Worksheet No.: 4

Student Name: RITEK MEHTA
UID: 24MCA20180
Branch: MCA (GENERAL)
Section/Group: 3 B
Semester: 1st
Date of Performance: 25/09/24
Subject Name: PYTHON PROGRAMMING LAB
Subject Code: 24CAH-606

1. **Aim of the practical:**

   a. **Write an experiment to swap two columns in numpy array.**

   b. **Write an experiment import a dataset with numbers and texts keeping the text intact in python numpy.**

Program Logic:

a.

1. **Import NumPy:**
   - Use import numpy as np to use NumPy functions.
2. **Create a 2D Array:**
   - Define a 2D array called array with some integer values using np.array().
3. **Display Original Array:**
   - Print the original array to see what it looks like before making any changes.
4. **Swap Columns:**
   - Swap the second column (index 1) and the fourth column (index 3) by using NumPy's indexing method: array[:, [1, 3]] = array[:, [3, 1]].
5. **Display Modified Array:**
   - Print the array again after swapping the columns to see the updated values.

b.

1. **Import NumPy:**
   - Use import numpy as np to access NumPy functions.
2. **Define Sample Data:**
   - Create a list of tuples named data. Each tuple includes a name, an age, and a salary.
3. **Define Data Types:**
   - Set the data types for each column:
     - name as a string (up to 10 characters),
     - age and salary as integers.
4. **Create a Structured Array:**
   - Use np.array() to create a NumPy array from the data list, and specify the data types for each column.
5. **Convert to a Regular Array:**
   - Convert the structured array into a regular NumPy array by converting each row into a list.
6. **Display the Array:**
   - Print the final array to display the name, age, and salary in a readable format.

Software Requirements:

1. **Operating System**:
   - **Windows**: Windows 10 or later. ○ **macOS**: macOS 10.14 (Mojave) or later.
   - **Linux**: Any modern Linux distribution (e.g., Ubuntu 20.04 LTS, Fedora, etc.).
2. **Python Installation**: ○ **Python Version**: Python 3.6 or later. Download the latest version from the official Python website.
   - **Python Latest Version**: Python 3.12.5

3. **Install Anaconda and Jupyter Notebook:**

o Download and install Anaconda from https://repo.anaconda.com/archive/Anaconda3- 2022.05Windows - x86_64.exe.

o Open “Anaconda Prompt” by finding it in the windows (start) Menu.

o Type the command in (python - -version) Anaconda was installed.

3. Code:

a.

```
# Step 1: Import NumPy

import numpy as np

# Step 2: Create a 2D Array

array = np.array([[10, 20, 30, 40],
                  [50, 60, 70, 80],
                  [90, 100, 110, 120]])

# Step 3: Display Original Array

print("Original Array:")
print(array)

# Step 4: Swap Columns (swap second column (index 1) with fourth column (index 3))

array[:, [1, 3]] = array[:, [3, 1]]

# Step 5: Display Modified Array

print("Modified Array after swapping columns 2 and 4:")
print(array)
```

