



National University of Computer & Emerging Sciences, Karachi
Spring-2021 (School of Computing)
Midterm-II



Course Code: CS-217	Course Name: Object-oriented Programming
Instructors: Dr. Abdul Aziz / Behraj Khan / Syed Zain / Basit Ali / Talha Khan / Nida Munawar	
Student ID:	Section:
Date: April 19, 2021	Time: 9:45 am - 10:45 am

Instructions:

- Attempt all tasks.
- The paper contain 2 questions on 2 pages.

Total Points: 40

Question No. 1	[Time: 45 minutes] [Points: 36]
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Zed Clothing is a top-notch brand that sells shirts, pants and ties to its dedicated buyers.

Apart from selling shirts, pants and ties, Zed Clothing also offers complete suits that comprise shirt, pant and a tie. There is also a special tag ID for each clothing type.

Furthermore, there is another process involved, that is tax calculation. This tax calculation is done on the basis of attributes of the clothing types. It must have complete access to the prices of each clothing type as well as the overall revenue of Zed Clothing.

The classes for this scenario are presented in *Figure 1*. Read the assumptions below and then perform the tasks. Note that *Figure 1* contains some of the variables that should be present in the classes, other attributes and functions can be defined as per the requirement of each task.

Assumptions:

1. You may create or modify any variables and override any functions if needed to satisfy the requirements of the question. But their role in the program have to be justifiable.
2. The design for shirts can either be *formal*, *traditional* or *casual*. The unit price for each of these types is Rs. 1500.
3. Shirts and pants are taxable items, but ties are not.
4. The pant styles available are either *bell-bottomed*, *straight fit* or *narrow fit*. The unit price for pant is Rs. 1200 for *bell-bottomed*, Rs. 1600 for *straight fit* and Rs. 2000 for *narrow fit*.
5. The pattern for tie can either be *stripes* or *checks*.
6. The price for *striped* tie is Rs. 700 and *checkered* tie is Rs. 800.
7. The tax rate for shirts is 7% of the price and for pants it is 4% of the price.

Tasks to be performed:

- a. Using *Figure 1*, illustrate how different objects will interact with each other using an Object interaction model.
- b. Identify the type(s) of inheritance present in the model and list different classes, which are involved in that particular type of inheritance.

- Declare variables and also provide suitable implementation for default and parameterized constructor(s) of each class.
- Add a function `bill()` in the class `Suit` that calculates the total price of suit based on the items present in the suit.
- Overload the function `bill()` in `Shirt` class to accept discount vouchers (7-letter string as discount code) along with the shirt object and returns the discounted price.
- Overload the "`<`" operator such that it displays if a given *Shirt* instance gives more profit than a *Pant* instance.
- For keeping track of the inventory, there must be a mechanism to find how much of each individual item (shirt, pant or tie) is remaining in stock. Also provide mechanism to see the current revenue (overall profit). Keep in mind that each type of clothing has a different price.
- Provide a copy constructor for copying objects of *Pant* class.
- Provide a global mechanism for tax calculation such that it has access to all of Zed Clothing's revenue details.

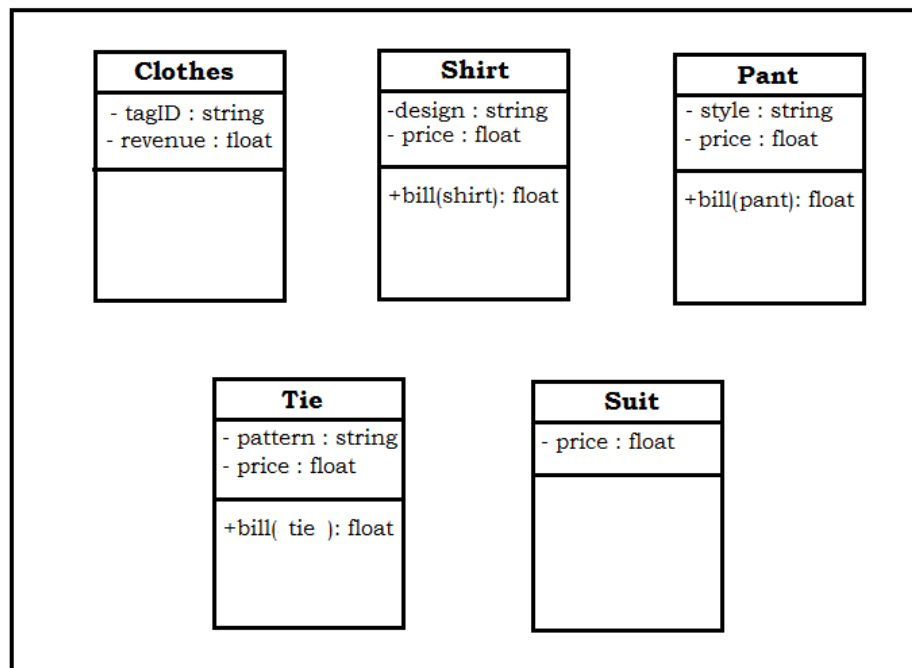


Figure 1

Question No. 2	[Time: 10 minutes] [Points: 04]
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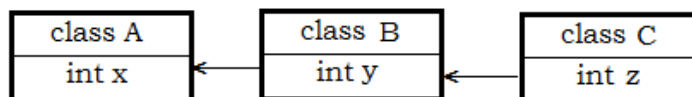


Figure 2

Implement the inheritance depicted in *Figure 2* and provide a constructor to initialize variables as **A::x = 2, B::y = 5, C::z = 12** using object declaration of class C i.e. **C ob(2, 5, 12);**
