GUJARAT TECHNOLOGICAL UNIVERSITY

BE 5 SEMESTER – OLD PAPER – S22 TO S25 – QUESTION BANK

Subject Name & Code: Python Programming - 3151108

Chapter 1: Introduction, Data Types and Operators

Repeated Questions:

1. Python Features:

- **Q.** List/discuss advantages and disadvantages of Python / key features of Python. **(WINTER 2022, 7 Marks; SUMMER 2023, 3 Marks; WINTER 2024, 3 Marks)**

2. Lists, Tuples and Methods:

- **Q.** Differentiate / compare List and Tuple; advantages of tuple; when to use one over the other. **(SUMMER 2022, 4 Marks; WINTER 2022, 3 Marks; SUMMER 2023, 7 Marks; SUMMER 2024, 3 Marks; WINTER 2024, 4 Marks; SUMMER 2025, 4 Marks)**
- **Q.** Describe list methods with examples — e.g. append(), insert(), discard(), count(), reverse(). **(SUMMER 2023, 3 Marks; WINTER 2023, 3 Marks)**

3. Operators:

- **Q.** Describe membership operator and identity operator with examples / explain is and is not operators with example. **(SUMMER 2022, 3 Marks; WINTER 2023, 3 Marks; WINTER 2024, 7 Marks)**
- **Q.** Explain/categorize operators in Python, including arithmetic, assignment, logical, and/or bitwise operators, with examples. **(SUMMER 2022, 7 Marks; WINTER 2022, 4 Marks; WINTER 2022, 3 Marks; SUMMER 2023, 7 Marks; WINTER 2023, 3 Marks OR; SUMMER 2024, 7 Marks; SUMMER 2025, 7 Marks)**

4. Type Conversion:

- **Q.** Explain type conversion in Python; differentiate implicit and explicit type conversion with examples / explain various type conversion functions. **(WINTER 2022, 7 Marks; SUMMER 2023, 7 Marks OR; SUMMER 2025, 4 Marks)**

Other Important Questions:

1. Installation, Compiler/Interpreter and Variables:

- **Q.** What is the significance of setting the environment variable PATH during Python installation? How does it affect running Python from the command line? **(SUMMER 2025, 4 Marks)**
- **Q.** Differentiate between compiler and interpreter. How is Python an interpreted language? **(SUMMER 2023, 4 Marks)**
- **Q.** What are keywords in Python? **(SUMMER 2023, 3 Marks)**
- **Q.** What are rules for naming a variable in Python? **(SUMMER 2023, 3 Marks OR)**
- **Q.** What are the advantages of choosing mnemonic variable names in Python? **(WINTER 2022, 3 Marks)**

2. Data Types, Sequences and Sets:

- **Q.** Describe the various data types in Python (e.g., integer, float, string, boolean, list, tuple, dictionary). How does Python manage memory allocation for these data types? **(SUMMER 2025, 7 Marks)**
- **Q.** What are common built-in data types in Python? **(SUMMER 2023, 7 Marks)**
- **Q.** What is the difference between mutable and immutable data types in Python? Provide examples of each. **(SUMMER 2025, 3 Marks OR)**

- **Q.** What are negative indexes and why are they used? **(WINTER 2024, 3 Marks)**
- **Q.** Describe slicing in Python. How does it work with lists, tuples, and strings? Provide examples to illustrate the slicing syntax. **(SUMMER 2025, 7 Marks OR)**
- **Q.** Differentiate List, Tuple, Set and Dictionary. **(WINTER 2023, 7 Marks)**
- **Q.** Describe Python tuple with example. Describe any two built-in tuple methods. **(WINTER 2023, 3 Marks)**
- **Q.** What is set in Python? Explain various methods that can be used with sets in Python. **(WINTER 2022, 7 Marks)**
- **Q.** Explain how string is converted into list. Convert string S = "GTU Supports Innovation" into list. **(SUMMER 2022, 3 Marks)**

3. Operators and Built-in Functions:

- **Q.** Explain the difference between = and == in Python. Provide an example where each of these is used. **(SUMMER 2025, 3 Marks)**
- **Q.** Explain modulo operator in Python with the help of a suitable example. **(WINTER 2022, 3 Marks OR)**
- **Q.** Explain the use of the following built-in functions in Python: max(), pow(), str(), input(). **(WINTER 2022, 4 Marks)**

