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	Model Answer Exam	SUM 20
Subject:	Programming with Python	
	SUB CODE	226
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1)	The model answer given here are prepared from the answers from the previously uploaded model answers by Board.	
2)	These model answers are not uploaded by the MSBTE official site but MSBTE study resources website prepared it for students. This model answer has question paper also inbuilt in it, no need to download it separate.	
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Question 1: Attempt any FIVE of the following

a) Enlist any four data structures used in Python.

Answer:

Python provides several built-in data structures to organize and manage data efficiently:

1. List:

- Type: Ordered, mutable (can be modified).
- Example: numbers = [1, 2, 3, "apple", 5.5].
- Use Case: Storing collections of items where order and modifications are required.

2. Tuple:

- Type: Ordered, immutable (cannot be modified).
- Example: coordinates = (10, 20, 30).
- Use Case: Storing fixed data like coordinates or constants.

3. Dictionary:

- Type: Unordered, mutable collection of key-value pairs.
- Example: student = {"name": "Alice", "age": 21}.
- Use Case: Fast lookups using unique keys (e.g., JSON-like data).

4. Set:

- Type: Unordered, mutable collection of unique elements.
- o Example: unique_ids = {101, 102, 103}.
- Use Case: Removing duplicates or checking membership.

b) Give membership operators in Python.

Answer:

Membership operators check if a value exists in a sequence (e.g., list, string, set):

1. in:

- Returns True if the value is found.
- Example:



- 2. not in:
 - Returns True if the value is **not** found.
 - Example:

python	
<pre>vowels = {'a', 'e', 'i', print('z' not in vowels)</pre>	

c) Write syntax for a method to sort a list.

Answer:

Use the **sort()** method to sort a list in-place (modifies the original list):



Examples:

1. Ascending Order:

python	
<pre>numbers = [3, 1, 4, 2] numbers.sort() print(numbers) # Output: [1, 2, 3, 4]</pre>	

2. Descending Order:

python			
<pre>numbers.sort(re print(numbers)</pre>			

3. Custom Sorting (e.g., by string length):

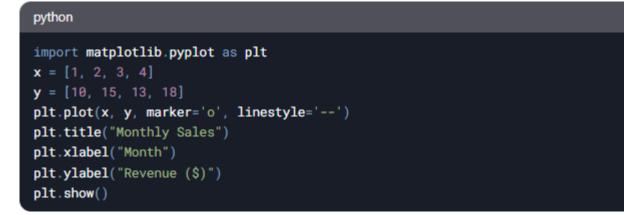
python	
words.sort	apple", "kiwi", "banana"] (key=lambda x: len(x)) s) # Output: ["kiwi", "apple", "banana"]

d) Write use of matplotlib package in Python.

Answer:

Matplotlib is a plotting library for creating static, interactive, and animated visualizations. Key use include:

1. Line Plots: Visualize trends over time (e.g., stock prices).



- 2. Bar Charts: Compare categorical data (e.g., sales by region).
- 3. Histograms: Display frequency distributions (e.g., exam scores).
- 4. Scatter Plots: Analyze relationships between variables.

e) What is data abstraction and data hiding?

Answer:

- Data Abstraction:
 - Definition: Hiding complex implementation details while exposing only essential features to the user.
 - Example: A Car class with a method start_engine(), where the internal mechanics are hidden.
- Data Hiding:
 - Definition: Restricting direct access to an object's internal data to prevent unintended modifications.
 - Python Implementation:
 - Single Underscore (_variable): Convention for "protected" variables (not enforced).
 - Double Underscore (__variable): Name mangling to make variables "private".
 - Example:



f) Write the syntax of fopen.

Answer:

In Python, the correct function is open(), not fopen().

Syntax:

python
<pre>file_object = open("filename", "mode", buffering=-1, encoding=None)</pre>

Parameters:

- filename : Name/path of the file (e.g., "data.txt").
- mode : Specifies the operation (default is "r" for read). Common modes:
 - "r" : Read mode.
 - "w" : Write mode (overwrites existing file).
 - "a" : Append mode (adds to the end).
 - "b" : Binary mode (e.g., "rb").

g) What is a dictionary?

Answer:

A **dictionary** is an unordered, mutable collection of **key-value pairs**.

Key Features:

- Keys: Must be unique and immutable (e.g., strings, numbers).
- Values: Can be of any data type (e.g., lists, other dictionaries).
- Syntax: {key1: value1, key2: value2}.

