Course Code & Name	26CAPL7002 Python Programming Lab		
Teaching Hours /week (L: T:P: R)	0:0:4:0	Credits	2
CIE Marks	50	ESE Marks	50
Course Type	Lab (PCL)	Exam Hours	3
Prerequisites (if any)			

Course Objectives:

1. To develop skills on basic python data structures and OOPs concepts
2. To gain problem solving skill to perform numerical computations and manage datasets

Course Outcomes (COs)

At the end of the course students should be able to:

CO #	Course Outcome	Bloom's Knowledge Level (KL)
CO 1	Implement various data types like lists, tuples, strings, decision-making statements and Functions.	K3
CO 2	Apply object-oriented programming principles to design and develop efficient programs for real-world problem solving.	K3
CO 3	Implement different file handling operations.	K3
CO 4	Demonstrate NumPy, Matplotlib, and Pandas to create arrays, perform numerical operations, visualize data using basic plots, and handle datasets using Series and DataFrames.	K3

Note: *K1- Remember, K2- Understand, K3- Apply, K4- Analyse, K5- Evaluate, K6- Create*

CO-PO Mapping Table (Mapping of Course Outcomes to Program Outcomes)

CO #	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8
CO 1	3	2	-	-	-	-	-	1
CO 2	3	3	2	2	-	-	-	1
CO 3	3	2	-	2	-	-	-	1
CO 4	3	3	3	3	-	-	-	1

Note: *1: Slight (Low), 2: Moderate (Medium), 3: Substantial (High), - : No Correlation*

Course Assessment Method

(CIE: 50 marks, ESE: 50 marks)

Continuous Internal Evaluation Marks (CIE)

Attendance	(Continuous Assessment) Preparation/Pre-Lab Work experiments, Viva and Timely completion of Lab Reports / Record	Internal Lab Examination-1	Internal Lab Examination- 2	Total
8	22	10	10	50 Marks

End Semester Examination Marks (ESE)

In Part A, all questions need to be answered and in Part B, each student can choose any one full question out of two questions.

Procedure/ Preparatory work/Design/ Algorithm	Conduct of experiment/ Execution of work/ troubleshooting/ Programming	Result with valid inference/ Quality of Output	Viva voce	Record	Total
10	15	10	10	5	50 Marks

Submission of Record: Students shall be allowed for the end semester examination only upon submitting the duly certified record.

Continuous Assessment (22 Marks)

1. Conduct of Lab Experiments/Project (12 Marks)
2. Timely Completion of Lab Reports/ Project Reports (5 Marks)
3. Viva Voce (5 Marks)

Final Marks Averaging: The final marks for conduct of experiments, viva, and records are the average of all the specified experiments in the syllabus.

Evaluation Pattern for End Semester Examination (50 Marks)

1. Procedure/Algorithm/Flowchart (10 Marks)
2. Conduct of Experiment/Execution of Work (15 Marks)
3. Quality of Output (10 Marks)
4. Viva Voce (10 Marks)
5. Record (5 Marks)

SYLLABUS

Exprt. No	List of Experiments
I	1. Implement basic arithmetic calculator. Prompt user input. 2. Find the area and perimeter of a circle, Prompt user for radius. 3. Print a given number is odd or even. 4. Find the biggest of three numbers. 5. Check whether a given number is prime or not. 6. Print all the palindrome numbers within a start and end limit given by the user. 7. Find the sum of digits of a given number. 8. Check whether a given string is palindrome or not. 9. Get a string from an input string where all occurrences of the first character of each word are replaced with '$' symbol. 10. Create a new string from the given string where the first and last characters are exchanged. 11. Write a Python program to check whether a given string contains a specified character or substring . 12. Replace the characters in the string by converting uppercase letters to lowercase and lowercase letters to uppercase. 13. Create a list and find a. the number of elements in the list, b. the largest and smallest element in the list, c. Find the sum of all elements in the list, d. sort the list content, e. Find the index of a particular element in the list. 14. Create two lists and eliminate the duplicates in both lists and then check whether they are the same or not. 15. Create two list of colors, and print the colors which are in the first list but not in the second list. 16. Create a list of numbers and store the sum of digits of each number into another list.

