
Q6. Explain the concept of class, objects, functions, data members with help of program. Also explain call by value and call by reference. (12.5 Marks)

Class

A **class** is a blueprint or template used to create objects. It defines **data members (variables)** and **member functions (methods)**.

Object

An **object** is an instance of a class. It represents a real-world entity and can access class members.

Data Members

Data members are variables declared inside a class that store data related to the object.

Member Functions

Functions defined inside a class that operate on data members are called member functions.

Example Program

```
class Student:
    # Data members
    name = ""
    marks = 0

    # Member function
    def display(self):
        print("Name:", self.name)
        print("Marks:", self.marks)

# Creating object
s1 = Student()
s1.name = "Rahul"
```

```
s1.marks = 85
s1.display()
```

Call by Value

In call by value, a **copy of the variable** is passed to the function. Changes inside the function do not affect the original value.

```
def change(x):
  x = 10

a = 5
change(a)
print(a)  # Output: 5
```

Call by Reference

In call by reference, the **reference (address)** of the variable is passed. Changes affect the original variable.

```
def change(lst):
  lst.append(10)

a = [1, 2, 3]
change(a)
print(a)  # Output: [1, 2, 3, 10]
```

Note: Python uses *object reference passing*.

Q8. (a) Explain the importance of pip command to install any library in Python. (4.5 Marks)

pip Command

pip stands for **Python Package Installer**. It is used to install, update, and manage Python libraries from the Python Package Index (PyPI).

Importance of pip

- Installs third-party libraries easily

- Manages library versions
- Saves development time
- Supports virtual environments

Example

pip install numpy

pip install pandas

pip uninstall numpy

pip list

Q8. (b) Using NumPy library, perform the following operations: (8 Marks)

- Creation of 1D array
- Reshaping an array
- Array slicing
- Aggregate operations

NumPy Program

```
import numpy as np


# 1D Array Creation
arr = np.array([1, 2, 3, 4, 5, 6])
print("1D Array:", arr)


# Reshaping array
reshaped = arr.reshape(2, 3)
print("Reshaped Array:\n", reshaped)


# Array Slicing
print("Sliced Array:", arr[1:4])
```

```
# Aggregate Operations
print("Sum:", arr.sum())
print("Mean:", arr.mean())
print("Max:", arr.max())
print("Min:", arr.min())
```

Q9. (b) Explain the use of NumPy, Pandas, Matplotlib in Python programming with example of each. (8 Marks)

NumPy

Used for numerical computing and handling arrays.

```
import numpy as np
a = np.array([1, 2, 3])
print(a * 2)
```

Use: Scientific calculations, matrices, linear algebra

Pandas

Used for data analysis and handling structured data like tables.

```
import pandas as pd

data = {
   "Name": ["Amit", "Riya"],
   "Marks": [80, 90]
}

df = pd.DataFrame(data)
print(df)
```

Use: Data cleaning, analysis, CSV/Excel handling

Matplotlib

Used for data visualization and plotting graphs.

```
import matplotlib.pyplot as plt


x = [1, 2, 3, 4]

y = [10, 20, 25, 30]


plt.plot(x, y)

plt.xlabel("X-axis")

plt.ylabel("Y-axis")

plt.title("Simple Line Graph")

plt.show()
```

Use: Graphs, charts, data visualization