University of Vavuniya, Sri Lanka

First Examination in Information and Communication Technology - 2020

Second Semester Dec/Jan 2022/2023

TICT1224(P): Object Oriented Programming(Practical)

- ⊙ Answer **All** questions.
- ⊙ This paper has **two questions** on **five pages**.
- ⊙ Time allowed: **Three Hours**.
- ⊙ Create a folder named with your **Index Number(TSXXXX)** in the desktop.
- ⊙ Save all the **screenshots** of your output in the above folder.
- ⊙ You are required to create the following using Java programming language.

1. Write a simple Java program named `Calculator` with seperate methods to get two numbers as user input and do basic mathematics operations such as addition, subtraction, multiplication and division. [30%]

   Sample Input and Output:

```
Enter first number: 10
Enter second number : 5

10 + 5  =15
10 - 5  =5
10 * 5  =50
10 / 5  =2
```

2. Consider the following diagram.

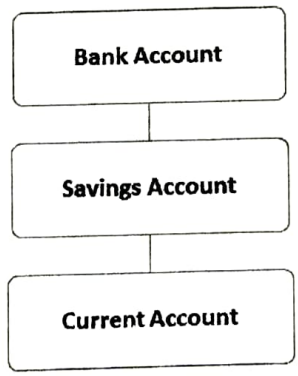

Figure 1: Tree Diagram

[Question 2 continues on the next page]

You are required to map the above diagram into a computer program using Java programming language.

(a) Create a class named **BankAccount** with the following properties.

i. Create the following instance variables inside the class and set them as private.

- `String firstname`
- `String lastname`
- `String accountType`
- `int accountNo`
- `double minBalance` - with the initial value 500, which is common for all the instances of this class
- `String branch`
- `double rate`

ii. Create three separate constructors as follows.

1. A default constructor to initialize all instance variables to null or 0.
2. A parametrized constructor with the parameters `firstname, lastname, accountType, accountNo, rate and branch` to initialize all the instance variables to the values passed through the parameter.

iii. Accomplish encapsulation by creating separate getters and setters to get and set the values of the instance variables `firstname, lastname, accountType, accountNo, rate and branch`.

iv. Create the following methods inside class `BankAccount`.

1. `findRate()` – This method should print the appropriate message based on the value of the variable rate as given in the table below.

Rate Criteria	Message
rate $\geq$ 75	Excellent
rate $\geq$ 50	Good
else	Normal

2. `display()`– This method should print all the details of the **BankAccount** including full name(combination of first name and last name), account type, account number ,minimum balance and branch.

(b) Derive a class named **SavingsAccount** from the class **BankAccount**.

Class SavingsAccount:

i. Create the following variables inside the class and set them as private.

- `double balance`
- `double interest`

[Question 2 continues on the next page]

- `String accountName`

ii. Make the variable `accountName` as constant and set its value to "Singithi".

iii. Create two constructors as follows.

1. A parametrized constructor with the parameters `firstname`, `lastname`, `accountType`, `accountNo`, `rate`, `balance` and `branch`.
   - Call the super class constructor inside this constructor using the appropriate keyword.
   - Initialize all the instance variables of the class `SavingsAccount` inside it.
2. Another parametrized constructor with the parameter `balance` to initialize the instance variable `balance`.

iv. Create the following methods inside class `SavingsAccount`.

1. `deposit(depositAmount)`- The method should calculate the new balance after depositing an amount and print the new balance after deposit.
   If the `depositAmount` is less than 0 the method should print a message "invalid amount" else it should calculate the balance based on the equation given below and print it.
   $$balance = balance + depositAmount$$
2. `withdraw(withdrawalAmount)` –The method should calculate the new balance based on the withdrawal amount. It should print a message "Not sufficient balance" if the balance is less than the withdrawalAmount and if the `withdrawalAmount` is less than 0, then it should print a message as "Invalid amount". Otherwise the method should calculate the new balance based on the following equation and return it.
   $$balance = balance - withdrawalAmount$$
3. `applyInterest()`– The method should calculate the `interest` based on the following criteria and return the `interest`.
   If balance $\leq$ 10000, then interest = (balance*0.1) else interest = 1000+(balance* 0.2)
4. Override the method display() to print all the details as in the super class and also the account name and current balance.
   Hint: call the super class method with appropriate keyword.

(c) Derive another class named `CurrentAccount` from the parent class SavingsAccount.

i. Create a variable named `balance`.

ii. Create a parameterized constructor with the parameter balance to initialize the variable balance.

[Question 2 continues on the next page]

iii. Override the method `applyInterest()` based on the following criteria.
If balance $\leq$ 10000, then interest = (balance*0.5) else interest = (balance* 0.9)

(d) Create another class named `BankAccountApp` which contains the main method.

i. Create an object for the `BankAccount` class with the following values and call methods appropriately.

First Name	Last Name	Account Type	Account Number	Rate	Branch
Kamal	Perera	Joint Account	87673542	44	Vavuniya

ii. Create object for the child class `SavingsAccount` with the following values and call the appropriate methods to get the output.

First Name	Last Name	Account Type	Account Number	Rate	Balance	Branch
Kasun	De Soyza	Savings Account	978394758	50	1000.00	Vavuniya

iii. Get the amount for deposit and withdrawal as user input and call the appropriate methods using appropriate objects to get the output as follows.

iv. Create an object for `CurrentAccount` class with the balance = 150000 using constructor and call the method `applyInterest`.

[70%]

Sample Input and Output:

```
Name: Kamal Perera
Account Type:Joint Account
Account No: 87673542
Bracnh: Vavuniya
Minimum Account Balance:500.0
Rate: Rate is Normal
-----------------
Savings Account Details
-----------------
Name:Kasun De Soyza
Account Type: Savings Account
Account Name:Singithi
Account No: 978394758
```

[Question 2 continues on the next page]

```
Branch: Vavuniya
Minimum Account Balance:500.0
Current Account Balance:1000.0

Enter the ammount you want to deposit: 200
Your balance after deposit : 1200.0

Enter the ammount you want to withdraw: 100
Your balance after withdrawal : 1100.0

Your interest is: 110.0
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Current Account Details
----------------

Your interest is: 136000.0
```

End