

Course Code: **MCA-106****L T C**Course Name: **Python Programming****3 1 4****INSTRUCTIONS TO PAPER SETTERS:**

1. Question No. 1 should be compulsory and cover the entire syllabus. There should be 10 questions of short answer type of 2.5 marks each, having at least 2 questions from each unit.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions to evaluate analytical/technical skills of candidate. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks, including its subparts, if any.
3. Examiners are requested to go through the Course Outcomes (CO) of this course and prepare the question paper accordingly, using Bloom's Taxonomy (BT), in such a way that every question be mapped to some or other CO and all the questions, put together, must be able to achieve the mapping to all the CO(s), in balanced way.

LEARNING OBJECTIVES:

In this course, the learners will be able to develop expertise related to the following:-

1. Master the fundamentals of writing Python scripts
2. Understand decision-making and functions in python
3. Interpret Object-oriented programming features in python
4. Gain knowledge of data structures in python
5. Explore GUI programming and database operations in python

PRE-REQUISITES:

Problem Solving Skills

COURSE OUTCOMES (COs):

After completion of this course, the learners will be able to:-

CO #	Detailed Statement of the CO	BT Level	Mapping to PO#
CO1	Demonstrate knowledge of basic programming constructs in python.	BTL2	PO1, PO2, PO3, PO5
CO2	Illustrate string handling methods and user defined functions in python.	BTL2	PO1, PO2, PO3, PO4, PO5, PO6, PO10
CO3	Apply data structure primitives like lists, tuples, sets and dictionaries.	BTL3	PO1, PO2, PO3, PO4, PO5, PO10
CO4	Inspect file handling and object- oriented programming techniques.	BTL4	PO1, PO2, PO3, PO4, PO5, PO6, PO10
CO5	Evaluate and visualize the data using appropriate python libraries.	BTL5	PO1, PO2, PO3, PO4, PO5, PO6, PO7, PO10, PO11
CO6	Develop python applications with database connectivity operations.	BTL6	PO1, PO2, PO3, PO4, PO5, PO6, PO7, PO8, PO9, PO10, PO11, PO12

UNIT – I

No. of Hours: 10 Chapter/Book Reference: TB1 [Chapter 5]; TB3 [Chapters 1-6, 15]

Conceptual Introduction: History, Features and Future of Python, Installation, Interactive Shell, Program Structure, Identifiers, Keywords, Escape Sequences, Data-Types, Variables,

Assignments, Immutable Variables, Operators and Operands, Precedence of Operators, Type-Conversion Functions, Short-circuit vs. Lazy Evaluation, Input and Output Functions, Comments, Command-Line arguments.

Control Flow: Conditional Statements: if, if-else, if-elif-else, Nested Conditionals, Loops: for, while, break, and continue statements.

Functions: Defining, Calling and Types of Functions, Arguments and Return Values, Formal vs. Actual Arguments, Scope and Lifetime, Keyword Arguments, Default Arguments, Decorators, Iterators and Generators, Recursion.

Modules: Importing Modules, Math and Random Module, Packages and Composition.

UNIT – II

No. of Hours: 11

**Chapter/Book Reference: TB2 [Chapters 5, 18];
TB3[Chapters 3, 10, 11, 13, 14]**

String Manipulations: Basic functions of Strings, Subscript Operator, Indexing, Slicing and Immutable Strings.

Data Structures: Lists, Tuples, and Dictionaries, Basic List Operations, List Slicing, List Methods, Cloning Lists, Mutability, Searching and Sorting Lists, Tuples: Tuple Assignment, Tuple as Return Value, Dictionary Literals, Adding and Removing Items, Accessing and Replacing Values, Traversing Dictionaries, Sorting Dictionaries, Dictionary Operations, Sets Operations.

File Handling: Text Files-Writing and Reading Operations, Creating and Reading a Formatted File, Manipulating Files and Directories, Closing Files.

UNIT – III

No. of Hours: 12

Chapter/Book Reference: TB3 [Chapters 7, 8, 12,13]

Object Oriented Programming: Classes, Objects, Attributes and Methods, Access Specifiers, Constructors, Static Methods, Data Hiding, Inheritance, Polymorphism, Operator Overloading, Abstract Classes.

Threads: Multi-Threading, Life-Cycle of a Thread, Synchronization using Locks and Semaphores.

Exception Handling: Exception Class Hierarchy, Except clause, Try, Finally clause, User-Defined Exceptions, Assertions.

UNIT – IV

No. of Hours: 12

**Chapter/Book Reference: TB1 [Chapters 11-12];
TB3 [Chapters 9, 16-23]**

Advanced Python: Lambda and List Comprehensions, Map, Reduce and Filter Functions

NumPy Library: Introduction to NumPy, Creation of One-Dimensional Arrays, Reshaping of an Array, Element-wise Operations, Aggregate Operations, Array Indexing, Array Slicing, Insert Row/Columns, Append Row/Columns, Array Manipulation Operations, Multi-Dimensional Arrays.

Pandas Library: Data Preparation and Pre-Processing, Series, Querying a Series, Data-Frames, DataFrame Indexing and Loading, Querying a Data Frame, Indexing Data Frames, Missing Values.

Data Visualization: Graphs in Python: Bar charts, Pie-charts, Scatter plots, Multiple plots, Subplots, Legends, Changing figure Size, Styling plots using Matplotlib Library.

GUI Programming: Creating User-interface, GUI Widgets with Tkinter, Creating Layouts,

Check Box, Radio Buttons, List Box, Menus, Menus Options, Dialog Boxes

Database Access: Database Connectivity Operations: Create, Insert, Select, Delete, Drop, Update, Joins.

TEXT BOOKS:

- TB1. Budd T A, "Exploring Python", McGraw-Hill Education, 1st Edition, 2011.
- TB2. Mark Lutz, "Learning Python", O'Reilly, 4th Edition, 2013.
- TB3. Y. Daniel Liang, "Introduction to Programming Using Python", Pearson, 1st Edition, 2013.

REFERENCE BOOKS:

- RB1. Kenneth A. Lambert, "The Fundamentals of Python: First Programs", Cengage Learning, 1st Edition, 2011.
- RB2. Allen Downey, "Think Python: How to Think Like a Computer Scientist", O'Reilly, 2nd Edition, 2015.
- RB3. Reema Thareja, "Python Programming using Problem Solving Approach", Oxford University Press, 1st Edition, 2017.
- RB4. Joel Grus, "Data Science from Scratch", O'Reilly, 2nd Edition, 2019.
- RB5. Tony Gaddis, "Starting out with Python", Pearson, 3rd Edition, 2014.