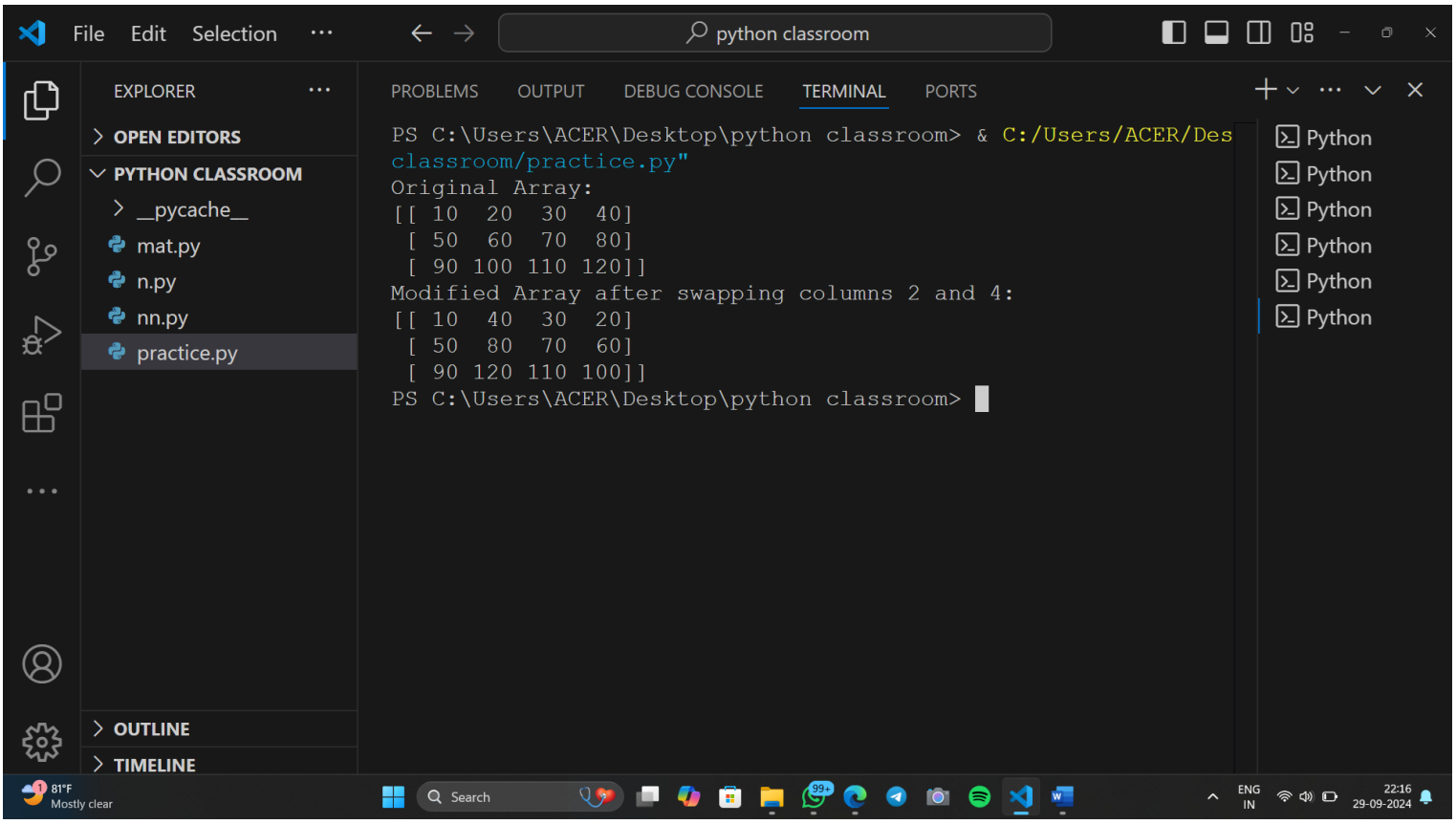
b.

```
# Step 1: Import NumPy

import numpy as np

# Step 2: Defining Sample Data (a list of lists with name, age, and salary)

data = [['Alice', 25, 50000],
        ['Bob', 30, 60000],
        ['Charlie', 35, 70000]]
```

