Course Code & Name	26CAPC7003 Advanced Python Programming		
Teaching Hours /week (L: T:P: R)	3:1:0:0	Credits	4
CIE Marks	40	ESE Marks	60
Course Type	Theory (PCC)	Exam Hours	3
Prerequisites (if any)			

Course Objectives:

1. To interpret the fundamentals of Python Programming
2. Apply Python libraries such as NumPy, Pandas, and Matplotlib to perform efficient data handling, numerical computations, and data visualization for solving real-world analytical problems.

Course Outcomes (COs)

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

CO #	Course Outcome	Bloom's Knowledge Level (KL)
CO 1	Explain the use of Python data types, lists, tuples, strings, decision-making statements, and functions to solve computational problems effectively.	K2
CO 2	Design and implement programs using basic object-oriented programming concepts such as classes, objects, inheritance, and polymorphism in Python.	K3
CO 3	Develop the ability to perform and apply various file handling operations for efficient data management using Python.	K3
CO 4	Apply Python libraries such as NumPy, Matplotlib, and Pandas for efficient data handling, numerical computation, and data visualization.	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	2	1	-	-	2
CO 2	3	3	2	2	1	-	-	2
CO 3	3	2	2	2	1	1	-	2
CO 4	3	3	3	3	1	-	-	3

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

Course Assessment Method

(CIE: 40 marks, ESE: 60 marks)

Continuous Internal Evaluation Marks (CIE)

Attendance	Assignment/ Micro-project	Internal Examination-1 (Written)	Internal Examination- 2 (Written)	Total
8	12	10	10	40 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.

PART A	PART B	TOTAL
■ 2 Questions from each module. ■ Total of 8 Questions, each carrying 3 marks **(8x3 =24 marks)**	■ Each question carries 9 marks. ■ Two questions will be given from each module, out of which 1 question should be answered. ■ Each question can have a maximum of 3 subdivisions. **(4x9 = 36 marks)**	**60 Marks**

SYLLABUS

Module #	Syllabus Description	Hours
1	Introduction to Python: Features of Python, How to Run Python, Identifiers, Reserved Keywords, Variables, Input, Output and Import Functions, Operators Data Types: Numbers, Strings, List, Tuple, Set, Dictionary, Data Type Conversions, Decision Making, Loops, Nested Loops, Control Statements, Types of Loops Functions: Definition, Function calling, Function arguments, Lambda Functions, Recursive Functions Modules & Packages: Creating Modules, import Statement, Locating Modules, Namespaces and Scope, Packages, Date and Time Modules. Package management like conda vs pip vs uv	12
2	Programming paradigms: Procedural paradigm and object oriented paradigm. Object Oriented Programming: Class	12

	definition, Creating objects, Encapsulation, Data hiding, Inheritance, Method Overriding, Operator Overloading, Polymorphism.	
3	File Handling: Opening a File, Closing a File, Writing to a File, Reading from a File, File Methods, Renaming a File, Deleting a File, Operations on CSV files.	**10**
4	Introduction to NumPy-- Basics of NumPy arrays-Creating arrays using array(), arange(), linspace(), zeros(), ones(). Arithmetic operations on arrays. Introduction to matplotlib - Basic Plotting- Create basic 2D plots: line, bar, scatter Introduction to pandas - Reading Data from Files Using Pandas, Data Structures-Series and DataFrame.	**12**

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
2	Fundamentals of Python First Programs	Kenneth A. Lambert	Cengage	3rd Edition, 2025

3	Python Programming for The Absolute Beginner	Michael Dawson	Cengage	3rd Edition, 2025

Web References/ Video Links (NPTEL, SWAYAM…)	
Sl.No	**Link ID**
1	https://archive.org/details/MIT6.00SCS11
2	https://www.coursera.org/course/pythonlearn
3	https://www.coursera.org/learn/python-databases

Course Assessment Questions

Course Outcome 1 (CO1):

1. Differentiate membership operators and identity operators with suitable example
2. Explain various decision-making statements in python.
3. Explain dictionary data type with suitable example.
4. Write a program to merge two python dictionaries
5. Define Modules. How can we create modules? Describe different syntaxes for import modules in programs. Explain important features of modules in Python.

