Practical Session 10
Date: 08/10/2025
Pandas I

Solve the following problems using Jupyter Notebook. Please write the following for each of the programming assignments.

1. The problem statement
2. The entire program
3. The sample input
4. The sample output

Please get the program report signed by the instructor.

1. Create a Series s1 from a NumPy array of 5 random integers between 10 and 100.
    a. Observe:
        i. The default integer index (0, 1, 2, ...)
        ii. The difference between type(s1) and type(arr)
    b. Create another Series s2 from the same array but with custom string indices ('a' to 'e').
    c. Demonstrate element-wise operations just like NumPy arrays.
    d. Create another Series with partially overlapping indices and perform arithmetic operations. What happens to index 'a', 'd', 'e', and 'f'?
    e. Access elements using labels and slices. Give three examples.
    f. Check for membership and conditional filtering. Give two examples.
2. Suppose you have the following data:
    a. population = pd.Series({'Odisha': 45, 'Bihar': 120, 'Gujarat': 70, 'Punjab': 55})
    literacy = pd.Series({'Bihar': 65, 'Odisha': 80, 'Gujarat': 85, 'Kerala': 95})
    b. Compute the literacy-to-population ratio and identify states missing in either Series.
    c. Replace missing values with "Data Not Available".
3. Create a 2D NumPy array and Convert it into a DataFrame.
    a. Perform element-wise operations (like NumPy). Give two examples.
4. Create a dictionary of lists and convert the dictionary into a DataFrame.
    a. Access columns like dictionary keys
    b. Add a new column and Delete a column (dictionary-style)

    c. Access multiple columns and Check for column membership (like dictionary keys).
5. Create a Series with custom labels.
    a. Using loc
        i. Select a single element by label
        ii. Select multiple elements using a list of labels
        iii. Slice using labels (inclusive of both ends)
    b. Using iloc
        i. Select a single element by position
        ii. Select multiple elements by positions
        iii. Slice using integer positions (exclusive of end)
6. Create two Series with overlapping and non-overlapping indices
    a. Add the two Series
    b. Observe index preservation
        i. Which indices are kept in the result?
        ii. What values appear as NaN and why?
    c. Fill missing values to complete alignment
7. Create two DataFrames with partially matching rows/columns
    a. Perform addition
    b. Explain
        i. Why are some cells NaN?
        ii. How does Pandas match data using both row and column labels?
    c. Fill missing values