4. Programs and Code Output:

- **Q.** Write a Python program to compute the sum, difference, product, and quotient of two numbers and print the output for each of them. **(SUMMER 2025, 3 Marks)**
- **Q.** Write a Python program to do the following with a list: create a list with five numbers; append a new number; remove the second element; sort the list in ascending order; reverse the sorted list; print the final list. **(SUMMER 2025, 7 Marks)**
- **Q.** Write the output of the following code:

```
txt = "Python Programming"
x = txt.casefold()
print(x)
y = txt.count("P")
print(y)
x = txt.split()
print(x)
```

(SUMMER 2023, 3 Marks OR)

Chapter 2: Python Decision Making and Loops

Repeated Questions:

1. for Loop:

- **Q.** Explain for loop in Python with suitable example / structure of for loop / display even numbers using for loop. **(SUMMER 2022, 3 Marks; WINTER 2022, 3 Marks; WINTER 2023, 4 Marks; SUMMER 2024, 3 Marks)**

2. while Loop:

- **Q.** Explain while loop in Python. How to create an infinite while loop? How to break an infinite while loop under a certain condition? Explain with example / infinite loop detection and break. **(SUMMER 2022, 4 Marks; SUMMER 2023, 3 Marks OR; WINTER 2024, 7 Marks OR; SUMMER 2025, 4 Marks OR; SUMMER 2025, 3 Marks)**

3. break, continue and pass:

- **Q.** Explain the use of break, continue, and pass statements in Python with examples / purpose of break. **(SUMMER 2022, 4 Marks OR; WINTER 2022, 4 Marks; SUMMER 2023, 4 Marks; SUMMER 2025, 3 Marks OR)**

Other Important Questions:

1. List and Loop Programs:

- **Q.** Develop a Python program to print even numbers in a list. **(SUMMER 2024, 4 Marks)**
- **Q.** Develop a Python program to count occurrences of an element in a list. **(SUMMER 2024, 4 Marks)**
- **Q.** Write a Python program to find sum of first N numbers using while loop. (Take N as user input.) **(WINTER 2023, 4 Marks)**
- **Q.** Write a Python program to multiply all the numbers stored in a list. **(WINTER 2022, 4 Marks)**
- **Q.** Describe the range() function with example. **(WINTER 2024, 3 Marks)**

2. Plotting (matplotlib):

- **Q.** Explain various features of a plot in Python. **(SUMMER 2024, 7 Marks)**
- **Q.** Develop a Python program that creates a matrix graph of the following plots using subplot: 1. linear plot, 2. scatter plot, 3. histogram, and 4. bar chart. [Diagram required – refer to the original question paper] **(SUMMER 2024, 7 Marks OR)**
- **Q.** Enlist types of plots available in Python matplotlib module. **(WINTER 2023, 3 Marks)**
- **Q.** Write a Python program to find roots of the quadratic equation $y = 3x^2 - 5x - 4$ in the range -5 to 5 on a plot. Put axes labels and plot title. [Diagram required – refer to the original question paper] **(WINTER 2023, 7 Marks OR)**

3. Pattern Programs:

- **Q.** Develop a Python program to construct the following pattern:

```
* * * * * * * * * * * * * * * * * * * * *
* * * * * * * * * *
* * * * * * * * * *
* * * * * * * * * *
* * * * * * * * * *
* * * * * * * * * *
* * * * * * * * * *
* * * * * * * * * *
```

  [Diagram required – refer to the original question paper] **(SUMMER 2024, 4 Marks)**

- **Q.** Write a Python program to generate the pyramid pattern:

```
*
* *
* * *
* * * *
```

  [Diagram required – refer to the original question paper] **(WINTER 2024, 7 Marks)**

- **Q.** Write Python code to print the following pattern using nested loop:

```
1
0 1
1 0 1
0 1 0 1
1 0 1 0 1
```

  Take number of rows as user input. [Diagram required – refer to the original question paper] **(WINTER 2023, 7 Marks)**

- **Q.** Write a Python program to generate the pyramid pattern as given below:

```
*
* * *
* * *
* * * *
```

  [Diagram required – refer to the original question paper] **(WINTER 2022, 7 Marks OR)**

