**EX.3 Working with NumPy Arrays, Pandas DataFrames, and Basic Plots using Matplotlib"**

**✅ AIM**

To understand and implement basic operations using NumPy arrays, Pandas DataFrames, and visualize data using Matplotlib.

**🔁 ALGORITHM**

**Part 1: NumPy Arrays**

1. Import NumPy library.
2. Create 1D and 2D arrays.
3. Perform operations like addition, multiplication, slicing, and reshaping.

**Part 2: Pandas DataFrame**

1. Import Pandas library.
2. Create a DataFrame from a dictionary or CSV.
3. Display data, info, and statistics.
4. Perform slicing, indexing, and basic operations.

**Part 3: Matplotlib Basic Plots**

1. Import matplotlib.pyplot.
2. Use sample data to draw:
   * Line plot
   * Bar plot
   * Pie chart
3. Customize plots with labels and titles.

**💻 SAMPLE CODE**

# Part 1: NumPy Arrays

import numpy as np

# Creating arrays

arr1 = np.array([1, 2, 3, 4, 5])

arr2 = np.array([[1, 2, 3], [4, 5, 6]])

# Array operations

print("Original Array:", arr1)

print("Array + 5:", arr1 + 5)

print("Sliced Array:", arr1[1:4])

print("Reshaped 2D Array:\n", arr2.reshape(3, 2))

# Part 2: Pandas DataFrame

import pandas as pd

# Creating DataFrame

data = {

'Name': ['Alice', 'Bob', 'Charlie'],

'Age': [25, 30, 35],

'Score': [85, 90, 88]

}

df = pd.DataFrame(data)

print("\nDataFrame:")

print(df)

print("\nDataFrame Info:")

print(df.info())

print("\nStatistics:")

print(df.describe())

# Part 3: Matplotlib Plots

import matplotlib.pyplot as plt

# Line Plot

plt.figure()

plt.plot(df['Name'], df['Score'], marker='o')

plt.title('Scores of Students')

plt.xlabel('Name')

plt.ylabel('Score')

plt.grid(True)

plt.show()

# Bar Plot

plt.figure()

plt.bar(df['Name'], df['Age'], color='orange')

plt.title('Age of Students')

plt.xlabel('Name')

plt.ylabel('Age')

plt.show()

# Pie Chart

plt.figure()

plt.pie(df['Score'], labels=df['Name'], autopct='%1.1f%%', startangle=90)

plt.title('Score Distribution')

plt.show()

**📊 EXPECTED OUTPUT**

**Console Output:**

Original Array: [1 2 3 4 5]

Array + 5: [ 6 7 8 9 10]

Sliced Array: [2 3 4]

Reshaped 2D Array:

[[1 2]

[3 4]

[5 6]]

DataFrame:

Name Age Score

0 Alice 25 85

1 Bob 30 90

2 Charlie 35 88

DataFrame Info:

<class 'pandas.core.frame.DataFrame'>

...

Statistics:

Age Score

count 3.000000 3.00000

mean 30.000000 87.66667

std 5.000000 2.51661

min 25.000000 85.00000

...

**Plots:**

1. Line plot of scores vs names.
2. Bar chart of age vs names.
3. Pie chart of score distribution.