Software Engineering Design – Advanced Programming Techniques, Semester 2023-3

RMIT UNIVERSITY

LAB ASSESSMENT 2 (30%) – MOCK TEST QUESTIONS

Test Duration: 120 mins (+ 15 mins for submission)

NOTE: only submit **three .cpp file for three questions**, and DON'T zip them together.

Question 1 (8 pts)

Define a class namely **Employee** with two attributes are ***name*** (string) and ***salary*** (double). Define subclass namely **Manager** (derives from the Employee class) which has an additional attribute is ***allowance*** (double).

For each class, provide a **constructor** to initialize all attributes, and a **showInfo**() method to print out all information.

a) Create and initialize an object for each class in main() then print out all information.

b) Create an **array** of 05 manager objects using *dynamic memory allocation*. Calculate and print out the ***average of their total income***. Note: *total income = salary + allowance*

Question 2 (10 pts)

Use linked list concepts to record real estate transactions (selling and buying a house) as below.

- David: bought the house for $800
- David --> John : price = $1000
- John --> Peter : price = $1200
- Peter --> Luna : price = $1800
- Luna --> Sophia: price = $3500

Hint: Define a class, e.g. namely **Broker**, with attributes are ***name***, ***buyPrice*** and ***nextBuyer***.

a) Write a function to print out all transactions exactly as above.

b) Write a function to print out information of the broker with the **lowest profit** *excluding the last broker who has not sold the house* (note: *profit = sellPrice - buyPrice*).

Question 3 (12 pts)

Write a simple C++ program to help manage an online shopping platform as below:

The application needs to allow managing each **shop** by name and list of current selling products. For each **product**, its name and unit price must be recorded.

For each **customer account**, we need to record name and list of orders. The information of each **order** must include ***order id*** *(counting up from 1), list of bought products, and the total expense*.

When buying products, customers with **normal accounts** don't get any discount, however, **gold membership accounts** will get a discount rate of 5% for all products.

Implement classes with suitable attributes and methods to satisfy the above requirements. Test them in main() with appropriate output messages.

Note: Assume that each customer only purchases one unit of each product, and the shops always have the products listed in their selling list to serve the orders.