4. Decision Making and Numeric Programs:

- **Q.** Explain nested if...else statement in Python. **(SUMMER 2023, 4 Marks)**
- **Q.** Explain nested if statements in Python with logical combinations. Write a program to get temperature and humidity from the user. Display the following messages in different situations: (1) If temperature > 30 and humidity < 20% → "Hot and Dry" (2) If temperature is between 20 to 30 and humidity between 20% to 40% → "Good weather condition" (3) If temperature is between 20 to 30 and humidity more than 80% → "Moisture present" **(SUMMER 2022, 7 Marks)**
- **Q.** Write a Python program that accepts a sentence and calculates the number of words, digits, uppercase letters and lowercase letters. **(SUMMER 2022, 7 Marks OR)**
- **Q.** Write a Python program to find the sum of all odd numbers up to a number specified by the user. **(SUMMER 2022, 4 Marks)**
- **Q.** Write a Python program to get a number from the user and find the sum of digits in the entered number and print the sum. Prompt the user to get the input number. **(SUMMER 2022, 7 Marks)**
- **Q.** Write a Python program to find factorial of a given number. **(SUMMER 2022, 3 Marks OR)**
- **Q.** Write Python code to check if a given year is a leap year or not. **(SUMMER 2022, 3 Marks)**
- **Q.** Write a Python program to print all the prime numbers between 100 to 200. **(WINTER 2022, 7 Marks)**
- **Q.** Write Python code to find determinant of a 3×3 matrix. Enter 9 data at runtime. **(WINTER 2023, 7 Marks OR)**

Chapter 3: Python Functions and Modules

Repeated Questions:

1. Functions:

- **Q.** Write a Python function to sum all the numbers in a list. **(SUMMER 2023, 3 Marks; WINTER 2024, 3 Marks)**
- **Q.** Develop a Python program to find maximum, minimum and average of given numbers using a user-defined function. **(SUMMER 2024, 7 Marks; WINTER 2024, 7 Marks)**

2. Modules, Scope and Lambda:

- **Q.** Describe module in Python / what is meant by module in Python; list built-in modules/functions. **(SUMMER 2023, 4 Marks OR; WINTER 2023, 4 Marks OR; WINTER 2024, 4 Marks OR)**
- **Q.** Discuss/explain global, local, and nonlocal variables / scope in Python. **(SUMMER 2023, 3 Marks; SUMMER 2024, 3 Marks OR; WINTER 2024, 4 Marks; SUMMER 2025, 7 Marks OR)**
- **Q.** Define/describe lambda function and use it in an example. **(WINTER 2023, 4 Marks; SUMMER 2024, 4 Marks OR)**

3. Dictionary:

- **Q.** Explain dictionary in Python in detail with suitable example. **(WINTER 2022, 3 Marks; SUMMER 2023, 4 Marks; SUMMER 2024, 3 Marks)**

Other Important Questions:

1. Functions and Arguments:

- **Q.** Explain the purpose of defining custom functions in Python. How do functions contribute to code reusability and organization? Provide an example of a function that calculates the factorial of a number. **(SUMMER 2025, 7 Marks)**
- **Q.** What is a function? Mention the types of functions and their use. **(WINTER 2024, 3 Marks OR)**
- **Q.** Write a Python function to convert a string into upper case and find the length of the string. The string will be passed to the function. **(WINTER 2024, 7 Marks OR)**
- **Q.** Describe Python function with keyworded variable-length argument with example. **(WINTER 2023, 4 Marks)**
- **Q.** Write the following Python functions: Function-1: Returns reverse string word-wise. Function-2: Counts occurrence of vowels from an input string. Design main Python code where the above functions are called. **(WINTER 2023, 7 Marks)**
- **Q.** What is the output of the following code snippet?

```
def fred():
    print("Zap")

def jane():
    print("ABC")

jane()
fred()
jane()
```

(WINTER 2022, 3 Marks OR)

- **Q.** What is the purpose of the def keyword in Python? **(WINTER 2022, 4 Marks OR)**
- **Q.** Explain command-line arguments with the help of one example. **(SUMMER 2022, 7 Marks OR)**

2. Modules and filter():

- **Q.** How do you import and use standard and external modules in Python? Explain the difference between import module, from module import name, and import module as alias. **(SUMMER 2025, 4 Marks OR)**
- **Q.** Describe the filter() method/function available in Python with example. **(WINTER 2023, 4 Marks)**

