The Open University of Sri Lanka
Faculty of Engineering Technology
Department of Electrical & Computer Engineering

Study Programme	: Bachelor of Software Engineering Honors
Name of the Examination	: Final Examination
Course Code and Title	**: EEI4562/ECI4262/EEX4562/ ECX4262/EEX4362/EEI4362**
	Object Oriented Design
Academic Year	: 2019/2020
Date	: 13th October 2020
Time	: 0930 – 1230hrs
Duration	**: 3 hours**

General Instructions

1. Read all instructions carefully before answering the questions.

2. This question paper consists of **Six (6)** questions in **Three (3)** pages.

3. Answer **Q1** and any **four (04)** questions from **Q2 – Q6**.

4. All questions carry equal marks.

5. This is a Closed Book Test **(CBT)**.

7. Answers should be in clear handwriting.

8. Do not use red colour pen.

Q1 is compulsory.
[Q1]

Consider an online reservation system for a bus company. The bus company includes several buses and realizes trips to different cities. Each bus is identified by its plate number and a separately assigned bus number. The trips are based on a predefined schedule and stop at predefined bus stations. Each bus can have only one trip per day. Each bus includes a driver and one hostess. For long trips, the bus will have breaks at service and rest areas. There are two types of trips, normal trips and express trips. Express trips do not stop at intermediate stations and get faster at the destination.

Seats can be reserved by customers on the web site of the bus company. The customer has the option to directly pay for the seat through the website. In that case, the seat cannot be cancelled (neither by the customer nor by the bus company). If the customer has not paid for the seat, the bus company can cancel the seat if the customer does not show up one hour before the trip. When the reservation is cancelled, the seat will become free and can be sold to another customer. Both the customer and the company staff must authenticate themselves for performing operations with the system.

a) Draw a use case diagram for describing the functional requirements of the above system.

(8 marks)

b) Passenger Nimal lists all scheduled busses from Kottawa to Nawala on December 31, 2019. He selects the one that departs at 13:00. The system displays all the seats with their status. Nimal chooses seat numbered 9, which happens to be free. He completes the reservation by entering his contact information. We assume Nimal had already logged on to the system prior to this scenario.

     i. Construct a sequence diagram for the above scenario. Show any boundary, control, and entity objects explicitly.

(12 marks)

Answer any four (04) questions from Q2 – Q6.

[Q2]

a) Explain the behaviors of "String" in Java comparing to the primitive data types.

(5 Marks)

b) Briefly explain the following concepts
- Class
- Object
- Static
- Instance Variable
- Constructor

(10 Marks)

c) Explain the access modifiers in Java.

(5 marks)

[Q3]

a) What is the difference between an interface and abstract class?

(5 Marks)

b) Briefly explain the following concepts
- Polymorphism
- Constructor
- Synchronization
- Protected
- Static   **(10 Marks)**

c) Write Java program to reverse a String in Java without using API functions

(5 Marks)

[Q4]

a) State 3 advantages of using design patterns   **(5 marks)**

b) Name and describe the three main categories of design patterns   **(9 marks)**

c) What are the uses of following design patterns?   **(6 marks)**
- Factory Pattern
- Singleton Pattern
- MVC Pattern

[Q5]

a) Explain the access modifiers 'public', 'private' and 'protected' in Java. **(6 marks)**

b) Explain the following terms with respect to exception handling.   **(6 marks)**
- try/catch
- throw
- finally

c) What is an Anonymous class in java?   **(4 marks)**

d) What do you understand by scope and lifetime of a variable? Explain with
examples.   **(4 marks)**

[Q6]

a) What do you mean by dynamic initialization of a variable in Java? Give an
example.   **(5 marks)**

b) What is bytecode? Explain its usefulness while translating a Java program in a
wide variety of environments.   **(5 marks)**

c) Write a Java program that will perform the following operations
1. Create an object of type ArrayList that will contain a list of floating-point
   numbers.
2. Now insert the following data: 12.34, 34.5, 5.6, 7.89, 10.12, 3.45
3. Show the number of elements in the object.
4. Remove 5.6 and 10.12
5. Display the content of the object.   **(10 Marks)**

-End of the paper -