



Sri Lanka Institute of Information Technology

Bachelor of Business Administration Honours

Final Examination

Year 4, Semester 1 (2022)

IM4692 – Object Oriented Programming

Duration: 2 Hours

June 2025

Instructions to Candidates:

- ◆ This is an **open book** exam.
- ◆ The total mark for the paper is 100.
- ◆ All the questions are compulsory.
- ◆ This paper contains 4 pages, including the cover page.
- ◆ Electronic devices capable of storing and retrieving text, including mobile phones and calculators are not allowed.

This question is based on the OOP concepts. Implement the necessary classes, along with their required attributes and methods, based on the following description.

- a) You are required to develop a student management system for a university which consists of two classes **Student** and **StudentManager**.

The **Student** class should have a studentID (int), name (String), age (int), major (String), and GPA (double) as attributes. This class should include a default constructor to initialize these attributes. Additionally, the following methods need to be implemented.

- updateGPA (double newGPA): This method should update the available GPA of the student to the new GPA.
- displayStudentDetails(): This method should display all the details of the student.

(10 marks)

- b) The **StudentManager** class should have an Array called StudentList to store a collection of student objects. This class should include a default constructor and following methods:

- addStudents (Student student): This method should add a student to the student list.
- searchStudent (int studentID): This method should search for a student by their ID and display their details.
- updateStudentGPA (int studentID, double newGPA): This method should update the GPA of a student by their ID.
- displayAll Students ( ): This method should display the details of all the students in the student list.

(15 marks)

- c) Implement a class called "StudentManagementApp" with the main method. In the main method, create an object of the **StudentManager** class. Populate the student list with at least 5 students using the addStudent() method. Perform the following operations:

- Search for a student by ID using the searchStudent() method.
- Update the GPA of a student using the updateStudentGPA() method.
- Display the details of all the students in the student list using the displayAllStudents() method.

(15 marks)

Save the project as **Question01**.

## Question 2

20 Marks

Write a program that takes input from the user and creates an Array of integers. The program should then remove all the even numbers from the Array and display only the odd numbers in the Array.

- a) Create an empty Array of integers using the Array class. Then prompt the user to enter numbers, one at a time, until they enter 0. Each number the user enters must be added to the Array. (8 marks)
- b) Once the user has entered all the numbers, remove any even numbers from the Array. (8 marks)
- c) Display the remaining odd numbers in the Array. (4 marks)

Save the project as **Question02**.

## Question 3

20 Marks

Code the following requirements for a **University Management System** in Java, using object-oriented programming principles.

- a) Create a class Person with private attributes: name, age, and email. Implement **getters and setters** for each attribute to control access. Ensure the fields are not accessible directly from outside the class. ABS (5 marks)
- b) Create two subclasses **Student** and **Lecturer** that inherit from the Person class.  
Student should have: studentId, major  
Lecturer should have: employeeId, department  
Use constructors in both subclasses to initialize all inherited and new attributes. (5 marks)
- c) In your main method, create an array to store both Student and Lecturer objects.  
Add multiple instances of each subclass to the list and call a common method like displayDetails() on each item in a loop. (5 marks)

- d) Make the Person class an abstract class and declare an abstract method displayDetails().

Override this method in both Student and Lecturer classes to print specific details.

(5 marks)

Save the project as **Question03**.

#### **Question 4**

**20 Marks**

Write a Java program that models a simple vehicle registration system. The system allows the user to enter details of different vehicles, and then filters and displays only those that are registered as "active".

- a) Create a Vehicle class with private attributes: registrationNumber, ownerName, and status (e.g., "active" or "inactive"). (6 marks)

- b) Use a constructor to initialize these attributes and provide getter methods for each field. Encapsulate the data properly. (6 marks)

- c) Create three Vehicle objects with sample data (no user input required). Two should have status "active", and the other one should have the status as "inactive". Output the vehicles using a method and only proceed if it's active. (4 marks)

- d) If the vehicle is "active", display its registration number and owner name using the getter methods. (4 marks)

Save the project as **Question04**.

**END OF THE PAPER**