**🔤 What is a String in Python?**

A **string** is a sequence of characters enclosed in **single quotes (' ')**, **double quotes (" ")**, or **triple quotes (''' ''' / """ """)**.

s1 = 'Hello'

s2 = "World"

s3 = '''This is

a multiline

string'''

**📏 String Indexing and Slicing**

**🧩 Indexing**

Each character in a string has an **index**, starting from 0.

text = "Python"

print(text[0]) # 'P'

print(text[-1]) # 'n' (negative indexing)

**✂️ Slicing**

Syntax: string[start:end:step]

* start – Start index (inclusive)
* end – End index (exclusive)
* step – (Optional) skip characters

s = "Python"

print(s[1:4]) # 'yth'

print(s[:3]) # 'Pyt'

print(s[::2]) # 'Pto'

print(s[::-1]) # 'nohtyP' (reversed)

**🛠️ String Methods**

Python provides many built-in string methods. Here’s a categorized breakdown:

**📌 Case Conversion**

s = "hello world"

print(s.capitalize()) # 'Hello world'

print(s.title()) # 'Hello World'

print(s.upper()) # 'HELLO WORLD'

print(s.lower()) # 'hello world'

print(s.swapcase()) # 'HELLO WORLD' if input was 'hello world'

**📌 Searching and Replacing**

s = "hello world"

print(s.find("world")) # 6

print(s.rfind("l")) # 9

print(s.index("world")) # 6

print(s.replace("world", "Python")) # 'hello Python'

print(s.count("l")) # 3

**📌 Check Methods (Boolean return)**

s = "Python3"

print(s.isalpha()) # False

print(s.isdigit()) # False

print("123".isdigit()) # True

print("python".islower()) # True

print("PYTHON".isupper()) # True

print("Hello".istitle()) # True

print(" ".isspace()) # True

**📌 Start/End Check**

s = "python.py"

print(s.startswith("py")) # True

print(s.endswith(".py")) # True

**📌 Alignment**

s = "Python"

print(s.center(10, "-")) # '--Python--'

print(s.ljust(10, "\*")) # 'Python\*\*\*\*'

print(s.rjust(10, "\*")) # '\*\*\*\*Python'

**📌 Split and Join**

s = "hello world python"

print(s.split()) # ['hello', 'world', 'python']

print(s.split("o")) # ['hell', ' w', 'rld pyth', 'n']

print(" ".join(['hi', 'there'])) # 'hi there'

**📌 Strip**

s = " hello "

print(s.strip()) # 'hello'

print(s.lstrip()) # 'hello '

print(s.rstrip()) # ' hello'

**📌 Encode & Decode**

s = "hello"

encoded = s.encode() # b'hello'

print(encoded.decode()) # 'hello'

**🧮 String Operators**

| **Operator** | **Description** | **Example** |
| --- | --- | --- |
| + | Concatenation | "Hi " + "There" → "Hi There" |
| \* | Repetition | "Hi"\*3 → "HiHiHi" |
| in | Membership | "H" in "Hello" → True |
| not in | Not a member | "Z" not in "Python" → True |
| == | Equality | "abc" == "abc" → True |

**🔁 Looping Through Strings**

s = "Python"

for char in s:

print(char)

**🧠 Immutable Nature of Strings**

Strings are **immutable** – once created, they cannot be changed in-place.

s = "hello"

# s[0] = 'H' # ❌ Error

s = 'H' + s[1:] # ✅ Correct way

print(s) # 'Hello'

**📌 String Formatting**

**1. % formatting (old-style)**

name = "John"

print("Hello %s" % name) # 'Hello John'

**2. str.format()**

print("Hello {}, welcome to {}!".format("Alice", "Python"))

**3. f-strings (Recommended, Python 3.6+)**

name = "Alice"

language = "Python"

print(f"Hello {name}, welcome to {language}!")

**🧪 Interview Questions**

**✅ Basic-Level**

1. What is a string in Python?
2. How are strings indexed?
3. Is Python string mutable or immutable?
4. What is the output of "Python"[::-1]?
5. Difference between find() and index()?

**✅ Intermediate-Level**

1. How do you reverse a string in Python?
2. How does join() differ from split()?
3. What is the use of strip() method?
4. What will " hello world ".strip().upper() return?

**✅ Advanced-Level**

1. How can you make a string palindrome check in Python?
2. Explain memory handling in strings when slicing is done.
3. What is the difference between isalpha(), isalnum(), and isdigit()?
4. How do you handle Unicode or encoded strings?

**💡 Tips for Interviews**

* Always mention that **strings are immutable**.