

Dr. Babasaheb Ambedkar Open University
Term End Examination January – 2026

Course	: MSCDS	Date	: 2026
Subject Code	: MSCDS-304	Time	: 03:00am to 05:15pm
Subject Name	: Advanced Python Programming	Duration	: 02.15 Hours
		Max. Marks	: 70

Section A

Answer the following (Attempt any three) (30)

1. Differentiate between aggregation, composition, and association with suitable real-world examples and their Python representations.
2. Describe how sockets work in Python for network communication. Provide an example of a simple client-server communication model.
3. Describe how file handling and OS-level operations can be performed using Python's OS and subprocess modules.
4. Describe how Python supports data manipulation using libraries such as NumPy and pandas. Give examples of data operations.
5. Discuss the design and implementation of the Singleton pattern in Python.

Section B

Answer the following (Attempt any four) (20)

1. Explain the MVC architecture pattern.
2. Compare supervised and unsupervised learning models in machine learning.
3. What is model overfitting, and how can it be prevented in Python using regularization techniques?
4. Explain how Python facilitates persistence with examples of database integration.
5. Explain Dependency Injection in object-oriented programming.
6. What is the Diamond Problem in Python's multiple inheritance system?

Section C

Part – A (Multiple Choice Questions)

(10)

1. What does the C3 Linearization algorithm in Python help with?
A Memory management B Function overloading
C Method Resolution Order D Type casting
2. What is the main use of closures in Python?
A Creating global variables B Preserving a function's enclosing environment
C Importing libraries D Converting functions to classes
3. Which built-in function applies a function to every item in an iterable?
A map() B filter()
C reduce() D apply()
4. Which Python keyword is used to define a generator function?
A async B Pass
C return D Yield
5. Which design pattern restricts a class to a single instance?
A Factory Pattern B Singleton Pattern
C Adapter Pattern D Composite Pattern

- 6 Which of the following is NOT a Creational Design Pattern?
A Singleton B Factory Method
C Builder D Adapter
- 7 What is the primary benefit of using Dependency Injection (DI)?
A Increases code complexity B Promotes tight coupling
C Increases modularity and testability D Disables dynamic typing
- 8 Which is true about the filter() function in Python?
A Returns elements that meet the condition B Returns elements that do not meet the condition
C Applies a function to all elements D Removes duplicates from a list
- 9 Which concept allows objects to behave like functions in Python?
A __init__() B __call__()
C __new__() D __repr__()
- 10 Which of the following is NOT a principle of Functional Programming?
A Pure Functions B First-Class Functions
C Shared Mutable State D Immutability

Part B (Do as Directed)

(10)

State whether the following statements are true or false.

- 1 Encapsulation in object-oriented programming hides internal object details from the outside world.
- 2 In functional programming, pure functions can have side effects like modifying global variables.
- 3 A Mixin class in Python is designed to be used as a standalone object.
- 4 In composition, the lifetime of the part object is dependent on the lifetime of the whole object.
- 5 The Abstract Factory pattern is used to create unrelated objects without specifying their concrete classes.
- 6 Python supports multiple inheritance directly.
- 7 Memoization helps optimize recursive functions by caching results of previous calls.
- 8 In Python, decorators are built on the concept of closures.
- 9 A proxy object provides direct access to the actual object's methods and properties without any control.
- 10 The Strategy pattern allows selecting an algorithm's behavior at runtime.
