

Quiz 4: Polymorphism – Virtual Functions and Abstract Classes

Course Title: Object Oriented Programming

Course Code: CC-112

Credit Hours: 3 (Theory)

Total Marks: 20

Submission Deadline: 28-06-2025

CLOs Assessed: CLO-2, CLO-3

Instructor: Syed Hamed Raza

Objective:

This assignment is designed to help students:

- Understand the concept of polymorphism in C++.
- Implement virtual and pure virtual functions.
- Apply abstract classes in object-oriented programming.

Instructions:

- Submit your work as a single `.cpp` file and a brief report (PDF format).
- Include comments in your code for clarity.
- Maintain academic integrity in your work.

Part A – Theory [6 Marks]

1. (2 Marks): What is polymorphism in object-oriented programming?
2. (2 Marks): Differentiate between virtual and pure virtual functions.
3. (2 Marks): Explain the concept and utility of abstract classes in C++.

Part B – Programming [14 Marks]

Design an abstract base class `Shape` with a pure virtual function `draw()`. Then:

- Derive two classes `Circle` and `Rectangle` from `Shape`, each implementing `draw()`.
- Use a base class pointer to demonstrate runtime polymorphism.
- Implement a virtual destructor in the base class.
- Write a main function that creates and manages these objects using polymorphism.