HYDERABAD INSTITUTE OF ARTS, SCIENCE, AND TECHNOLOGY

Artificial Intelligence Lab -1
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Lab Objectives

By the end of this lab, students should be able to:

- Understand Python basics and its environment.
- Use essential Python libraries for AI/ML like numpy, pandas, and matplotlib.
- Write and execute simple Python programs for data handling and visualization.

Lab Topics

1. Python basics (variables, data types, operators, control structures)
2. Functions and loops
3. Lists, dictionaries, tuples, sets
4. NumPy basics (arrays, operations)
5. Pandas basics (DataFrames, reading CSV, basic operations)
6. Matplotlib basics (plotting graphs)

Lab Exercises

Exercise 1: Python Basics

Goal: Practice variables, types, and basic operations.

```
# Variables
name = "Fatima"
age = 23
height = 5.5

# Print
print("Name:", name)
print("Age:", age)
print("Height:", height)
```

```python
# Data types
print(type(name), type(age), type(height))

# Arithmetic operations
a = 10
b = 3
print("Addition:", a+b)
print("Division:", a/b)
print("Integer Division:", a//b)
print("Power:", a**b)
```

Exercise 2: Control Structures

Goal: Use if-else and loops

```python
# If-Else
marks = 85
if marks >= 50:
    print("Pass")
else:
    print("Fail")

# For Loop
for i in range(5):
    print("Number:", i)

# While Loop
count = 0
while count < 5:
    print("Count:", count)
    count += 1
```

Exercise 3: Functions

Goal: Create reusable code blocks

```python
def greet(name):
    return f"Hello, {name}!"

print(greet("Fatima"))

def add_numbers(a, b):
    return a + b

print("Sum:", add_numbers(5, 7))
```

Exercise 4: Lists, Tuples, Dictionaries

Goal: Use basic data structures

```
# List
fruits = ["apple", "banana", "cherry"]
fruits.append("orange")
print(fruits)

# Tuple
dimensions = (10, 20, 30)
print(dimensions)

# Dictionary
student = {"name": "Fatima", "age": 23, "marks": 85}
print(student["name"])
student["marks"] = 90
print(student)
```

Exercise 5: NumPy Basics

Goal: Work with arrays for AI

```
import numpy as np

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

# Operations
print("Add 5:", arr + 5)
print("Square:", arr ** 2)

# 2D Array
matrix = np.array([[1,2],[3,4]])
print("Matrix:\n", matrix)
```

Exercise 6: Pandas Basics

Goal: Load, view, and manipulate data

```
import pandas as pd

# Create DataFrame
data = {"Name": ["Fatima ", "Ali", "Sara"], "Marks": [85, 90, 78]}
df = pd.DataFrame(data)
print(df)

# Read CSV (if provided)
# Access columns
```

```
print(df["Name"])

# Describe data
print(df.describe())
```

Exercise 7: Matplotlib Basics

Goal: Simple plotting

```
import matplotlib.pyplot as plt

# Sample data
x = [1,2,3,4,5]
y = [2,4,6,8,10]

plt.plot(x, y, color='blue', marker='o')
plt.title("Simple Plot")
plt.xlabel("X-axis")
plt.ylabel("Y-axis")
plt.show()
```

Discussion Points

- Importance of Python in AI and ML.
- When to use NumPy vs Pandas.
- How to visualize data using Matplotlib.
- Difference between lists, tuples, and dictionaries.

Assessment Questions

1. Write a Python function to calculate factorial of a number.
2. Create a NumPy array of 10 random numbers and find its mean.