1 Introduction to Python

□ Concepts

- What is Python
- Features (Easy, Interpreted, OOP, Cross-platform)
- Applications (Web, AI, Data Science, Automation)
- Installing Python
- Running Python (IDLE / Terminal / VS Code)
- Python syntax basics
- Comments

□ Explanation

Python is a high-level interpreted language known for simple syntax and powerful libraries. It's widely used in AI, ML, Web Development, Automation, and Data Science.

□ Practice Questions

1 Write a program to print your name, college, and branch.
2 Write a program to print Python version.
3 Write a program using single line and multi-line comments.
4 Write a program to print formatted output (name & age).

2Variables & Data Types

□ Topics

- Variables
- Naming rules
- Multiple assignment
- Type checking
- Type conversion

□ Data Types

- int
- float
- complex
- str
- bool
- None

□ Explanation

Variables store data. Python is dynamically typed, so you don’t declare type explicitly.

□ Practice Questions

1 Swap two numbers without using third variable.
2 Convert temperature Celsius → Fahrenheit.
3 Take user input and print its data type.
4 Convert string to integer and perform addition.

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3 Operators

□ Types

- Arithmetic
- Comparison
- Logical
- Assignment
- Bitwise
- Membership
- Identity

□ Explanation

Operators perform operations on variables and values.

□ Practice Questions

1 Check if number is even or odd using operator.
2 Check largest among three numbers.
3 Check if a number is divisible by 5 and 7.
4 Write calculator using operators.

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4 Input & Output

□ Topics

- input()
- print()
- formatting (f-string)
- sep & end
- string formatting methods

□ Practice Questions

1 ake name and age and print formatted output.
2 Print multiplication table using user input.
3 Print number with 2 decimal precision.
4 Take 3 numbers and print average.

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5 Conditional Statements

□ Topics

- if
- if else
- if elif else
- nested if
- ternary operator

□ Explanation

Used for decision making.

□ Practice Questions

1 Check number positive/negative/zero.
2 Find largest of three numbers.
3 Check leap year.
4 Grade calculator using marks.

□ 6□ Loops

□ Topics

- for loop
- while loop
- nested loop
- break
- continue
- pass

□ Practice Questions

1 Print 1 to 100 numbers.
2 Print factorial of number.
3 Print star pattern.
4 Find sum of digits of number.

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7 Strings

□ Topics

- String indexing
- slicing
- string methods
- string formatting
- escape characters

□ Explanation

Strings are immutable sequences of characters.

□ Practice Questions

1 Reverse a string.
2 Check palindrome string.
3 Count vowels and consonants.
4 Remove spaces from string.

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8 Lists

□ Topics

- List creation
- indexing
- slicing
- methods (append, remove, sort)
- nested list
- list comprehension

□ Practice Questions

1 Find largest element in list.
2 Remove duplicates from list.
3 Sort list without using sort().
4 Find second largest number.

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9 Tuples

□ Topics

- tuple creation
- immutability
- methods
- packing & unpacking

□ Practice Questions

1 Convert tuple to list.
2 Find max and min in tuple.
3 Count occurrences of element.
4 Swap values using tuple unpacking.

□ Sets

□ Topics

- set creation
- union
- intersection
- difference
- set methods

□ Practice Questions

1 Find common elements in two lists using set.
2 Remove duplicates using set.
3 Check subset.
4 Perform all set operations.

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11 Dictionary

□ Topics

- key value pairs
- methods
- nested dictionary

- looping dictionary

□ Practice Questions

1 Count frequency of characters.
2 Student marks dictionary program.
3 Merge two dictionaries.
4Find highest value key.

12Functions

□ Topics

- function definition
- parameters
- return
- default arguments
- keyword arguments
- lambda function
- recursion

□ Practice Questions

1 Write function to check prime number.
2 Fibonacci using recursion.
3 Find factorial using function.
4 Lambda function to find square.

13Modules & Packages

□ Topics

- import
- from import
- math module
- random module
- creating modules

□ Practice Questions

1 Generate random number.
2 Use math module for sqrt.

3 Create custom module.
4 Dice simulator.

14File Handling

□ Topics

- open modes
- read write append
- file methods
- with statement

□ Practice Questions

1 Write text to file.
2 Count words in file.
3 Copy file content.
4 Read file line by line.

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15 Exception Handling

□ Topics

- try except
- finally
- else
- custom exceptions

□ Practice Questions

1 Handle divide by zero.
2 Validate user input number.
3 File not found handling.
4 Custom exception example.

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16 OOP (Very Important)

□ Topics

- Class & Object

- constructor
- self keyword
- methods
- inheritance
- polymorphism
- encapsulation
- abstraction
- method overriding

□ Practice Questions

1 Create student class.
2 Bank account class.
3 Inheritance example.
4 Employee salary calculator.

17Advanced Python

□ Topics

- Iterators
- Generators
- Decorators
- Closures
- Context managers
- Multithreading basics
- Regex
- Virtual environments

□ Practice Questions

1 Generator for even numbers.
2 Decorator to measure function time.
3 Regex email validator.
4 Custom iterator.

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18 Libraries Basics

□ Topics

- NumPy
- Pandas
- Matplotlib
- Requests

- JSON

□ Practice Questions

1 Create numpy array and operations.
2 Read CSV using pandas.
3 Plot graph using matplotlib.
4 Fetch API using requests.

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19 Testing

□ Topics

- unit testing
- pytest basics
- assertions

□ Practice Questions

1 Write unit test for addition function.
2 Test prime number function.
3 Assertion example.
