University of Management and Technology
School of Systems and Technology, Department of Computer Science

Assignment 03– Spring 2024

Course Title:	Object Oriented Programming			Course Code:	CC1022	Credit Hours:	4(3,1)
Course Instructor:	**Mr. Owais Khan**			Program Name:	BSCS		
Semester:	2nd	Batch: SP24-BCS	Section:	V12	Date:	06-06-2024	
Due Date:	**07-06-2024, Friday**			Maximum Marks:		**20**	
Student's Name:				Reg. No.			

Important Instructions (To be followed very strictly)

- This is an individual assignment
- Attempt all questions
- Assignment must be handwritten you have to upload pdf on LMS before deadline with .cpp code file.
- The assignment must include all steps involved to solve given questions.
- Dry run each question.
- No submission is allowed after the aforementioned deadline.

Question No 1. [CLO-3] <Bloom Taxonomy – C2: Apply> Marks [20]

Model a solution for a given problem using object-oriented principles in C++.

Problem 1: Inheritance and Polymorphism (8 marks)

a) Create a base class called Person with protected member variables name and age. Provide a constructor to initialize these variables and a virtual function displayDetails() to display the name and age.

b) Derive two classes, Student and Teacher, from Person. Add a private member variable studentId in the Student class and teacherId in the Teacher class. Implement the displayDetails() function in each derived class to display the additional information along with the name and age.

c) Create objects of Student and Teacher and demonstrate polymorphism by calling the displayDetails() function on each object.

Problem 2: Abstraction (7 marks)

a) Create an abstract class called Shape with a pure virtual function calculateArea(). Derive two classes, Rectangle and Circle, from Shape. Implement the calculateArea() function in each derived class to calculate and return the area of the shape.

b) Create objects of Rectangle and Circle and demonstrate the abstraction and resizing functionality by calling the calculateArea() function and the resize() function on each object.

Question 3: Encapsulation and Access Modifiers (5 marks)

a) Create a class called BankAccount with private member variables accountNumber (integer), balance (double), and pin (string). Provide appropriate accessor and mutator functions to access and modify these variables.

b) Implement a public member function withdraw(double amount) in the BankAccount class to withdraw money from the account. Apply appropriate encapsulation techniques to ensure that the withdrawal is only allowed if the correct pin is provided and if the account has sufficient balance.

c) Create an object of BankAccount and demonstrate the encapsulation and withdrawal functionality by calling the appropriate functions.

Guidelines:

- Submit a pdf file that will have your code along with the output screens.
- Provide a brief explanation of your approach for each question.
- Give your .cpp source files too.