THE SUPERIOR UNIVERSITY LAHORE

Final-Term Exam
Semester: 3rd
Section: BSAI-3A/3B **Session: Fall-24**

Faculty of Computer Science and Information Technology **QCH: Mr.**
Subject: Data Structures And Algorithm (Lab) **Total Marks: 40**

Name:_____

Roll No: _____

Date: _____

Time Allowed: 120 Mins.

Instructions:

- Use of mobile phone and internet is strictly prohibited.
- Write your code and paste your code output if applicable.
- No extra time will be given.

Question #	Sub Questions	CLO #	Domain & BT Level	Total Marks
1	a,b,c,d,e	1	C3	10
2	a,b,c,d,e	1	C3	10
3	a,b,c,d,e	1	C3	10
4	a,b	1	C4	10

Q1: Working with a Pandas DataFrame (10 Marks)

Given the following DataFrame:

```
import pandas as pd
data = {
   "Name": ["Ali", "Sara", "Hassan", "Zoya"],
   "Age": [22, 25, 21, 24],
   "Marks": [88, 92, 79, 85]
}
df = pd.DataFrame(data)
```

Write Python code to:

a) Display only the rows where Marks > 80.
b) Add a new column named Grade based on the following condition:

- Marks >= 90: Grade is 'A'
- Marks >= 80 and Marks < 90: Grade is 'B'
- Marks < 80: Grade is 'C'.

c) Calculate and display the average Marks of all students.
d) Sort the DataFrame by Marks in descending order and display the result.
e) Filter the rows where Age > 22 and display only the Name and Marks columns.

Q2: Working with a Pandas Series (10 Marks)

Given the following Series:

```
import pandas as pd
s = pd.Series([4, 7, 2, 9, 3, 6])
```

Write Python code to:

a) Calculate and print the **mean** and **median** of the series.
b) Create a new Series where each value in s is squared.
c) Find the maximum and minimum values in the series and their respective indices.
d) Filter and display all values from the series that are greater than 5.
e) Retrieve and display the values from the series at **odd indices**.

Q3: Working with a NumPy Array (10 Marks)

Write Python code to:

a) Create a 1-dimensional NumPy array with the values [1, 2, 3, 4, 5].
b) Compute and print the **sum** of all elements in the array.
c) Multiply each element in the array by 2 and print the resulting array.
d) Print the indices of all elements in the array that are greater than 2.
e) Reverse the array and print the resulting array.

Q4: Binary Search Tree (10 Marks)

Write a Python function to perform the following operations on a Binary Search Tree (BST):

a) Insert the values 15, 10, 20 into the BST.
b) Write a method to check if the value 10 exists in the BST and print "Found" or "Not Found".