PYTHON PROGRAMMING

Course Code	21CS43	Course type	PCC	Credits L-T-P	3 - 0 – 1
Hours/week: L - T- P	3 - 0 – 2			Total credits	4
Total Contact Hours	L = 40 Hrs; T = 0 Hrs; P = 20 Hrs Total = 60 Hrs			CIE Marks	100
Flipped Classes content	10 Hours			SEE Marks	100

Course learning objectives	
1.	Gain knowledge about basic Python language syntax and semantics to write Python programs using the procedure oriented programming paradigm.
2.	Appreciate the usage of high level data constructs provided by Python and work with file and exception handling mechanisms.
3.	Write Python applications using the object-oriented programming paradigm.
4.	Become acquainted with the development of database and GUI applications and usage of various packages.

Required Knowledge of : Procedure Oriented and Object Oriented Programming Languages

Unit – I	Contact Hours = 8 Hours
Python Fundamentals: **An Introduction to Python programming:** Introduction to Python, IDLE to develop programs; **How to write your first programs:** Basic coding skills, data types and variables, numeric data, string data, five of the Python functions; **Control statements:** Boolean expressions, selection structure, iteration structure; **Define and use Functions and Modules:** define and use functions, more skills for defining and using functions and modules, create and use modules, standard modules Text Book 1 – Chapters 1,2,3,4	

Unit – II	Contact Hours = 8 Hours
Higher Data Constructs: **Lists and tuples:** Basic skills for working with lists, list of lists, more skills for working with lists, tuples; **Dictionaries:** get started with dictionaries, more skills for working with dictionaries; **Strings:** Basic skills for working with strings, split and join strings; **Dates and times:** get started with dates and times Text Book 1 – Chapters 6,12,10,11	

Unit – III	Contact Hours = 8 Hours
Files, Exception Handling, Database Programming **File I/O:** An introduction to file I/O, text files, CSV files, binary files; **Exception Handling:** handle a single exception, handle multiple exceptions, Two more skills; **Work with a database:** An introduction to relational databases, SQL statements for data manipulation, SQLite Manager to work with a database, use Python to work with a database Text Book 1 – Chapters 7,8,17	

Unit – IV	Contact Hours = 8 Hours
Object Oriented Programming:	

Define and use your own classes: An introduction to classes and objects, define a class, object composition, encapsulation; **Inheritance:** Inheritance, override object methods; **Design an object oriented program:** Techniques for object-oriented design Text Book 1 – Chapters 14,15,16

Unit – V	**Contact Hours = 8 Hours**
Packages: **How to build a GUI Program:** Create a GUI that handles an event, more skills for working with components; **Numpy Basics:** Arrays and Vectorized Computation: Creating ndarrays, Data Types for ndarrays, Operations between Arrays and Scalars, Basic Indexing and Slicing, Indexing with slices, Boolean Indexing, Transposing Arrays and Swapping Axes; **Getting started with Pandas:** Introduction to Pandas Data Structures, Summarizing and Computing Descriptive Statistics, Handling missing data; **Plotting and Visualization:** A Brief matplotlib API Primer, Plotting Functions in pandas Text Book 1 – Chapters 18 Text Book 2 – Chapters 4,5,7,8	

Flipped Classroom Details

Unit No.	**I**	**II**	**III**	**IV**	**V**
No. for Flipped Classroom Sessions	**2**	**2**	**2**	**2**	**2**

List of Experiments

Unit No.	**No. of Experiments**	**Topic(s) related to Experiment**
2	2	Functions and lists
		Functions and dictionaries
3	2	File I/O and exception handling mechanisms
		Implement a Python program to work with a database
4	2	Object composition and encapsulation
		Inheritance and polymorphism
5	2	GUI application
		NumPy, Pandas and Matplotlib packages

Unit No.	**Self-Study Topics**
1	Test and debug a program
2	Work with numbers, recursion and algorithms
5	Numpy – Data Processing using Arrays

