SEMESTER S3

PYTHON PROGRAMMING LAB

(Common to CA / AI)

Course Code	**PCCAL308**	**CIE Marks**	50
Teaching Hours/Week (L: T:P: R)	0:0:3:0	**ESE Marks**	50
Credits	2	**Exam Hours**	2 Hrs. 30 Min.
Prerequisites (if any)	UCEST105	**Course Type**	Lab

Course Objectives:

1. To equip the learner to use Python data structures like Lists, Tuples, Sets, and Dictionaries in solving problems and also constructs such as Strings, Functions, Modules, Regular Expressions, turtle, and Tkinter.
2. To introduce the fundamentals of data analysis using Numpy, Pandas, and SciPy.

KTU SPECIAL

Expt. No.	Experiments
1	Write a Python program to sort a list of tuples based on the second element in each tuple.
2	Write a Python program to count the occurrences of each word in a given text and store the result in a dictionary.
3	Write a Python program to find all unique elements in a list.
4	Write a Python program to create a set of squares of all even numbers between ***m*** and ***n*** using set comprehension.
5	Write a Python program using sets to find all unique characters in a given string.
6	Write a Python program that takes a list of numbers and returns a new list containing only the even numbers from the original list.
7	Write a Turtle program to draw an equilateral triangle. Modify the program to draw triangles of different sizes.
8	Write a Turtle program to draw a flower with a specified number of petals.
9	A basic calculator that can perform addition, subtraction, multiplication, and division using Tkinter
10	A digital clock that displays the current time and updates every second using Tkinter.
11	Write a Python program to copy the contents of one text file to another.
12	Write a Python program to merge the contents of two text files and write the result into a third file.
13	Write a Python program using NumPy to create an array of 10 random numbers and calculate the mean and standard deviation.
14	Write a Python program using NumPy to create a 3x3 matrix of integers. Reshape it into a 1D array and then flatten it back to a 2D array.

15	Write a Python program using NumPy to create two 3x3 matrices and perform matrix multiplication.
16	Write a Python program using Pandas to load a CSV file into a DataFrame, display the first five rows, and calculate the mean of a specified column.
17	Write a Python program using Pandas to read a CSV file and perform basic data analysis tasks like finding the sum, mean, and standard deviation of a specified column.
18	Write a Python program using Pandas to load a CSV file into a DataFrame. Remove duplicate rows and display the cleaned DataFrame.
19	Write a Python program using Matplotlib to plot a line graph of a dataset representing monthly sales figures.

Course Assessment Method
(CIE: 50 marks, ESE: 50 marks)

Continuous Internal Evaluation Marks (CIE):

Attendance	Preparation/Pre-Lab Work experiments, Viva and Timely completion of Lab Reports / Record (Continuous Assessment)	Internal Examination	Total
5	**25**	**20**	**50**

KTUSPECIAL

End Semester Examination Marks (ESE):

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**

- ***Submission of Record: Students shall be allowed for the end semester examination only upon submitting the duly certified record.***
- ***Endorsement by External Examiner:*** *The external examiner shall endorse the record*

Course Outcomes (COs)

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

	Course Outcome	Bloom's Knowledge Level (KL)
CO1	Choose Control Structures and Functions in Python to solve complex problems.	**K3**
CO2	Utilize Python Libraries for Data Manipulation and Analysis	**K3**
CO3	Develop Geometric Shapes Using Turtle and Graphics Basic GUI Applications Using Tkinter	**K3**
CO4	Make use of File Handling and Basic Data Visualization in Python.	**K3**

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

CO- PO Mapping (Mapping of Course Outcomes with Program Outcomes)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	2	2	2							3
CO2	3	3	2	2	2							3
CO3	3	2	3	2	3							3
CO4	3	2	3	2	3							3

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

KTUSPECIAL

Text Books				
Sl. No	**Title of the Book**	**Name of the Author/s**	**Name of the Publisher**	**Edition and Year**
1	Learning Python	Mark Lutz	O'Reilly Media	5/e, 2013
2	Python Crash Course: A Hands-On, Project-Based Introduction to Programming	Eric Matthes	No Starch Press	2/e, 2019
3	Python for Everyone	Cay S. Horstmann, Rance D. Necaise	Wiley	3/e, 2024

Reference Books				
Sl. No	**Title of the Book**	**Name of the Author/s**	**Name of the Publisher**	**Edition and Year**
1	Automate the Boring Stuff with Python: Practical Programming for Total Beginners	Al Sweigart	No Starch Press	2/e, 2019
2	Python for Data Analysis: Data Wrangling with Pandas, NumPy, and IPython	Wes McKinney	O'Reilly Media	2/e, 2017
3	Python Cookbook: Recipes for Mastering Python 3	David Beazley and Brian K. Jones	O'Reilly Media	3/e, 2013
4	Fluent Python: Clear, Concise, and Effective Programming	Luciano Ramalho	O'Reilly Media	1/e, 2015
5	Core Python Programming	R. Nageswara Rao	Dreamtech	3/e, 2022

KTU SPECIAL

Video Links (NPTEL, SWAYAM…)	
Module No.	**Link ID**
1	https://onlinecourses.swayam2.ac.in/cec22_cs20/preview
2	https://onlinecourses.nptel.ac.in/noc24_cs45/preview
3	https://onlinecourses.nptel.ac.in/noc19_cs41/preview
4	

Continuous Assessment (25 Marks)

1. Preparation and Pre-Lab Work (7 Marks)

- Pre-Lab Assignments: Assessment of pre-lab assignments or quizzes that test understanding of the upcoming experiment.
- Understanding of Theory: Evaluation based on students' preparation and understanding of the theoretical background related to the experiments.

2. **Conduct of Experiments (7 Marks)**

- Procedure and Execution: Adherence to correct procedures, accurate execution of experiments, and following safety protocols.
- Skill Proficiency: Proficiency in handling equipment, accuracy in observations, and troubleshooting skills during the experiments.
- Teamwork: Collaboration and participation in group experiments.

3. **Lab Reports and Record Keeping (6 Marks)**

- Quality of Reports: Clarity, completeness and accuracy of lab reports. Proper documentation of experiments, data analysis and conclusions.
- Timely Submission: Adhering to deadlines for submitting lab reports/rough record and maintaining a well-organized fair record.

4. **Viva Voce (5 Marks)**

- Oral Examination: Ability to explain the experiment, results and underlying principles during a viva voce session.

KTU SPECIAL

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

Evaluation Pattern for End Semester Examination (50 Marks)

1. **Procedure/Preliminary Work/Design/Algorithm (10 Marks)**

- Procedure Understanding and Description: Clarity in explaining the procedure and understanding each step involved.
- Preliminary Work and Planning: Thoroughness in planning and organizing materials/equipment.
- Algorithm Development: Correctness and efficiency of the algorithm related to the experiment.
- Creativity and logic in algorithm or experimental design.