International University - VNUHCM
School of Computer Science and Engineering

Midterm Examination

Date: 13/11/2021; Duration: 90 minutes

Online; open book exam

SUBJECT: Object-Oriented Programming (IT069IU)	
Approval **By the SCSE** Signature  Full name: **Nguyễn Văn Sinh**	Lecturer: Signature  Full name: Trần Thanh Tùng
Proctor 1 Signature Full name:	Proctor 2 Signature Full name:
STUDENT INFO	
Student name: **Student ID:**	

INSTRUCTIONS: the total point is 100 (equivalent to 30% of the course)

1. *Purpose:*
   - Test your knowledge on object-oriented programming in the following topics: Classes, Objects, Encapsulation, Abstraction, Inheritance, and Polymorphism (CLO1)
   - Examine your skill in analysis and design classes and algorithms (CLO2)
2. *Requirement:*
   - Read carefully each question and answer it following the requirements
   - **SUBMIT YOUR EXAM TO THE BLACKBOARD**

1. **(20 marks)** In Object-Oriented Programming, describe, explain, and give an example to illustrate each of the following keywords:
   a. protected and private (10 marks)
   b. super (10 marks)

2. **(35 marks)** Give the following code

```
public class A {
 private int x;
 public static int count1 = 0;
 public int count2 = 0;

 public A(int x) {
   //TO IMPLEMENT

   System.out.println("Ctor of A");
   A.count1++;
  count2++;
 }
}
public class B extends A {
 protected int y;
 private int z;
 public B (int x, int y, int z) {
    // TO IMPLEMENT
   System.out.println("Ctor of B");
 }
}
```

   a. (5 marks) Implement the constructor "`public A (int x)`"
   b. (10 marks) Give examples to show the difference between `count1` and `count2`
   c. (5 marks) Implement a **copy** constructor for class A
   d. (10 marks) Implement the constructor "`public B (int x, int y, int z)`"
   e. (5 marks) What is the output after calling "`B b = new B(1,2,3);`"

3. **(45 marks)** A program to manage delivery services – MyDeli.

   NOTE: Read the entire question before design and implement.

In the system, there are drivers, clients, and services. Implement the system with the following requirements

- Services. There are 3 types of services: food delivery, express delivery and in-day delivery. Each service has a name and a price. A food delivery costs 1$ per km, an express delivery costs 2$ per km, and in-day delivery costs 0.5$ per km. Each service has a status: booked, delivering, and delivered.
- A driver can serve any type of service, but he can serve only one service at a time.
- A client can book many services and can check the status of all booked services.
- Each time a client books a service, the client must provide the distance for the delivery, and can know the cost of the service but cannot select a driver.
- The system manages all booked service, and a driver can select and accept any booked service. The status of the accepted service becomes delivering.
  After finishing a delivery, the status of the service becomes delivered, 80% of cost of the service goes to the account of the driver, and the driver is free to take another service.

a. (20 marks) Write classes to store services, clients, and drivers.

b. (15 marks) Implement a function name "MyDeli" to test the following scenario in order

1. Create 2 drivers (d1 and d2) and 2 clients (c1 and c2)
2. Client c1 books one 2km food delivery, one 5km express delivery.
3. Client c2 books one 10km express delivery.
4. Driver d1 accepts the food delivery
5. Show the status of all services of client c1
6. Driver d2 accepts the 5km express delivery, after finishing the service, accepts the 10km express delivery.
7. Show the balance (account) of two drivers
8. Driver d1 finish all services, driver d2 finish all services
9. Show the status of all services of client c2

c. (10 marks) Implement the in-day delivery service where many booked in-day delivery services can be grouped together and given to a driver. Write a function to test the scenario

- Client c1 books one 7km in-day delivery
- Client c2 books one 5km in-day delivery
- Combine 2 booking into a single service and give it to the driver d1.
- Show the balance of driver d1

-- The end --