B TECH FIRST YEAR (COMMON COURSE)

Course code		L	T	P
Course title	**Problem solving using Advanced Python**	2	1	0

Course objective: The objective of the course is to make its students able

1	To learn the Object Oriented Concepts in Python
2	To learn the concept of reusability through inheritance and polymorphism
3	To impart the knowledge of functional programming
4	To learn the concepts of designing graphical user interfaces
5	To explore the knowledge of standard Python libraries

Pre-requisites: Students are expected to have basic knowledge of programming concepts of python programming.

Course Contents / Syllabus

UNIT-I	**Classes and Objects**	**8 hours**

Introduction: Python Classes and objects, User-Defined Classes, Encapsulation, Data hiding, Class Variables and Instance Variables, Instance methods, Class method, static methods, constructor in python, parametrized constructor, Magic Methods in python, Object as an argument, Instances as Return Values, namespaces

UNIT-II	**Object Oriented Concepts**	**8 hours**

Introduction to the Specialization, Inheritance, Types of inheritance, Invoking the Parent Class's Method, Method overriding, abstract class, MRO and super (), Polymorphism

Introspection: Introspecting types, Introspecting objects, Introspecting scopes, inspect modules, introspect tools

UNIT-III	**Functional Programming**	**8 hours**

Map, filter, Reduce, Comprehensions, Immutability, Closures and Decorators, generators, Co-routines, iterators, Declarative programming

UNIT-IV	**GUI Programming**	**8 hours**

Ipywidgets Package, Numeric Widgets, Boolean Widgets, Selection Widgets, String Widgets, Date Picker, Color Picker, Container Widgets, Creating a GUI Application, Tkinter, button, canvas.

UNIT-V	**Libraries in Python**	**8 hours**

NumPy: Basic Operation, Indexing, slicing and Iterating, multidimensional arrays, NumPy Data types, Reading and writing data on Files, **Pandas:** Series and Data Frames, Grouping, aggregation, Merge Data Frames, Generate summary tables, Group data into logical pieces, Manipulation of data. **SciPy:** Introduction to SciPy, Create function, modules of SciPy. **Matplotlib:** Scatter plot, Bar charts, histogram, Stack charts, Legend title Style, Figures and subplots, plotting function in pandas, Labelling and arranging figures, Save plots. **Seaborn:** style function, colour palettes, distribution plots, category plot, regression plot.

Course outcome: At the end of course, the student will be able to

CO 1	Define classes and create instances in python	K_1, K_2
CO 2	Implement concept of inheritance and polymorphism using python	K_3

CO 3	Implement functional programming in python	K_2
CO 4	Create GUI based Python application	K_3
CO 5	Applythe concept of Python libraries to solve real world problems	K_3, K_6

Text books

(1) Magnus Lie Hetland, "Beginning Python-From Novice to Professional"—Third Edition, Apress

(2) Peter Morgan, Data Analysis from Scratch with Python, AI Sciences

(3) Allen B. Downey, "Think Python: How to Think Like a Computer Scientist", 2nd edition, Updated for Python 3, Shroff/O'Reilly Publishers, 2016

(4) Miguel Grinberg, Developing Web applications with python, OREILLY

Reference Books

(1) Dusty Phillips, Python 3 Object-oriented Programming - Second Edition, O'Reilly

(2) Burkhard Meier, Python GUI Programming Cookbook - Third , Packt

(3) DOUG HELLMANN, THE PYTHON 3 STANDARD LIBRARY BY EXAMPLE, :Pyth 3 Stan Libr Exam _2 (Developer's Library) 1st Edition, Kindle Edition.

(4) Kenneth A. Lambert, ―Fundamentals of Python: First Programs‖, CENGAGE Learning, 2012.

E-books& E-Contents:

(1)https://www.pdfdrive.com/a-python-book-beginning-python-advanced-python-and-python- exercises-e125280.html

(2)https://www.pdfdrive.com/a-python-book-beginning-python-advanced-python-and-python-e9236005.html

(3)https://www.pdfdrive.com/learn-python-in-one-day-and-learn-it-well-python-for-beginners-with-hands-on-project-the-only-book-you-need-to-start-coding-in-python-immediately-e183833259.html

(4)https://www.pdfdrive.com/python-programming-python-programming-for-beginners-python-programming-for-intermediates-d180663309.html

(5)https://www.pdfdrive.com/python-programming-python-programming-for-beginners-python-programming-for-intermediates-d180663309.html

(6) https://realpython.com/tutorials/advanced/

Reference Links

Unit 1-https://nptel.ac.in/courses/106/106/106106145/

Unit-2-https://www.python-course.eu/python3_inheritance.php

Unit -3 https://realpython.com/courses/functional-programming-python/

Unit-4: https://realpython.com/python-gui-tkinter/

Unit-5: https://nptel.ac.in/courses/106/107/106107220/
https://nptel.ac.in/courses/106/106/106106212/
https://nptel.ac.in/courses/106/105/106105152/

https://www.youtube.com/watch?v=98YeQpmQeH8

https://www.youtube.com/watch?v=u9x475OGj_U

https://www.youtube.com/watch?v=HFW7eA9wUxY

https://www.youtube.com/watch?v=byHcYRpMgI4

https://www.youtube.com/watch?v=9N6a-VLBa2I

https://www.youtube.com/watch?v=Ta1bAMOMFOI

https://www.youtube.com/watch?v=FsAPt_9Bf3U

https://www.youtube.com/watch?v=LwPTfwlry1s
https://www.youtube.com/watch?v=YXPyB4XeYLA
https://www.youtube.com/watch?v=dVr7r7QgLrk&t=21s
Students may follow Links given below to get certification in course of Advanced python
Link for Certification in Python https://swayam.gov.in/nd1_noc20_cs36/preview https://swayam.gov.in/nd1_noc20_cs46/preview