: Simple tuple create kiya.

Example 2

```
print(t[0])
```

Explanation: Index access possible hai.

Example 3

```
print(len(t))
```

Explanation: Length count karta hai.

Example 4

```
for i in t:
    print(i)
```

Explanation: Tuple ke elements iterate kiye.

Example 5

```
print(t.count(2))
```

Explanation: 2 kitni baar aya count karta hai.

Example 6

```
print(t.index(3))
```

Explanation: Value ka index batata hai.

Example 7

```
t2 = t + (4,5)
print(t2)
```

Explanation: Tuples concatenate ho gaye.

Example 8

```
print(t * 2)
```

Explanation: Tuple repeat ho gaya.

Example 9

```
a,b,c = t
print(a,b,c)
```

Explanation: Tuple unpacking ki.

Example 10

```
print(type(t))
```

Explanation: Type confirm kiya.

3 DICTIONARY

Definition: Dictionary key-value pairs me data store karta hai. Curly braces {} me likha jata hai.

Example 1

```
student = {"name": "Ali", "age": 20}
print(student)
```

Explanation: Dictionary create hui.

Example 2

```
print(student["name"])
```

Explanation: Key se value access ki.

Example 3

```
student["age"] = 22
print(student)
```

Explanation: Value update ki.

Example 4

```
student["city"] = "Karachi"
print(student)
```

Explanation: New key add ki.

Example 5

```
print(student.keys())
```

Explanation: Sab keys show karta hai.

Example 6

```
print(student.values())
```

Explanation: Sab values show karta hai.

Example 7

```
print(student.items())
```

Explanation: Key-value pairs show karta hai.

Example 8

```
student.pop("age")
print(student)
```

Explanation: Specific key remove karta hai.

Example 9

```
for key in student:
    print(key, student[key])
```

Explanation: Dictionary iterate ki.

Example 10

```
for key, value in student.items():
    print(key, value)
```

Explanation: Key aur value dono ek sath print kiye.

4 FOR LOOP

Definition: For loop kisi sequence par iterate karne ke liye use hota hai. Yeh fixed iterations ke liye best hai.

Example 1

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

Explanation: 0 se 4 tak print karega.

Example 2

```
for i in range(1,6):
    print(i)
```

Explanation: 1 se 5 tak print karega.

Example 3

```
for char in "Python":
    print(char)
```

Explanation: Har character print karega.

Example 4

```
for i in [10,20,30]:
    print(i)
```

Explanation: List iterate ki.

Example 5

```
for i in range(1,11):
    print("2 x", i, "=", 2*i)
```

Explanation: Table print ki.

Example 6

```
for i in range(10):
    if i == 5:
        break
    print(i)
```

Explanation: break loop stop karta hai.

Example 7

```
for i in range(5):
    if i == 2:
        continue
    print(i)
```

Explanation: continue ek iteration skip karta hai.

Example 8

```
for i in range(3):
    for j in range(2):
        print(i, j)
```

Explanation: Nested loop ka example.

Example 9

```
numbers = [1,2,3]
for n in numbers:
    print(n)
```

Explanation: List ke elements iterate kiye.

Example 10

```
for i in range(5,0,-1):
    print(i)
```

Explanation: Reverse counting.

5 WHILE LOOP

Definition: While loop tab tak chalta hai jab tak condition true hoti hai. Condition false hote hi loop stop ho jata hai.

Example 1

```
i = 1
while i <= 5:
    print(i)
    i += 1
```

Explanation: 1 se 5 tak print karega.

Example 2

```
i = 5
while i > 0:
    print(i)
    i -= 1
```

Explanation: Reverse counting.

Example 3

```
i = 1
while i <= 3:
    print("Hello")
    i += 1
```

Explanation: 3 baar Hello print karega.

Example 4

```
i = 0
while i < 5:
    print(i*2)
    i += 1
```

Explanation: Multiples print karega.

Example 5

```
i = 1
while i <= 10:
    if i == 5:
        break
    print(i)
    i += 1
```

Explanation: break loop stop karta hai.

Example 6

```
i = 0
while i < 5:
    i += 1
    if i == 3:
        continue
    print(i)
```

Explanation: continue ek iteration skip karta hai.

Example 7

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

Explanation: Sum calculate kiya.

Example 8

```
num = 0
while num != -1:
    num = int(input("Enter number (-1 to stop): "))
```

Explanation: User input based loop.

Example 9

```
i = 1
while i <= 5:
    print(i*i)
    i += 1
```

Explanation: Square print karega.

Example 10

```
i = 10
while i >= 1:
    print(i)
    i -= 1
```

Explanation: Countdown.