UNIT -1 – Lab Questions

1. Consider a class named `Car` with private, protected, and public members. Create an object of the class and demonstrate how each type of access specifier works in accessing the members.
2. Create a class `Rectangle` with private attributes length and width. Implement methods inside the class to calculate the area and perimeter of the rectangle. Use appropriate access specifiers.
3. Design a base class Vehicle with protected data members like speed and color. Derive classes Car and Bike with additional features. Implement methods to display vehicle details.
4. Design a class for managing inventory items with private data members. Use access specifiers to control access and implement methods for item addition and display.
5. Design a simple program to manage student information using methods in C++. The program should be able to add new students, display student details, and calculate the average marks of all students. Define some functions outside class using the scope resolution operator.
6. Create a Class Diagram for Passport Automation system

   The Classes include

   Applicant

   Passport Administrator

   Database

   Police

   Regional Administrator

7. In an online shopping system, users can register, browse products, add items to a cart, and make purchases. Design a class diagram capturing these functionalities.

   Solution:

   1. - Class name: User

      - Attributes: userId, username, email, password

      - Methods: register(), login()

   2. - Class name: Product

      - Attributes: productId, name, price, quantityAvailable

      - Methods: viewDetails(), addToCart()

   3. - Class name: Cart

      - Attributes: cartId, items[], totalAmount

      - Methods: addItem(), removeItem(), calculateTotal()

   4. - Class name: Purchase

      - Attributes: purchaseId, user, items[], purchaseDate, totalAmount

      - Methods: makePurchase(), generateReceipt()

8. In a social networking platform, users can create posts, like/comment on posts, and connect with other users. How would you model these interactions in a class diagram?

Solution:

- Class name: User
  - Attributes: userId, username, posts[], friends[]
  - Methods: createPost(), addFriend()

- Class name: Post
  - Attributes: postId, content, timestamp, likes, comments[]
  - Methods: addLike(), addComment()

9. Design a class diagram for an online banking system where users have accounts, can perform transactions, and view their transaction history.

Solution:

- Class name: User
  - Attributes: userId, name, accounts[]
  - Methods: openAccount(), viewTransactionHistory()
- Class name: Account
  - Attributes: accountId, balance, transactions[]
  - Methods: deposit(), withdraw()
- Class name: Transaction
  - Attributes: transactionId, date, amount, fromAccount, toAccount
  - Methods: processTransaction(), viewDetails()

10. In a university system, users include students, faculty, and administrators. Design a class diagram representing their relationships and functionalities.

Solution:

- Class name: Student
  - Attributes: studentId, name, enrolledCourses[]
  - Methods: enrollCourse(), viewGrades()
- Class name: Faculty
  - Attributes: facultyId, name, taughtCourses[]
  - Methods: assignGrade(), viewEnrolledStudents()
- Class name: Administrator
  - Attributes: adminId, name
  - Methods: addCourse(), manageUsers()