National University of Computer and Emerging Sciences, Lahore Campus

Course Name:	Software Design and Architecture Lab	Section:	ALL
Program:	BS (Software Engineering)	Semester:	Spring 2022
Duration:	3 hour	Total Marks:	65
Evaluation Type:	Lab Final Exam	Weight:	40 %
Name:		Roll Number:	

Note:

- The quality of the answers will affect the marks.
- Students will receive **ZERO** marks if the answers are plagiarized.
- Use of mobile phones, helping code, **internet**, flash drives, and smart devices are strictly prohibited.
- Discussion with other students is not allowed.
- You must ensure that you have made proper submission of your code and well in time. No queries will be entertained later.
- Your submission file must bear your **Roll number** and the **question number**. Any submission not bearing a roll number will not be entertained even if it bears your name.

Question 1 **(Marks 20)**

Scenario:

A weather alert system (WAS) needs to be developed for maintaining the data of weather alert forecasting. There are many local systems present in multiple cities that monitors weather. Admin can register multiple cities and their systems. The system (WAS) notifies other cities when there is an alarming situation related to weather. Alarming threshold for each city is being set by admin and sub admin. Cities local system can bind themselves for other selective cities weather alarming condition. The system (WAS) also checks whatever other local systems are still in active or not. Admin can set a time threshold in which every system needs to verified whatever it is connected or not. Admin can register multiple sub admins also.

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1. ***Draw class diagram and implement java code for the following scenario. Proper constraints, conventions, methods, return types etc should be present. Each scenario and stakeholders should be present in the solution.***
2. ***Consider design patterns in mind while creating solution for it. In case, if more than one design pattern is being applied in the solution, then do mention it.***
3. ***Java code should be proper functional and should acquire inputs from user.***

Question 2

```
class whatsApp {

   public void sendMessage() {
   System.out.println("Msg Sent");
  }
 }

class facebook
{
   public void sendMessage() {
   System.out.println("Msg Sent");
  }
 }

class Twitter
{
   public void sendMessage() {
   System.out.println("Msg Sent");
  }
 }

class Instagram
{
   public void sendMessage() {
   System.out.println("Msg Sent");
  }
 }

class SocialMedia
{
   Whatsapp obj1=new whatsApp();
   Facebook obj2=new facebook();
   Twitter obj3=new Twitter();
   Instagram obj4=new Instragram();
   public void connectWhatsapp()
   {
     obj1.sendMessage();
   }
   public void connectFacebook()
   {
     obj2.sendMessage();
   }
   public void connectTwitter()
   {
     obj3.sendMessage();
   }
  public void connectInstagram()
  {
     obj4.sendMessage();
  }
}

class Main {
  public static void main (String[] args) {
  SocialMedia mainObj=new SocialMedia();
  }
}
```

Consider the above given code. According to CK AND LK metrics The **Weighted Methods for Class (WMC)** for *SocialMedia* is **four** and **Class size metrics (CS)** is **eight.** The task is to modify the code of *SocialMedia* in such way that **Weighted Methods for Class (WMC)** count becomes **one** and **Class size metrics (CS)** do not exceed **five**.

class size <5
weighted method =1

Note:

The main functionality of the class SocialMedia is to send message with the help of any four social media. You have to rewrite the code in such a way that SocialMedia allows user to send with any of the four DMBS, BUT constraint for WMC AND CS mentioned above must be fulfilled. Lastly, there should be option in the main for the user to provide input for sending message from desired social media.

Question 3 **(Marks 15)**

Consider the following code and determine which S.O.L.I.D principle it follows or not. If their exits violation. Correct the violation and draw a class diagram for it.

```
public class DebitCard{
public void doTransaction(int amount){
System.out.println("tx done with DebitCard");
}
}

public class CreditCard{
public void doTransaction(int amount){
System.out.println("tx done with CreditCard");
}
}
```

```
public class ShoppingMall {

    private DebitCard debitCard;   —
                        card
    public ShoppingMall (DebitCard debitCard) {        Liskove
     this.debitCard = debitCard;
    }
    public void doPayment(Object order, int amount){   DIP voilation

     debitCard.doTransaction(amount);
    }

    public static void main(String[] args) {
      DebitCard debitCard=new DebitCard();
      ShoppingMall shoppingMall=new ShoppingMall(debitCard);
      shoppingMall.doPayment("some order",5000);
     }
}
```

Question 4 **(Marks 15)**

Draw a state diagram for the following description:

A state diagram of user account life cycle in the context of online shopping. Every company having customers maintains customer accounts and supports a complete life cycle of the account from its creation until it is closed. There are differences in what are the stages (states) in the account's life cycle, and what are conditions or events causing account to change its state. For the user account to be created, it has to meet some initial requirements. For example, user id (used as a login name) must be unique, at least for the existing accounts. After account was created, it might need to be verified. Verification depends on the company and could include e-mail, phone, and/or address verification. If account was not verified during some predefined period of time, that account could be moved to the suspended accounts.

New, active, or suspended accounts could be cancelled at any time by client's request. Note, the precondition for this usually includes payment of any outstanding balances, and might require some separate account state or substate to handle this case. User account might be suspended for security reasons, manually or automatically. For example, website intrusion detection system locks user account for predefined period of time, if there were several unsuccessful login attempts using incorrect account password. After account lock times out, account is activated back automatically. Some user accounts could be inactive for a long period of time. Company policy or business rules could require moving such dormant for a year or two accounts to the suspended state.