M.Sc. (Five Year Integrated) in Computer Science

(Artificial Intelligence & Data Science)

Semester 1

Python Programming Lab

LAB CYCLE 2

Instructions:

1. Do and write programs with proper naming conventions.
2. Practice all programs on your own. Copying the solution from others will be penalized.
3. Maintain Index/ content properly.
4. Brief descriptions including algorithm used and flowchart of the work you did for each exercise.
5. If you believe I have an error in a lab, please inform me of it. Explain why you think it is an error and, if you like, suggest a correction.
6. Perform unit testing with prepared test cases.
7. Save the programs in a separate folder on PC (in Lab), and push it in your Git repo.

SL No	Question	Concepts Covered
1.	Suppose a newly born pair of rabbits, one male and one female, are put in a field. Rabbits can mate at the age of one month so that at the end of its second month, a female has produced another pair of rabbits. Suppose that our rabbits never die and that the female always produces one new pair every month from the second month. Develop a program to show a table containing the number of pairs of rabbits in the first N months.	Critical thinking, Loops, formatted io.
2.	Write a program to read a string containing numbers separated by a space and convert it as a list of integers. Perform the following operations on it. 1. Rotate elements in a list by 'k' position to the right 2. Convert the list into a tuple using list comprehension 3. Remove all duplicates from the tuple and convert them into a list again. 4. Create another list by putting the results of the evaluation of the function $f(x) = x^2 - x$ with each element in the final list 5. After sorting them individually, merge the two lists to create a single sorted list.	List, tuple, set, list comprehension

3.	Read the file 'iris.json' as a text file : 1. Create a list having each line of the file as an element 2. Convert it into a list of dictionary objects. 3. Show the details of all flowers whose species is "setosa". 4. Print the minimum petal area and max sepal area in each species 5. Sort the list of dictionaries according to the total area are sepal and petal.	JSON, dictionary
4.	Write a program to create a class Box with data members length, breadth, height, area, and volume. Provider constructor that enables initialization with one parameter (for cube), two parameters (for square prism) three parameters (rectangular prism). Also, provide functions to calculate area and volume. Create a list of N boxes with random measurements and print the details of the box with maximum volume: area ratio.	Class, objects, constructor
5.	Write a program to create a parent class, 3DShapes, with methods printVolume() and printArea(), which prints the Volume and Area, respectively. Create classes Cylinder and Sphere by inheriting 3DShapes class. Using these child classes, calculate and print the volume and area of a cylinder and sphere.	inheritance