Question 2: Attempt any THREE of the following

- a) Explain with example:
- i) Indentation
- ii) Variables

Answer:

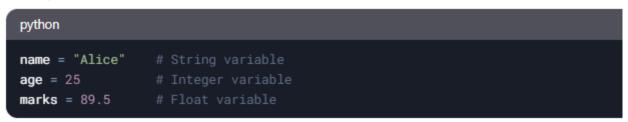
i) Indentation:

- Python uses indentation (spaces/tabs) to define code blocks instead of braces {}.
- Example:



ii) Variables:

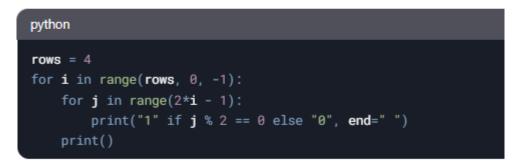
- Variables store data values and do not require explicit type declaration.
- Example:



b) Print the following pattern using loop:



Answer:



- The outer loop (rows) controls the number of rows (4 to 1).
- The inner loop prints alternating 1 and 0 based on j % 2.

c) Write python program to perform following operations on set:

- i) Create set of five elements
- ii) Access set elements
- iii) Update set by adding one element
- iv) Remove one element from set

Answer:

python # i) Create set my_set = {1, 2, 3, 4, 5} print("Original Set:", my_set) # ii) Access elements print("\nAccessing Elements:") for element in my_set: print(element, end=" ") # iii) Update set my_set.add(6) print("\n\nAfter Adding 6:", my_set) # iv) Remove element my_set.remove(3) print("After Removing 3:", my_set)

Output:

Original Set: {1, 2, 3, 4, 5} Accessing Elements: 1 2 3 4 5 After Adding 6: {1, 2, 3, 4, 5, 6} After Removing 3: {1, 2, 4, 5, 6}

- d) Describe following Standard Packages:
- i) Numpy
- ii) Pandas

Answer:

i) Numpy:

- · A library for numerical computing with support for arrays and matrices
- Example:



ii) Pandas:

- · A library for data manipulation and analysis using DataFrame structure
- Example:



Question 3: Attempt any THREE of the following

a) What is the output of the following program?

python
<pre>dict1 = {'Google': 1, 'Facebook': 2, 'Microsoft': 3} dict2 = {'GFG': 1, 'Microsoft': 2, 'Youtube': 3} dict1.update(dict2) for key, value in dict1.items(): print(key, value)</pre>

Answer:

Output:

Google 1 Facebook 2 Microsoft 2 GFG 1 Youtube 3 b) Write a Python program that takes a number and checks whether it is a palindrome.

Answer:

Method 1: Using string slicing

```
python
num = input("Enter a number: ")
if num == num[::-1]:
    print(f"{num} is a palindrome.")
else:
    print(f"{num} is not a palindrome.")
```

Method 2: Using arithmetic operations

```
python
num = int(input("Enter a number: "))
original = num
reverse = 0
while num > 0:
    digit = num % 10
    reverse = reverse * 10 + digit
    num = num // 10
print(f"{original} is a palindrome." if original == reverse else f"{original} is not a palin
e.")
```

c) Write a Python program to create a user-defined module that will ask your program nar display the name of the program.

Answer:

Step 1: Create the module (program_name.py)



Step 2: Use the module in the main program



Output:



d) List data types used in Python. Explain any two with example.

Answer:

Python Data Types:

int, float, str, list, tuple, dict, set, bool.

Explanation with Code Examples:

- 1. int (Integer):
 - Represents whole numbers (positive, negative, or zero).
 - Example:



- 2. str (String):
 - Represents textual data enclosed in single (' ') or double quotes (" ").
 - Example:



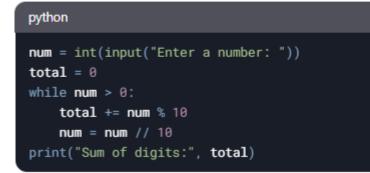
Question 4: Attempt any THREE of the following

a) Compare list and tuple (any four points).

Answer:

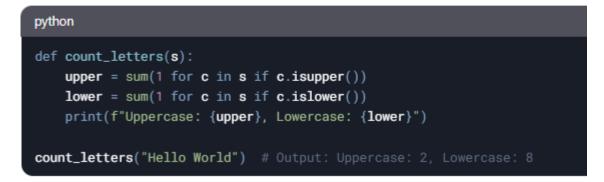
List	Tuple
Mutable (e.g., [1, 2])	Immutable (e.g., (1, 2))
Uses append(), pop()	No modification methods
More memory consumption	Less memory consumption
Syntax: Square brackets	Syntax: Parentheses

b) Write a Python program to find the sum of digits in a number. Answer:

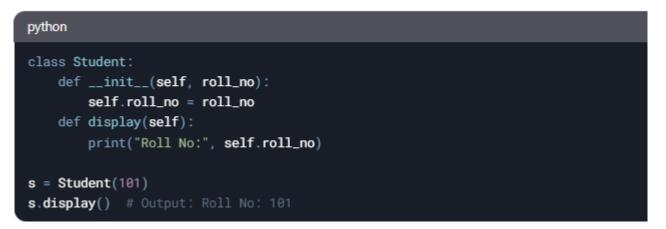


Output: Enter a number: $123 \rightarrow$ Sum of digits: 6.

c) Write a function to calculate uppercase and lowercase letters in a string. Answer:



d) Write a Python program to create class Student with roll-no and display contents. Answer:



e) Explain: i) open() ii) write() functions with example.