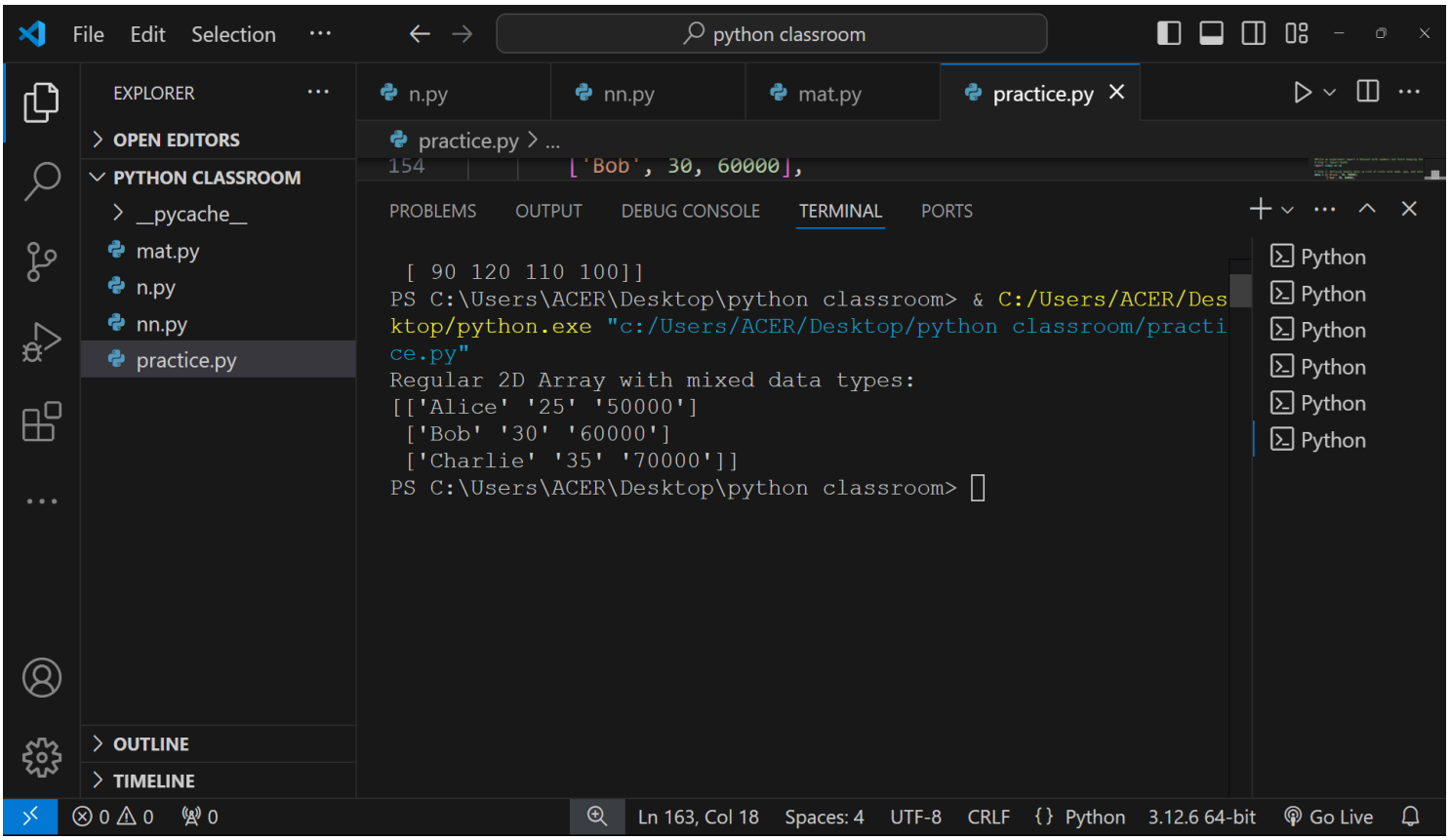
```
# Step 3: Creating a Regular 2D NumPy Array
# Here, no explicit data types are required. NumPy will automatically infer the types.

data_array = np.array(data)


# Step 4: Displaying the Array

print("Regular 2D Array with mixed data types:")
print(data_array)
```

Result:

a.



b.



5. Learning outcomes (What I have learnt):

1. **NumPy Array Creation**: Learned to create a 2D NumPy array using np.array() with integer values.
2. **Column Manipulation**: Gained skills in swapping columns in a NumPy array using advanced indexing.
3. **Structured Arrays**: Learned to create structured arrays for mixed data types by defining custom data types.
4. **Data Conversion**: Understood how to convert structured arrays into regular NumPy arrays for easier display.
5. **Data Visualization**: Improved ability to print and display arrays in a user-friendly format for better interpretation.

Evaluation Grid (To be created as per the SOP and Assessment guidelines by the faculty):

Sr. No.	Parameters	Marks Obtained	Maximum Marks
1.	Worksheet		8 Marks
2.	Viva		10 Marks
3.	Simulation		12 Marks
	Total		30 Marks

Teacher Signature