	17. Create a set and do all the basic set operations. 18. Create a tuple with different data types and a. Find the length of the tuple b. check whether an element exists in a tuple or not c. Convert the tuple into a list and vice versa. 19. Create a dictionary and sort it based on keys in ascending and descending order. 20. Merge two dictionaries. 21. Create a user defined function to find the factorial of a given number. 22. Remove the vowels in a string using a user defined function. 23. Implement a menu-driven calculator. Use separate functions for the different operations. 24. Write a Python program using the datetime module to a. Display the current date and time, b. Extract only the date, month, and year separately c. Find the difference between two given dates 25. Create a package graphics with modules rectangle, circle and subpackage graphics.threeD_graphics with modules cuboid and sphere. Write programs to find the area and perimeter of a rectangle, area and circumference of a circle, surface area and volume of a cuboid, and surface area and volume of a sphere. Import these modules in another program and display the results.
II	1. Create a student class with relevant attributes using a constructor for two students and print. 2. Create an Employee class and find the net salary for two employees. The net salary is the sum of basic_pay, 40% of basic_pay(DA) and HRA=1000. Basic pay is given while creating the object. 3. Create a Rectangle class with attributes length and breadth. Find area and perimeter. Compare two Rectangle objects by their area and perimeter. 4. Create a class **Animal** with an attribute name and a method display() that prints the animal's name. Derive a class **Dog** from **Animal** that has an additional attribute breed and a method show_details() to display both the

	name and breed of the dog. Create an object of the **Dog** class and display its details. 5. Create a class Publisher (name). Derive class Book from Publisher with attributes title and author. Derive class Python from Book with attributes price and no_of_pages. Write a program that displays information about a Python book. Use base class constructor invocation and method overriding. 6. Create a Rectangle class with attributes length and breadth. Find area. Compare two Rectangle objects by their area using operator overloading.
III	1. Write a Python program to read a file line by line and store it into a list. 2. Python program to copy odd lines of one file to another. 3. Write a Python program to read specific columns of a given CSV file and print the content of the columns. 4. Write a Python program to write a Python dictionary to a CSV file.
IV	1. Write a Python program using NumPy to create an array of the first 10 even numbers. Reshape the array into a 2×5 matrix. Compute the following on the array: a. Element-wise square b. Sum of all elements c. Mean and standard deviation Print each result with appropriate labels. 2. Using Matplotlib, generate a line plot for the the temperature readings collected every hour, use random numbers between 20 and 25: a. Plot the temperature against hour values (0–9). b. Add labels for X-axis (Hour), Y-axis (Temperature), and a title “Hourly Temperature Variation”. c. Display grid lines on the plot. 3. Using Pandas, perform the following, create a Series containing monthly sales values: sales = [12000, 15000, 17000, 16000, 20000] with month names as index. a. Convert the above Series into a DataFrame with a column name “Sales”. b. Add a new column “Growth %” showing percentage growth compared to

	the previous month and display the first 3 rows of the DataFrame.

Text Books				
Sl. No	**Title of the Book**	**Name of the Author/s**	**Name of the Publisher**	**Edition and Year**
1	Core Python Applications Programming	Wesley J. Chun,	Pearson Education	3rd Edition, 2016
2	Introduction to Computer Science using Python	Charles Dierbach	Wiley	2015

Reference Books				
Sl. No	**Title of the Book**	**Name of the Author/s**	**Name of the Publisher**	**Edition and Year**
1	How to think like a Computer Scientist: Learning with Python	Downey, A.	John Wiley	2015

Web References/ Video Links (NPTEL, SWAYAM…)	
Sl.No	**Link ID**
1	https://youtu.be/ruQb8jzkGyQ?si=C2Wp9DhTuiUb_bjK
2	https://www.coursera.org/learn/python?specialization=python#syllabus
3	https://www.coursera.org/learn/python-data?specialization=python#syllabus
4	https://www.coursera.org/learn/python-databases?specialization=python#syllabus