Sri Lanka Institute of Information Technology

B.Sc. Special Honours Degree/ Diploma

in

Information Technology

Year 2, Semester I (2018)

IT2020 - Software Engineering

Duration : 3 Hours

Instructions to Candidates:

1. This paper contains **five** Essay Type Questions with a total of 100 marks.
2. Answer all questions in the booklet given.
3. This paper contains 6 pages with the Cover Page.
4. Electronic devices capable of storing and retrieving text, including calculators and mobile phones are not allowed.

Question 1 (15 marks)

Draw a sequence diagram for the below given description by identifying **stereotypes**.

A student can enroll for the semester online. When they are using the online enrollment for the first time they need to register by giving the student ID. Afterwards they can login to the system and can perform enrollment.

When students are enrolling the system will automatically check for any prerequisite subjects they have to complete before enrolling and for any outstanding semester payments. Once all prerequisite subjects have been completed and payments are not outstanding, the student can successfully enroll into the semester. Prerequisite subject details and payments made by students are all stored in StudentDB. When the enrolling is successful student will get an enroll success message, if not successful they will get a message that enrollment is unsuccessful and to enroll again.

* User Login interaction is already modeled. You can reuse it for Enroll Student sequence diagram.

Hint: You may use two boundary classes and two control classes and suitable entity classes for login process and enrollment process.

Question 2 (15 marks)

Given below is a detailed description of "Glamour Me Up" application (GMU) developed for an online fashion store. Model a **physical diagram** for GMU application.

This application can be used by mobile and desktop users to order accessories. GMU is compatible to run with any Windows 10 or above operating system. Desktop users can access GMU using browser while the mobile users needs to install this application which will run inside the android OS.

The main application runs in Apache webserver, which is installed in the IBM server. The User Interface (UI) of GMU is developed with JSP web pages and it is deployed in Apache webserver. GMU is formed with **Order**, **Stocks** and **Payments** core modules. UI component communicates with order through **Iorder**, stock through **Istock** and payment through

Ipayment respectively. Apart from this UI component is responsible to create GSAM interface, this interface is needed for the mobile application and desktop to function correctly.

Database server GMU maintains is called GMU_DBServer, it has MongoDB Driver installed which runs the MongoDB. MSADB interface is implemented by the MongoDB and it helps to communicate with order and inventory components when needed. Both desktop and the mobile devices connect to the web server via http over internet. IBM server and DB server is connected via LAN.

Question 3 (25 marks)

a) Based on the below given code come up with a control flow graph and then calculate the minimum number of test cases required for full branch coverage. (Show the branch coverage as a percentage for each test case)

(15 marks)

```
public void Print()   {

     If (y<10)
          System.out.Println ("Less than Ten");
     else if (x>20)
          System.out.Println ("Greater than Twenty");
     else
          System.out.Println ("Greater than Twenty");
}
```

b) How many test cases are required to achieve 100% statement coverage for the given below code? (10 marks)

```
while (x < y) {
          x = x + 3;
          y = y + 2;

          if ((x + y) < 10) {
              s = x + y;
          } else {
              s = x - y;
          }
      }
```

Question 4 (35 marks)

a) A project tracking system helps a supervisor keep track of the progress of projects. Each project is described completely in the system and is stored in the project repository. Supervisors can add projects when new projects are assigned to them and remove projects when they are completed. Project evaluation criteria can changes as the project progresses and these changes need to be updated in all the projects in the repository.

Briefly describe a suitable design pattern with the relevant class diagram including appropriate methods which can be used for the given scenario.

(8 marks)

b) Suppose you are going to buy a Ticket for an Event *"ABBA reunion 2019 in USA"*. And the Cost of the event is 2000 US Dollars. This is the standard package available for all visitors who wants to watch the event. It will have some additional facilities as well according to each individual. For Example;

- For accommodation you can have a separate room for 2 persons with additional 100 US Dollars.
- Food will be provided with an additional charge of another 100 US Dollars
- Transportation will be provided with additional charge of another 100 US Dollars.
- Visitors can reserve priority seats for another 100 US Dollars.
- These choices are optional, you can avail them with additional charges.

i) Identify the design pattern for the above scenario. Justify your answer. (2 marks)

ii) Draw the class structure of the design pattern you identified in part i) with appropriate methods. (10 marks)

c) The below code shows the startup of a computer. (15 marks)

```
//the components of a computer

class CPU {
    public void processData() { }
}

class Memory {
    public void load() { }
}

class HardDrive {
    public void readdata() { }
}

class Computer {
    private CPU cpu;
    private Memory memory;
    private HardDrive hardDrive;

    public Computer() {
        this.cpu = new CPU();
        this.memory = new Memory();
        this.hardDrive = new HardDrive();
    }

    public void run() {
        cpu.processData();
        memory.load();
        hardDrive.readdata();
    }
}


class User {
    public static void main(String[] args) {
        Computer computer = new Computer();
        computer.run();
    }
}
```

i) Identify the design pattern used in this code. Justify your answer.

(2 marks)

ii) What is the main purpose of using the design pattern you have mentioned above for this solution? (2 marks)

iii) Draw the class structure of the design pattern you identified in part i) with appropriate methods for the above scenario. (11 marks)

Question 5 (10 marks)

a) What type of version control management process is most suitable for open source software development and justify you answer. (2 marks)

b) Compared to traditional software, Software as a Service (SaaS) has many benefits. List two benefits which SaaS has over traditional software development. (2 marks)

c) Explain two advantages Automated Testing has over Manual Testing.

(2 marks)

d) List three types of triggers used in state chart diagram and briefly explain them. Use examples to illustrate you answer.

(3 marks)

e) What does "**Do behavior**" mean in a state chart diagram?

(1 mark)