CL-1004
Object Oriented Programming

Lab No 9

Objectives:
- Inheritance

Note: Carefully read the following instructions (*Each instruction contains a weightage*)

1. There must be a block of comments at start of every question's code by students; the block should contain brief description about functionality of code.
2. Comment on every function about its functionality.
3. Use understandable name of variables.
4. Proper indentation of code is essential
5. Write a C++ statement(s) for each of the following task one after the other, in the same order.
6. Make a Microsoft Word file and paste all of your C++ code with all possible screenshots of every **task output in MS word and submit .cpp file with word file**.
7. Make separate .cpp files for all tasks and use this format **22F-1234_Task1.cpp**.
8. First think about statement problems and then write/draw your logic on copy.
9. After copy pencil work, code the problem statement on MS Studio C++ compiler.
10. At the end when you done your tasks, attached C++ created files in MS word file and make your submission on Google classroom. (Make sure your submission is completed).
11. Please submit your file in this format **22F-1234_L1**.
12. Do not submit your assignment **after deadline**.
13. **Do not copy code from any source otherwise you will be penalized with negative marks.**

Problem 1: | (Inheritance)

Consider the following hierarchy as it exists in a university:
- There are two types of persons in the university i.e. **Student** and **Faculty**
- Every **Person** has some basic information that is common to all persons i.e. the first_name and last_name stored as private attributes and age which is a protected attribute.
- A student can in turn be either an **Undergraduate** or a **Graduate** student, every student has a cgpa.
- An undergraduate student has a fyp_name as his private attribute.
- A graduate student has a thesis topic as his private attribute.
- A faculty member has private attributes about the number of courses he is currently teaching, i.e. his course_count and a three digit telephone extension number.
- Use 3 file structure.

Problem 2: | (Inheritance)

Design a class named **PersonData** with the following member variables:

- FirstName
- LastName
- Address

Write the appropriate getter and setter functions for these member variables. Next, design a class named **CustomerData**, which is derived from the **PersonData** class. The CustomerData

Class should have the following member variables:

- CustomerNumber
- MailingList

The CustomerNumber variable will be used to hold a unique integer for each customer. The

MailingList variable should be a bool. It will be set to true if the customer wishes to be on a mailing list, or false if the customer does not wish to be on a mailing list. Write appropriate getter and setter functions for these member variables. CustomerData class will have the

- InputCustomerData member function which will Input all the data for customer.
- DisplayCustomerData member function which will display all the data for customer.

Demonstrate an object of the CustomerData class in a simple program.

Use 3 file structure.

Problem 3: | (Multi level Inheritance)

A retail store has a preferred customer plan where customers may earn discounts on all their purchases. The amount of a customer's discount is determined by the amount of the customer's cumulative purchases in the store.

- When a preferred customer spends $500, he or she gets a 5% discount on all future purchases.
- When a preferred customer spends $1,000, he or she gets a 6% discount on all future purchases.
- When a preferred customer spends $1,500, he or she gets a 7% discount on all future purchases.
- When a preferred customer spends $2,000 or more, he or she gets a 10% discount on all future purchases.

Design a class named PreferredCustomer, which is derived from the CustomerData class you created in **problem 2**. The PreferredCustomer class should have the following member variables:

- purchasesAmount (a double)
- discountLevel (a double)

The purchasesAmount variable holds the total of a customer's purchases to date. The discountLevel variable should be set to the correct discount percentage, according to the store's preferred customer plan. Write appropriate member functions for this class and demonstrate it in a simple program.

Use three file structure.

Problem 4: | (Multi Level Inheritance)

Write a class **Person**. It should have the following three attributes:

A. Name
B. Age
C. Gender

Now do the following steps

- Inherit a class **EmployedPerson** from person.
- Employed should inherit only Name from the Person.
- Employed should have an attribute NIC number.
- Employed has a member function Employ that should output "Hi, I am Employ from Employed Class".

- Inherit another class **Unemployed** from Person.
- Unemployed should inherit Name from Person.
- Unemployed should have no other attribute but constructor should output "Hi, I am

UnEmploy from UnEmployed Class".

- Inherit a class **BusinessMan** from Employed.
- It should inherit only NIC number from Employed.
- BusinessMan should inherit Employ function from Employed.
- Write a display function in this class. It should display all the attributes of BusinessMan in it.
- Create an object of BusinessMan in main and call the Employ function.

Call the display function of BusinessMan with the same object.
Create an object of UnEmployed in main and print the members. Note: Only write default constructors for each class. Default constructor should initialize all attributes of class to appropriate values.
Use three file structure.

Problem 5: | (Multi Level Inheritance)

Design the following classes with given variables and methods using inheritance.
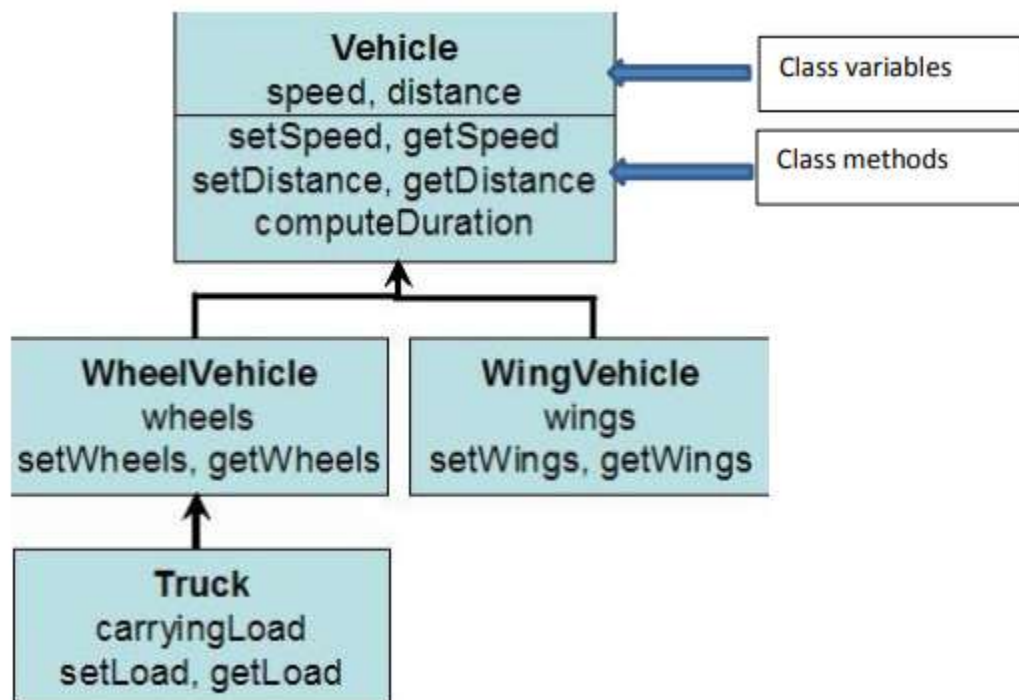
Explain your work with proper output.
Use three file structure.

Proper code indentation will hold extra marks!

Best of luck 😊

You are done with your exercise, submit on classroom at given time.