Answer:

1. open(): Opens a file.



2. write(): Writes data to a file.

python	
<pre>with open("output.txt", "w") as f: f.write("Hello World")</pre>	

Q.5 Attempt any two

a) Write the output for the following if the variable course = "Python":



Answer:

python	
<pre>>> course[:3] >> course[3:] >> course[2:2] >> course[:] >> course[-1]</pre>	<pre># Output: 'Pyt' # Output: 'hon' # Output: '' (empty string) # Output: 'Python' # Output: 'n'</pre>
<pre>>> course[1]</pre>	# Output: 'y'

- course[:3]: Slices from index 0 to 2 (excludes index 3).
- course[3:] : Slices from index 3 to the end.
- course[2:2] : Start and end index are the same → no characters.
- course[:]: Returns the full string.
- course[-1] : Accesses the last character (n).
- course[1] : Accesses the second character (y).

b) Write a Python program to generate five random integers between 10 and 50 using NumPy library.

Answer:

python
import numpy as np
Generate 5 random integers between 10 and 50 (exclusive of 50) random_ints = np.random.randint(low=10, high=50, size=5) print("Random Integers:", random_ints)

Output Example:

Random Integers: [12 34 25 45 30]

- np.random.randint(): Generates integers between low (inclusive) and high (exclusive).
- size=5 : Specifies the number of integers to generate.

c) Write a Python program to create a class 'Diploma' having a method 'getdiploma' that prints 'I got a diploma'. It has two subclasses namely 'CO' and 'IF' each having a method with the same name that prints 'I am with CO diploma' and 'I am with IF diploma' respectively. Call the method by creating an object of each of the three classes.

Answer:

python
Parent class
class Diploma:
<pre>def getdiploma(self):</pre>
print("I got a diploma")
Subclass CO
class CO(Diploma):
<pre>def getdiploma(self):</pre>
<pre>print("I am with CO diploma")</pre>
Subclass IF
class IF(Diploma):
<pre>def getdiploma(self):</pre>
print("I am with IF diploma")
Create objects
<pre>d = Diploma()</pre>
c = CO()
i = IF()
Call methods
Call methods d.getdiploma() # Output: I got a diploma
c.getdiploma() # Output: I got a diploma c.getdiploma() # Output: I am with CO diploma
i.getdiploma() # Output: I am with IF diploma
i.getaipiona() w output. i am with in aipiona

- Method Overriding: Subclasses CO and IF override the getdiploma() method of the parent Diploma.
- Polymorphism: Objects of different classes invoke their respective getdiploma() methods.

Answer:

Multiple Inheritance: A class can inherit attributes and methods from more than one parent class

Program:

```
python
# Parent Class 1
class Parent1:
    def method1(self):
        print("Method from Parent1")
# Parent Class 2
class Parent2:
    def method2(self):
        print("Method from Parent2")
# Child Class inheriting from Parent1 and Parent2
class Child(Parent1, Parent2):
    def child_method(self):
        print("Method from Child")
# Create object
obj = Child()
# Access methods from all classes
obj.method1() # Output: Method from Parent1
obj.method2() # Output: Method from Child
```

- Child inherits from both Parent1 and Parent2.
- The child class can access methods from all parent classes.

b) Write a Python program to create a user-defined exception that checks whether the passwor correct or not.

Answer:

python
<pre># Custom exception class class PasswordError(Exception):</pre>
pass
<pre>def validate_password(input_password):</pre>
<pre>correct_password = "secret123"</pre>
<pre>if input_password != correct_password:</pre>
raise PasswordError("Incorrect Password! Access denied.")
else:
<pre>print("Access granted!")</pre>
Test the exception
try:
<pre>user_input = input("Enter password: ")</pre>
<pre>validate_password(user_input)</pre>
except PasswordError as e:
<pre>print(e)</pre>

- Output Examples:
 - Correct Password:

Enter password: secret123 Access granted!

Incorrect Password:

```
Enter password: hello
Incorrect Password! Access denied.
```

- PasswordError is a custom exception raised when passwords do not match.
- try-except block handles the exception gracefully.

c) Describe various modes of file object. Explain any three in detail.

Answer:

File Modes:

• r (Read), w (Write), a (Append), r+ (Read+Write), b (Binary), x (Exclusive Creation).

r (Read Mode):

- Purpose: Opens a file for reading (default mode).
- Example:



- Note: File must exist; else, raises FileNotFoundError.
- w (Write Mode):
- Purpose: Opens a file for writing. Overwrites existing content.
- Example:



- Note: Creates a new file if it doesn't exist.
- a (Append Mode):
- Purpose: Opens a file for appending data to the end.
- Example:

python	
file = open("logs.txt", "a") file. write ("\nNew log entry")	

• Note: Preserves existing content; adds new data at the end.

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