

**Faculty of Engineering, University of Jaffna**  
**Department of Computer Engineering**  
**EC5080: Software Construction**  
**Lab – 03: Classes and Objects**

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**Date: 11<sup>th</sup> May 2021**

**Duration: 3 Hours**

1. You are required to design a banking system which consists of several branches in different locations and each branch has a number of registered accounts.
  - a. The system consists of branches with an ID and location.
  - b. Each branch has a number of accounts each representing an account for a client.
  - c. Each account has an ID, client name, and a balance which represents the amount of money in the account.
  - d. All accounts have an annual interest rate which represents the rate used to compute the annual interest for that account. Note that all accounts should share the same value of the annual interest rate (default 4.5%).
  - e. All data fields in the designed classes should be encapsulated.
  - f. You should provide the following features via the system
    - i. Ability to enter account info from the user each time a new account is created.
      1. Make sure that the id entered by the user includes exactly six digits, if not it should keep on asking the user to enter a valid id, and
      2. Make sure that the entered balance is not a negative value, if so it should keep on asking the user to enter a valid positive or zero balance.
    - ii. Ability to enter branch info from the user each time a new branch is created.
    - iii. Ability to compute the monthly interest rate.  
(Monthly interest rate = annual interest rate / 12)
    - iv. Ability to compute monthly interest for the account.  
(Monthly interest = balance \* monthly interest rate).
    - v. Ability to withdraw a specified amount of money from the account. Note that the method should check whether the available balance is sufficient to perform the withdrawal and print the following message if it fails: "Withdrawal failed: no sufficient balance".
    - vi. Ability to deposit a specified amount of money to the account.
    - vii. Ability to obtain info of the number of accounts in each branch, and the total number of accounts in all the branches.
    - viii. Ability to print the details of any account in any of the branches.
    - ix. Ability to print the details of all branches in the system.

- Draw the class diagram of for the given question.
- Write a Java program that implements your classes with given requirements.

**Instructions:**

- Create a zip file named L3\_2018\_E\_xxx which contains the UML class diagram and the Java program.
- Upload the zip file on/before given deadline via team.
- Any plagiarized work will be given 0 marks.