Assignment 02

Due: December 12 (Self) December 13 (Open)

Suppose you are working on an object-oriented module for the sale and purchase of sacrificial animals. Major Classes are **Seller**, **Dealer**, **Animal**, **Buyer,** and **Invoice**. Details of the classes can be seen in Table 1. Note that the system does not store information about individual person, apart from the Seller, dealer, or a buyer. Write Java code for the class declaration, instance variables, and constructors for all the classes. Use inheritance and composition where required. You can create new class(es) if needed, with explanation in comments.

Table1:

Class	Attributes
Animal	Type (Cow, Goat, Lamb etc), a unique identification tag, color, weight, price per kg, the date of arrival of the Animal to the dealership, service charges, and whether the Animal is sold or not.
Dealer	dealer's name, dealer's id, dealer's address, the dealer's phone number, and the commission rate. The dealer object also keeps track of the Animals that the dealer has. It includes a method that calculates the earning of the dealer
Seller	Seller's name, id, address, contact, profit rate and sales tax rate. Includes methods to calculate the sales tax on the profit and after tax profit of the seller
Buyer	Name, id, address, contact. Includes a method to calculate the amount the buyer has to pay

REQUIREMENT 1:

1. Your code must ensure that all the relevant classes **Seller**, **Dealer**, **Buyer,** and distinct classes **Animal** and **Invoice** implement a common method for maintaining the finances. Details of the classes can be seen in Table 1. Explain with proper syntax as to how this can be achieved using object-oriented programming.
2. Write Java code that implements the method for each class with the following details:
    a. The method for the Animal class calculates the price of the animal given the weight and price per kg of the animal.
    b. The method for the Dealer class calculates the commission earned by the dealer. A dealer may charge a certain percentage commission on the sale price of the Animal.
    c. The profit earned by the seller given a certain profit rate on the price of the animal calculated in the Animal class. Sales Tax is deducted at the rate of 17% on the profit earned. The method should display an appropriate message accordingly.
    d. The method for the buyer class calculates the amount to be paid by the buyer, by retrieving the price of the animal and adding the service charges.
    e. The method for the Invoice class calculates the total amount to be paid, by retrieving the dealer amount, the buyer amount and adding 7% sales tax calculated on the price of the animal to it. The method should set the isSold variable of the Animal class to true.

REQUIREMENT 2:

The Dealer class should be able to maintain record of multiple Animals using minimal code.

1. Write an **addAnimal()** method that receives a Animal object and adds it to the Dealer class after confirming the dealer does not contain the animal.
2. Write a **contains** method that takes the *tagID* of an Animal and determines whether the Dealer has that Animal in its collection.

3. Write part of the code that removes the Animal from the dealer class after confirming the dealer contains the animal object. This should set the isSold variable of the animal to true.
4. Add a get method that returns all the Animal objects for the dealer.

REQUIREMENT 3:

1. Demonstrate the use of Polymorphism by writing code for the toString methods of all the classes, such that printing an object of the Invoice class produces an output similar to the following:

   Animal Details:

   TagID: Cow123 Type: Cow Color: Brown Age: 3.00 Years Approx Weight: 80.00KGs Price: 52000.00

   Dealer Details:

   Dealer ID: dealer123 Name: dealer name CNIC: 12334-0984756-9 Contact No: 0345-2984567 Address: Kohat

   Dealer Commission: 520.00

   Seller Details: SellerID: seller123 Name: seller name CNIC: 12334-0984756-9 Contact No: 0345-2984567 Address: Kohat

   Income Tax: 1560.00

   After Tax Profit: 8840.00

   Buyer Details: SellerID: buyer123 Name: buyer name CNIC: 12334-0984756-9 Contact No: 0345-2984567 Address: Kohat

   Amount Paid: 52000.20

   Date of Transaction: 12/7/2021

   Sales Tax: 3640.00

   Total Amount to be paid: PKR 56160.20

REQUIREMENT 4: Write code for a test class with the following details:

1. Create an object of each class mentioned in Table 1, assuming the values for the data members of each class. Create an array that takes the objects of ALL the classes as its elements. Write an enhanced for loop to display the object details.
2. The dealer decides to offer 2% percent discount on the commission at runtime. Write code with explanation.

REQUIREMENT 5:

Draw a UML class diagram that represents the classes and their relationships in the above questions.