ML UNIT-4,5

Theek hai.
Ab **String aur List methods** ko **proper tareeke se**, no sugarcoating, no fluff.
Yeh wahi jagah hai jahan log Python “jaanta hoon” bolte hain… aur interview / exam mein nange ho jaate hain.

🔥 STRING METHODS (Python)

String = immutable
Matlab: original string **kabhi change nahi hoti**.
Jo milega, **nayi string** hogi.

```
> a = "abcd"
> a += "e"
> b = id(a)
> a += "f"
> a
'abcdef'
> _ctypes.PyObj_FromPtr(b)
'abcdef'
```

lower() / upper()

Case normalize karne ke liye (real-world must).

```
name = "DhRuV"

print(name.lower())  # dhruv

print(name.upper())  # DHRUV
```

capitalize() / title()

```
s = "python programming"

print(s.capitalize())  # Python programming

print(s.title())       # Python Programming
```

strip() / lstrip() / rstrip()

Extra spaces = silent bugs.

```
s = "  hello  "

s.strip()   # "hello"
```

replace()

String ke andar surgery.

s = "I like Java"

s.replace("Java", "Python")

split()

String → list (bohot important).

s = "apple,banana,orange"

fruits = s.split(",")

Result:

['apple', 'banana', 'orange']

join()

List → string (ulta kaam).

fruits = ['apple','banana']

",".join(fruits)

find() / index()

s = "python"

s.find("t") # 2

s.find("z") # -1

⚠️ index() error deta hai, find() nahi.

count()

s = "banana"

s.count("a") # 3

startswith() / endswith()

Validation ke liye.

email.endswith("@gmail.com")

🔟 isdigit() / isalpha() / isalnum()

Input validation.

"123".isdigit() # True

"abc".isalpha() # True

⚠️ STRING REALITY CHECK

s = "hello"

s[0] = "H" # ❌ ERROR

String **badlegi nahi**, nayi banegi.

🔥 LIST METHODS (Python)

List = mutable
Yahan asli power hai… aur asli bugs bhi.

append()

End mein add.

nums = [1,2]

nums.append(3)

insert()

Specific position pe add.

nums.insert(1, 99)

extend()

Multiple values add.

nums.extend([4,5])

remove()

Value se delete.

nums.remove(99)

⚠️ First occurrence only.

pop()

Index se delete + return.

x = nums.pop()

clear()

nums.clear()

List khaali.

index()

nums.index(3)

Value ka index.

count()

nums.count(2)

sort() / reverse()

nums.sort()

nums.reverse()

⚠️ **Original list change hoti hai**.

🔟 copy()

Dangerous concept.

a = [1,2]

b = a.copy()

❌ b = a = reference copy
✔ copy() = real copy

🧠 STRING vs LIST (EXAM GOLD)

Feature	String	List
Mutable	❌	✅
Indexing	✅	✅
Methods change original	❌	✅
Used for	Text	Data collection

💀 COMMON STUDENT MISTAKES

- append() vs extend() confuse karna
- split() bhool jaana
- String ko mutable samajhna
- b = a ko copy samajhna

🧨 Final Coach Truth

Agar yeh methods **finger memory** mein nahi gaye,
to:

- coding slow
- bugs zyada
- confidence zero

Next step bol:

- 🔥 **20 practice questions**
- 🔥 **exam MCQs**
- 🔥 **real-world examples**
- 🔥 **string + list combined problems**

Choose.

Theek hai bhai. **Modules in Python** ko **short + easy + exam-ready** samjhaata hoon.

Module kya hota hai?

👉 **Module = ek Python file (.py)** jisme reusable code hota hai
(functions, variables, classes).

Simple rule:

Ek file = ek module

Module kyun use karte hain?

- Code reuse
- Code readable & organized
- Large program ko parts mein todna

Example (User-defined Module)

File: math_utils.py

```
def add(a, b):
    return a + b
```

Use:

```
import math_utils

print(math_utils.add(2, 3))
```

Built-in Modules (Python ke saath aate hain)

Examples:

- math
- random
- os
- sys

```
import math

print(math.sqrt(16))
```

Module import karne ke tareeke

Normal import

```
import math

math.sqrt(9)
```

Specific import

```
from math import sqrt
```

sqrt(9)

Alias (short name)

import numpy as np

Types of Modules

1. **Built-in** – Python ke saath
2. **User-defined** – tum khud banate ho
3. **External** – pip install se (jaise numpy, pandas)

Exam-ready definition

A module is a Python file containing reusable code such as functions and classes.

Ultra-short yaad rakh

.py file → module

Agar chaahe to next:

- **Packages vs Modules (short)**
- **Custom module banana (step-by-step)**
- **Import errors & fixes**

Bol bhai, **aage kya?**

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Bol bhai, **aage kya?**

Theek hai bhai. **random module** ko **easy + practical + exam-ready** tareeke se samjhaata hoon. Ye Python ka built-in module hai—install kuch nahi.

random module kya karta hai?

👉 **Random values generate** karta hai: numbers, choices, shuffle, sampling.

Simple line:

Jahan unpredictability chahiye, wahan random

Import ka tareeqa

import random

Most-used functions (IMPORTANT)

random()

0 aur 1 ke beech random float deta hai.

random.random() # e.g. 0.347

randint(a, b)

a se b (inclusive) random integer.

random.randint(1, 6) # dice roll

randrange(start, stop, step)

Range ke andar se random number.

random.randrange(0, 10, 2) # 0,2,4,6,8 me se

choice(sequence)

List/tuple/string me se **ek** random element.

random.choice(['apple', 'banana', 'orange'])

shuffle(list)

List ko **in-place** randomly mix karta hai.

cards = [1, 2, 3, 4]

random.shuffle(cards)

sample(sequence, k)

Unique random elements (without replacement).

random.sample([1,2,3,4,5], 3)

seed(value)

Same random sequence repeat karne ke liye.

random.seed(10)

random.randint(1, 10)

👉 Testing/debugging me kaam aata hai.

Quick Comparison (exam trap)

- choice() → ek element
- sample() → multiple unique elements
- shuffle() → poori list mix

Common Uses

- Games (dice, cards)
- Simulations
- Random testing data
- Sampling

Exam-ready definition

The random module in Python is used to generate random numbers and perform random selections.

Ultra-short yaad rakh

randint → number

choice → one item

sample → many items

shuffle → mix list

Agar bole to next:

- **Mini programs (dice, password)**
- **random vs numpy.random**
- **MCQ traps**
- **Practice questions**

Bol bhai, **aage kya?**