Course Outcome 2 (CO2):

1. Explain the necessity of method overriding in python programming. Give example.
2. Create a class Rectangle with attributes length and width, each of which defaults to1. Provide member functions that calculate the perimeter and the area of the rectangle. Provide set and get functions for the length and width attributes. The set functions should verify that length and width are each floating-point numbers larger than 0.0 and less than 20.0. Perimeter=2(length + width) and Area=length*width.

Course Outcome 3 (CO3):

1. Explain important file operations in python.
2. Write a program to append a file with the contents of another file.

Course Outcome 4 (CO4):

1. Explain the creation of NumPy arrays using array(), arange(), linspace(), zeros(), and ones() functions with suitable examples.
2. Describe the steps involved in creating basic 2D plots using Matplotlib. Illustrate the creation of line plots, bar charts, and scatter plots with suitable examples.
3. Explain the data structures Series and DataFrame in Pandas. Discuss how data can be read from files using Pandas with appropriate examples.

Model Question Paper

Reg No.:_____ Name:_____

FEDERAL INSTITUTE OF SCIENCE AND TECHNOLOGY

MCA S1 (R,S) Examination ---------- 2026 (2026 Scheme)

Course Code: 26CAPC7003

Course Name: Advanced Python Programming

Max. Marks: 60 Duration: 3 Hours

PART A

Answer all questions, each carries 3 marks.

		CO	Marks
1	Write a program to illustrate the difference between mutable and immutable data type.	CO1	(3)
2	Explain Modules and Packages in python with suitable example.	CO1	(3)
3	Explain the concept of constructors and destructors in OOP. How do they differ in purpose?	CO2	(3)
4	Discuss how abstraction helps in reducing complexity in object-oriented programming.	CO2	(3)
5	Describe how Files are handled in Python.	CO3	(3)
6	Explain seek() and tell() methods with example	CO3	(3)
7	Differentiate between array() and arange() functions in NumPy.	CO4	(3)
8	Explain the significance of Matplotlib in data visualization.	CO4	(3)

PART B

(Answer any one full question from each module, each question carries 9 marks)

Module I

9	a) What is the use of Control Statements?	CO1	(5)

	b) Briefly discuss the dictionary data type with syntax for creation.	CO1	(4)

OR

10	a) Describe the Fundamental data types in python.	CO1	(5)
	b) Briefly discuss the list data type in python. Explain the use of append() and insert() methods in list.	CO1	(4)

Module II

11	a) Demonstrate how encapsulation is achieved using private variables and public methods, with the help of a program.	CO2	(4) (5)
	b) What is inheritance? Explain different types of inheritance supported by Python with examples.	CO2	

OR

12	a) "Method Overriding is different from Method Overloading" Justify the statement.	CO2	(5)
	b) Explain the Object-Oriented Concepts of Class and Object in Python	CO2	(4)

Module III

13	a) Explain seek() and tell() methods with example.	CO3	(4)
	b) What are CSV files? Explain how Python handles CSV files with suitable example.	CO3	(5)

OR

14	a) Discuss the different modes of opening files, and explain the functions used for reading from and writing to files with suitable examples.	CO3 CO3	(5) (4)
	b) Explain the functions used for file handling-read (), read (n), readline(), readlines().		

Module IV

15	a) Define Series and DataFrame in pandas. Mention their key differences.	CO4 CO4	(4) (5)
	b) What are the functions used to read data from files using pandas.		

OR

16	a) Explain the significance of matplotlib in data visualization.	CO4	(3)
	b) Explain the syntax and usage of plot(), bar() and scatter().	CO4	(6)

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