Sri Lanka Institute of Information Technology

B.Sc. Special Honours Degree/ Diploma

in

Information Technology

Final Examination

Year 2, Semester II (2017)

IT221 - Software Engineering II

Duration : 2 Hours

November 2017

Instructions to Candidates:

- This paper is preceded by 10 minutes reading period. The supervisor will indicate when answering may commence.
- This paper contains **four** Essay Type Questions with a total of 100 marks.
- Answer all questions in the booklet given.
- This paper contains 6 pages with Cover Page.
- Electronic devices capable of storing and retrieving text, including calculators and mobile phones are not allowed.

Question 1 (15 marks)

Draw a **State diagram** for the door object scenario given below.

All dangerous chemicals are stored in the restricted area and access to that area is prohibited for any unauthorized person. It operates under specific regulations and guidelines. There is only one security door to enter and leave the restricted area.

The security door can be "Opened", "closed" "locked", or "alert". This security door can be opened only with a correct security code. Once the code is entered, it will check for the validity of the code and provide or deny access. In the case of an unauthorized security code, it will allow another two attempts to enter the code and in the third time Door alarm would sound if the code is invalid.

Once the door is opened, within 20 seconds it will close itself automatically. When a person enters he/she can close the door by pressing the close button from inside. When the door is in the closed mode, door gets automatically locked within 10 seconds after closing it. Door will lock only when it's closed. While the door is locked the alarm would ring creating an alert stage. In this stage alarm would ring continually until it is turned off. The alarm can be turned off only by a valid finger print, which will result the door to open.

Question 2 (25 marks)

a) What does the term "CRC" stand for? Explain the format of the CRC card in your own words. (5 marks)

b) Draw a **Class Diagram** with multiplicities for the system given below.

(20 marks)

D-Drive is a company which owns many vehicles and it rents out vehicles to various companies or people. This company stores following information about the vehicles they own.

- Vehicle details which they keep track are registration details, engine capacity, next service date, laden weight (for vans and lorries), towing capacity (lorries).
- Trailers can be attached to lorries when needed.
- Company needs to record which trailers can be attached to which lorries.
- All vehicles are made by one manufacturer.

- In this company there are permanent employees and contract employees.
- Both vans and lorries must be allocated to a permanent employee. A permanent employee has a maximum of 1 lorry or van allocated to them.
- However, there are some permanent employees (office staff) who do not have a lorry or van allocated to them.

Note – You do not have to include attributes or methods of classes.

Question 3 (30 marks)

a) Explain the meaning of strict sequencing and weak sequencing using your own examples. (5 marks)

b) "My Style" (MS) is an Online fashion application developed to promote online purchasing with the customers. Given below is a detailed description of the deployment of "My Style" application. Model a physical diagram for this description. (25 marks)

"My-Style" application is accessible for any user via a mobile phone or a desktop. Desktop users can access the "My-Style" via a Brower while Mobile users need to install the My_Style app running inside the Android OS.

MS backend application (MSpackage.dll) is a C# application, which is deployed in the Dell Inspiron 5000 machine.MSpackage.dll runs in Windows 10 and the Windows OS is installed in Dell Inspiron 5000 machine.

CustomerManagement, StockManagement, SalesManagement are the three core modules MS backend application consists with. Interfaces of MS backend application is implemented via ASP.NET.These core modules provides its services through Icustomer, IStock and ISales user interfaces. ICustomer interface is accessible by mobile and desktop users.

SalesManagement and StockManagement interacts via IPurchase interface which is implemented by Stock component. CustomerManagement can get sales and stock details from their related component interfaces. Both desktop and the mobile devices connect to the web

server via http over internet. MS has a database server named MS_DataServer which runs the Oracle11g. MS_DB database is installed in Oracle 11g which implements IDms interface in which stock and sales components can use to retrieve data. MS_DataServer is connected to the backend via WAN.

Question 4 (30 marks)

Part A

There are more than 1000 employees which are employed at "Alba Steel". It has 5 main departments as Manufacturing, Supplies, Sales, HRM and Marketing. All these employees will belong to one of these departments. This company has hierarchy levels as Non-executive, executive, manager, senior manager.

a) All Employee details should be entered into the system and registering the employee, removing an employee, calculate salary, updating employees details are the services which the system should provide. These services should be invoked via a client interface.

i). Suggest a suitable design pattern to be used for and justify your answer.

(3 marks)

ii). Explain the design pattern in (i) above using a class diagram

(7 marks)

b) Employee visiting cards are to be printed with Employee details (Name, Designation & email etc) and Department details (Department name, Address & extension etc) he/she works for. These visiting cards to be printed minimizing the DBaccess and minimizing the Object creation when printing starts as a bulkprocess.

i). Suggest suitable design pattern and justify your answer. (4 marks)

ii). Explain the design pattern in (i) above using a class diagram

(6 marks)

Part B

In this question you are expected to use your knowledge on design patterns to suggest a solution for a given code segment.

```
public abstract class Sandwich {
    protected String description = "Sandwich";

    public String getDescription(){
        return description;
    }

    public abstract double price();
}

public class WhiteBreadSandWich extends Sandwich {

    public WhiteBreadSandWich(String desc){
       description = desc;
    }

    public double price() {
        return (3.0);
    }

}

public abstract class SandWichType extends Sandwich {

    public abstract double price();

}

public class Cheese extends SandWichType{
    Sandwich currentSandwich;

    public Cheese (Sandwich sw){
        currentSandwich = sw;
    }

    public String getDescription(){
        return currentSandwich.getDescription() + ", Cheese";
    }

    public double price() {
        return currentSandwich.price().add(0.50));
    }

}
```

```
public class Mayonnaise extends SandWichType{
    Sandwich currentSandwich;

    public Mayonnaise (Sandwich sw){
        currentSandwich = sw;
    }

    public String getDescription(){
        return currentSandwich.getDescription() + ", Mayo";
    }

    public double price() {
        return currentSandwich.price().add(0.60));
    }

}

public class SandwichMaker {

    public static void main(String args[]){

        Sandwich mySandwich = new WhiteBreadSandWich("White bread
Sandwich");
        System.out.printf("Price of %s is $%.2 %n",

mySandwich.getDescription(), mySandwich.price());
        mySandwich = new Cheese (mySandwich);
        System.out.printf("Price of %s is $%.2 %n",

mySandwich.getDescription(),mySandwich.price());

        mySandwich = new Mayonnaise(mySandwich);
        System.out.printf("Price of %s is $%.2 %n",

mySandwich.getDescription(),mySandwich.price());

    }
}
```

i) What is the design pattern that has been used to implement this code segment? Justify your answer.

(3 marks)

ii) Using a simple class diagram, show the structure of the design pattern identified in part i) above.

(7 marks)

********** End of Final Paper **********