Books	
	Text Books:
1.	Michael Urban and Joel Murach, Python Programming, Shroff/Murach, 2016
2.	Wes McKinney, Python for Data Analysis, OReilly, 1st Edition, 2012
	Reference Books:

1.	SciPy and NumPy, O`Reilly, 1st Edition, 2012
2.	Mark Lutz, Programming Python, O`Reilly, 4th Edition, 2010
	E-resources (NPTEL/SWAYAM.. Any Other)- mention links
1.	The joy of computing using python - https://onlinecourses.nptel.ac.in/noc21_cs32/preview
2.	Programming in python- https://onlinecourses.swayam2.ac.in/cec22_cs20/preview

Course delivery methods		**Assessment methods**	
1.	Chalk and Talk	1.	IA tests
2.	PPT and Videos	2.	Open Book Assignments (OBA)/ Lab Project
3.	Flipped Classes	3.	Lab Test
4.	Practice session/Demonstrations in Labs	4.	Semester End Examination
5.	Enquiry Based Learning		

Course Outcome (COs)

Learning Levels:

Re - Remember; Un - Understand; Ap - Apply; An - Analysis; Ev - Evaluate; Cr – Create

At the end of the course, the student will be able to		**Learning Level**	**PO(s)**	**PSO(s)**
1.	**Illustrate** basic principles of Python programming and **Demonstrate** programs using the procedure oriented programming paradigm.	**Ap**	1,3	1
2.	**Develop** Python programs for file operations, exception handling, GUI, database operations and **Make use of** different packages for computing and manipulation.	**Ap**	1,2,3,5, 9,10,12	1,2,3
3.	**Explain** the concepts of object-oriented programming paradigm and **Apply** the same to develop programs.	**Ap**	1,2,3,5, 9,10,12	1,2,3

Scheme of Continuous Internal Evaluation (CIE):

For integrated courses, a lab test also will be conducted at the end of the semester. The lab test **(COMPULSORY)** will be part of the CIE. **No SEE for Lab**.

THEORY (60 marks)			**LAB (40 marks)**		Total
IA test 1	IA test 2	Assignment (OBA/Lab Project/ Industry assignment)	Conduction	Lab test	
25 marks	25 marks	10 marks	15 marks	25 marks	100 marks

IA Test:
1. No objective part in IA question paper
2. All questions descriptive

Conduct of Lab:
1. Conducting the experiment and journal: 5 marks
2. Calculations, results, graph, conclusion and Outcome: 5 marks
3. Viva voce: 5 marks

Lab test: (Batchwise with 15 students/batch)
1. Test will be conducted at the end of the semester

2. Timetable, Batch details and examiners will be declared by Exam section 3. Conducting the experiment and writing report: 5 marks 4. Calculations, results, graph and conclusion: 10 marks 5. Viva voce: 10 marks
Eligibility for SEE: 1. 40% and above (24 marks and above) in theory component 2. 40% and above (16 marks and above) in lab component 3. **Lab test is COMPULSORY** 4. Not eligible in any one of the two components will make the student **Not Eligible** for SEE

Scheme of Semester End Examination (SEE):	
1.	It will be conducted for 100 marks of 3 hours' duration.
2.	**Minimum marks required in SEE to pass: 40 out of 100**
3.	Question paper contains two questions from each unit each carrying 20 marks. Students have to answer one full question from each unit.

Rubrics:Levels	**Target**
1 (Low)	**60% of the students score Less than 50 % of the total marks.**
2 (Medium)	**60% of the students score 50 – 70 % of the total marks.**
3 (High)	**60% of the students score More than 70 % of the total marks.**

CO-PO Mapping (planned)													**CO-PSO Mapping (planned)**		
CO	**PO 1**	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**	**PSO 3**
1	√		√										√		
2	√	√	√		√				√	√		√	√	√	√
3	√	√	√		√				√	√		√	√	√	√
Tick mark the CO, PO and PSO mapping															