EAST WEST UNIVERSITY
Department of Computer Science and Engineering
B.Sc. in Computer Science and Engineering Program
Final Examination, Fall 2020 Semester

Course:	**CSE 110 Object Oriented Programming, Section-5**
Instructor:	**Tanni Mittra, Senior Lecturer, CSE Department**
Full Marks:	**30 (20 will be counted for final grading)**
Time:	**1 Hour and 20 Minutes**
Submission Time:	**10 Minutes**

Note: There are **5** (**Five**) questions, answer ALL of them. Course Outcome (CO), Cognitive Level and Mark of each question are mentioned at the right margin.

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1. **Define** a Generic class named **Account** that has three instance variables: *accInfo*, representing an object of any type T, *withdraw*, a double value representing withdraw amount of the account and *deposite,* a double value representing the deposite amount of the account. The partial class diagram of Account class is given below. [CO3, C3, Mark: 6]

Account <T>
- accInfo: T - withdraw: double - deposite: double

Complete this class definition by including appropriate constructors, setters, getters and toString methods. For withdraw and deposite operation you may safely assume that the class T has a variable named balance and implement toString() method in its definition.

2. Objects of the **Account** class as defined in question 1, must have non-negative withdraw and deposite. If negative values are given for any fields, a user-defined exception NegativeValueException must be thrown and the program must stop executing. [CO3, C3, Mark: 6]

Define a user-defined exception class **NegativeValueException**.

Then, **modify** the Account class such that if the withdraw amount is negative, the class must throw a **NegativeValueException**. Write only the part of the class that you have modified. No need to write the full definition again.

Write a main method within the Main class that creates an Account type object, surrounded with appropriate try-catch block.

3. Write a java program that will take student id and marks of three exams i.e. MID1, MID2 and final of 30 students of a class. After taking input write them in a file called "student.txt". Now read the file and find out which student get highest marks in MID1, MID2 and final. [CO3, C3, Mark: 6]

4. Consider the following class diagram. [CO3, C3, Mark: 6]

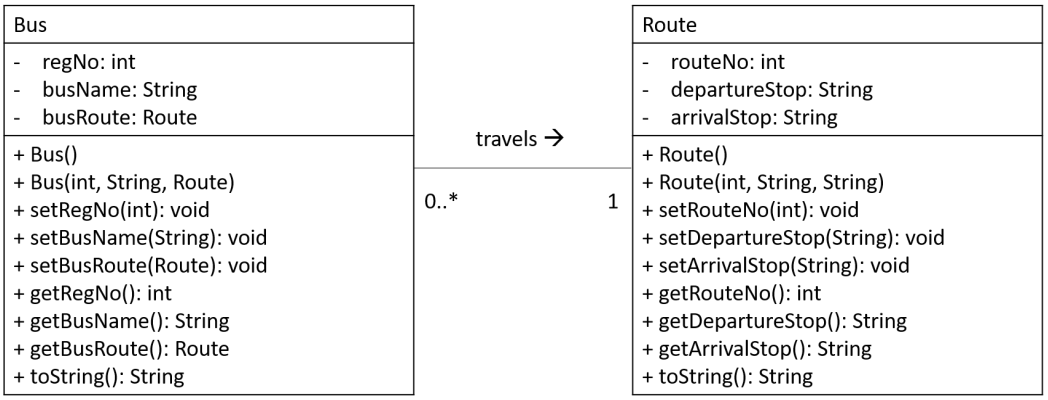

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Figure 1: A class diagram

Assume that the above-mentioned classes have already been implemented. Also consider that you have a Main class and within the main() method in which the following array lists of Route and Bus type objects are created.

```
ArrayList<Route> routes = new ArrayList<>();
ArrayList<Bus> buses = new ArrayList<>();
// adding few routes and buses
routes.add(……);
buses.add(……);
```

a) **Complete** the above program in Java that writes all Bus type objects as created and held in *buses* ArrayList into a file named **"buses.dat"** using **DataOutputStream** class. You must write the data in the following format.

```
regNo busName routeNo departureStop arrivalStop
```

b) Do you need to change the class definition of the above-mentioned classes to write objects of those classes directly into a file using **ObjectOutputStream** class? If yes, what would be the change?

5. Create an Interface Vehicle with method changeGear(int a), speedUp(int a) and applyBrakes(int a). Create two classes bicycle and bike which will implement Vehicle interface. Both classes contain two attributes speed and gear. Where [CO3, C3, Mark: 6]

changegear method set the value of gear and speedup for increasing the speed and applyBrakes for decreasing the speed. In the main method create one instance of bicycle and one instance of bike class. Perform three operation on this two objects and display the information.