964
C: 60

Air University

Mid Semester Examinations: Spring 2025

Student ID: 241503

Subjective Part
(To be solved on Answer Books only)

Subject: Object-Oriented Programming
Class: BSCYS
Section(s): A
Course Code: CS-112

Time Allowed: 120 Minutes
Max Marks: 50
FM's Name: Sheikh Qaisar Ayyub
FM's Signature:

INSTRUCTIONS

- Attempt responses on the answer book only.
- Nothing is to be written on the question paper.
- Rough work or writing on question paper will be considered as use of unfair means.
- Tables / calculators are allowed / not allowed.

	Q. No. 1 (CLO 1)	20 Marks
A	You are designing a **Hospital Management System** where a **Doctor** needs to access the private medical records of a **Patient**. Since patient data is **confidential**, it is stored as **private** in the Patient class. However, a Doctor should be allowed to view and update the records. To achieve this, **the Doctor class is declared as a friend of the Patient class**, allowing it to access the private attributes directly. Doctor Class (dcode, wardid) Patient (Pcode, diseasecode) Answer Following: • What is the use of class friends. • How doctor can access private member of patient class. • What is the relationship between doctor and patient	10
B	You are designing a **banking application** where customer information needs to be stored securely. The system should allow customers to **check their balance and deposit money**, but their **account details should not be directly accessible** from outside the class. **Question:** Design a **C++ program** with a **BankAccount class** that demonstrates the use of **public and private access specifiers**. The class should meet the following requirements: **Class: BankAccount** **Private Attributes:** • accountNumber (Unique account number) • balance (Current balance) **Public Methods:** • deposit(double amount) – Adds money to the account. • displayBalance() – Displays the current account balance. **Answer Following:** 1. **Write a C++ program** implementing the BankAccount class.	10

	2. **Ensure that accountNumber and balance remain private** and cannot be accessed directly. 3. **Use public methods** to interact with private data securely. 4. **Create an object** of BankAccount, deposit money, and display the balance.	
	Q. No. 2 (CLO 2)	**Marks: 10**
A	You are developing a **library management system** where each book has a **Book ID, Title, and Author**. Instead of creating multiple objects separately, you need to store book records efficiently using an **array of objects**. **Question:** • Explain what happens when we carte a object of class with new operator and without new operator. • Implement the array of objects to store multiple books in C++ by using new operator?	10
	Q. No. 3 (CLO 03)	**Marks: 20**
A	You are designing a **transportation system** where there are different types of vehicles, such as **cars, bikes, and buses**. All vehicles share common attributes like speed and fuel, but each type has **unique properties**: • A **car** has seats. (enginePower, seats, speed • A **bike** has helmetRequired. • A **bus** has passengerCapacity. **Question:** • Explain the concept of inheritance in terms of reusability and Extensibility ? • How would you design a class hierarchy to implement **inheritance** for different vehicle types?	10
B	A bank system allows users to perform operations on bank accounts using the following functionalities: + Operator: Adds the balance of two accounts and stores the result in a third account. == Operator: Checks if two account balances are equal and outputs "Balances are equal" if true. Question Statement Write a C++ program to implement the following scenario: Create three bank accounts ac1, ac2, and ac3. Take initial balances for ac1 and ac2 from the user. Perform the following operations using operator overloading: • ac3 = ac1 + ac2; → Add balances of ac1 and ac2 and store in ac3. • • if(ac1 == ac2) → Check if balances of ac1 and ac2 are equal. If true, display "Balances are equal". Otherwise, display "Balances are not equal".	10