**SEMESTER/YEAR :** **3/2**

**COURSE CODE** : **20CSXXXX**

**TITLE OF THE COURSE**: **COMPUTATIONAL THINKING WITH PYTHON**

**L: T/A: P: C:**  **3 : 0 : 0 : 3**

**Course Objectives:**

The objectives of the Course are:

1. To understand basic concepts of computational thinking.

2. To introduce python programming for problem solving.

3. To introduce different debugging and unit testing tools.

4. To solve real world problems using python data structures.

5. Learn to handle files and exception handling in python.

6. To explore Python's object-oriented features.

7. To build Web services and Networked programs in python.

8. To train students to design an application as part of the course mini- project using

computational thinking with python.

**Course Outcomes:**

After undergoing this course, students will be able to:

1. An acquaintance of the basic concepts about computational thinking.
2. Understanding basic concepts of python programming for problem-solving.
3. Apply computational thinking to solve real-world programs using python.
4. Build python programs using core data structures like lists, dictionaries, and, tuples.
5. Implement object-oriented concepts using python.
6. Design applications related to web services and network Programming.

**Module 1:**  **Introduction to Computational Thinking and Python 8Hrs**

Introduction to computational thinking: Stages of Computational thinking, Design using Flowcharts, Implementation, Testing Python Basics: Values, expressions and statements, Conditional execution, Functions Iterations

**Module 2: Python Environment and Data Structures 9Hrs**

Python Environment: Usage of Debugging and Unit Testing tools in python, Introduction to Github, Executing the python programs using Jupyter notebooks, Python Data Structures: Strings, Arrays, Lists, Tuples, Sets and Dictionaries

**Module 3: Python Files and Exception Handling 9Hrs**

Files: File types, modes, File functions, File attributes, File positions, Looping over file,

Exception Handling: Try-Except, Exception syntax, examples, Types of exception with except, multiple exceptions with except, Try-Finally, Raise exceptions with arguments, Python built-in exceptions, User-defined exceptions, Assertions.

**Module 4: Python Objects 9Hrs**

Classes and Objects: Creating classes, Using Objects, Accessing attributes, Classes as Types, Introduction to Multiple Instances, Inheritance.

**Module 5: Applications of Python 7Hrs**

Applications: Networked Programs, Using web services

**Text Books:**

1. “Python for Everybody-Exploring Data Using Python 3”, Dr. Charles R. Severance,

Shroff Publishers; First edition (10 October 2017)

2. “Introduction to Computing & Problem Solving with Python”,Jeeva Jose,P.Sojan Lal,

Khanna Book Publishing; First edition (2019).

**Reference Books:**

1. “Computer Science Using Python: A Computational Problem- Solving Focus”,

Charles Dierbach, Introduction John Wiley, 2012.

2. “Introduction to Computation and Programming Using Python”, John V Guttag,

Prentice Hall of India, 2015.

3."How to think like a Computer Scientist, Learning with Python", Allen Downey,

Jeffrey Elkner and Chris Meyers, Green Tea Press, 2014.

4. “Learning to Program with Python”, Richard L. Halterman, 2011.