



PYTHON FUNDAMENTALS

TechRacine Solutions Academy

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Study Guide

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Introduction to Python

Python is one of the most popular programming languages in the world.

It is widely used for web development, automation, artificial intelligence, data science, and scripting.

Python is beginner-friendly because of its simple syntax and readability.

Python was created by Guido van Rossum and released in 1991.

Many modern companies use Python for backend systems and AI applications.

Features of Python

Python provides many powerful features for developers.

1. Easy to Learn
2. Simple and Readable Syntax
3. Cross Platform Support
4. Large Community Support
5. Extensive Libraries
6. Object-Oriented Programming Support
7. AI and Machine Learning Support

Installing Python

Python can be downloaded from the official Python website.

During installation, developers should enable the option 'Add Python to PATH'.

After installation, Python commands can be executed using terminal or command prompt.

```
python --version
```

Python Syntax

Python syntax is simple and easy to understand.

Unlike many programming languages, Python uses indentation instead of curly braces.

Proper indentation is mandatory in Python.

```
print("Welcome to TechRacine Academy")
```

Variables and Data Types

Variables are used to store data values.

Python automatically detects variable data types.

Common data types include string, integer, float, boolean, list, tuple, and dictionary.

```
name = "TechRacine"  
age = 5  
salary = 45000.50  
is_active = True
```

Operators in Python

Operators perform calculations and comparisons.

Python supports arithmetic, comparison, assignment, and logical operators.

```
a = 10  
b = 5  
  
print(a + b)  
print(a > b)
```

Conditional Statements

Conditional statements help programs make decisions.

Python uses if, elif, and else statements.

```
marks = 80
```

```
if marks >= 50:  
    print("Pass")  
else:  
    print("Fail")
```

Loops in Python

Loops execute code repeatedly.

Python supports for and while loops.

Loops reduce repetitive coding.

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

Functions

Functions are reusable blocks of code.

Functions improve code organization and maintainability.

```
def add(a,b):  
    return a + b  
  
print(add(10,20))
```

Lists, Tuples and Dictionaries

Python provides multiple collection data types.

Lists are mutable collections.

Tuples are immutable collections.

Dictionaries store key-value pairs.

```
students = ["Arun", "Kumar"]
```

```
employee = {  
    "name": "John",  
    "age": 25  
}
```

Object-Oriented Programming

Python supports object-oriented programming concepts.

Classes and objects help organize application logic.

OOP improves code reusability.

```
class Student:  
  
    def __init__(self, name):  
        self.name = name  
  
obj = Student("Arun")
```

File Handling

Python can read and write files.

File handling is useful for reports, logs, and data processing.

```
file = open("sample.txt", "r")  
  
print(file.read())
```

Exception Handling

Exception handling manages runtime errors.

Python uses try and except blocks.

```
try:  
    print(10 / 0)  
  
except:  
    print("Error Occurred")
```

Python Libraries

Python contains thousands of libraries for different purposes.

Popular libraries include NumPy, Pandas, Flask, Django, TensorFlow, and Requests.

Libraries improve development speed.

Python for Web Development

Python frameworks such as Flask and Django are used for web development.

Developers can build APIs, admin portals, and enterprise systems using Python.

Python for AI and Automation

Python is the most popular language for AI and automation.

Python is widely used in Machine Learning, Generative AI, and scripting automation.

Libraries such as TensorFlow and PyTorch support AI development.

Using Python with VS Code

VS Code provides excellent support for Python development.

Developers should install the Python extension in VS Code.

VS Code supports debugging, IntelliSense, terminal integration, and virtual environments.

Best Practices

Write clean and properly indented code.

Use meaningful variable names.

Avoid unnecessary global variables.

Break large programs into functions.

Handle exceptions properly.

Use virtual environments for projects.

Summary

Python is a powerful and beginner-friendly programming language.

It is widely used in web development, automation, AI, and enterprise applications.

Python's simple syntax and extensive libraries make it one of the best languages for modern software development.

Learning Python provides strong opportunities in software engineering and AI development.