3. Dictionaries:

- **Q.** What are the restrictions on dictionary keys in Python? Can a dictionary key be mutable? Explain why or why not with an example. **(SUMMER 2025, 3 Marks)**
- **Q.** How do you create a dictionary in Python? Give an example of a dictionary with at least three key-value pairs. **(SUMMER 2025, 3 Marks OR)**
- **Q.** Describe different methods to make a dictionary variable. **(WINTER 2023, 3 Marks OR)**
- **Q.** Explain the conversion of list to dictionary in Python. **(WINTER 2022, 7 Marks OR)**

Chapter 4: Python File Operations

Repeated Questions:

1. File Modes and Text Files:

- **Q.** Explain/discuss/enlist the different file modes in Python, such as 'r', 'w', 'a', 'b', etc. **(WINTER 2022, 7 Marks OR; SUMMER 2023, 7 Marks; WINTER 2023, 4 Marks OR; SUMMER 2024, 3 Marks OR; WINTER 2024, 4 Marks; SUMMER 2025, 4 Marks OR)**
- **Q.** Read from and write to a text file / read first n lines and create a new file / count lines not starting with a given alphabet. **(SUMMER 2023, 7 Marks OR; SUMMER 2024, 4 Marks; SUMMER 2025, 4 Marks)**

2. CSV Files:

- **Q.** Develop a Python program to create a CSV file that contains five entries along with header (serial number, name, birth_date, and city). **(SUMMER 2024, 7 Marks OR; WINTER 2024, 4 Marks OR)**
- **Q.** Explain the different methods available for manipulating CSV files in Python / read and write to a CSV file with example. **(WINTER 2022, 7 Marks; SUMMER 2023, 7 Marks; WINTER 2024, 7 Marks OR)**

3. Exception Handling:

- **Q.** Explain exception handling / try-except / types of exceptions / errors and try-except block. **(WINTER 2022, 4 Marks; SUMMER 2023, 7 Marks OR; WINTER 2023, 4 Marks OR; SUMMER 2024, 7 Marks; WINTER 2024, 3 Marks OR; WINTER 2024, 7 Marks; SUMMER 2025, 3 Marks)**

Other Important Questions:

1. CSV File Programs:

- **Q.** Write a Python program to read marks of students from "student marks.csv". Find average, maximum, and minimum marks from data. (File contains 100 records.) **(WINTER 2023, 7 Marks)**
- **Q.** Write a program to print 100 Fibonacci numbers in file "Myfibonnaci.csv". **(WINTER 2023, 7 Marks OR)**

Chapter 5: MicroPython

Repeated Questions:

1. MicroPython Overview:

- **Q.** Explain the difference between Python and MicroPython / merits and demerits of MicroPython over Python / key differences such as memory usage, performance, and supported features. **(WINTER 2022, 3 Marks OR; SUMMER 2023, 4 Marks OR; WINTER 2023, 3 Marks OR; WINTER 2024, 4 Marks OR; SUMMER 2025, 7 Marks)**
- **Q.** What is MicroPython? Discuss its unique features / explain features of MicroPython / where it is used. **(SUMMER 2023, 4 Marks; SUMMER 2024, 3 Marks; WINTER 2024, 3 Marks)**
- **Q.** Enlist various IDE/tools available to carry out programming in MicroPython. **(WINTER 2023, 3 Marks; WINTER 2024, 3 Marks OR)**

2. MicroPython Programs:

- **Q.** Write/develop a MicroPython program to send digital data on a GPIO pin and blink an LED / interface LED and button / ring counter / LCD. [Diagram required – refer to the original question paper] **(WINTER 2022, 7 Marks OR; WINTER 2023, 7 Marks; WINTER 2023, 7 Marks OR; SUMMER 2024, 4 Marks OR; WINTER 2024, 7 Marks OR)**

Other Important Questions:

1. NodeMCU and Sensors:

- **Q.** List different features available in NodeMCU 8266 controller. **(WINTER 2024, 4 Marks)**
- **Q.** Write a MicroPython program to read a proximity sensor connected at Pin1, and blink the LED if sensing is detected. [Diagram required – refer to the original question paper] **(WINTER 2024, 7 Marks)**
- **Q.** Write a short note on: Sensor programming using MicroPython. **(WINTER 2022, 4 Marks)**

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