SLIATE

SRI LANKA INSTITUTE OF ADVANCED TECHNOLOGICAL EDUCATION

(Established in the Ministry of Higher Education, vide in Act No. 29 of 1995)

Higher National Diploma in Information Technology

Second Year, First Semester Examination – 2016

IT2313 Object Oriented Analysis and Design

Instructions for Candidates:
Answer only five questions

No. of questions : 6
No. of pages : 3
Time : 3 h

Question 01

(i) Briefly describe the following in the context of object oriented programming:

a. Class (02 marks)
A class is a program code template for creating same type objects

b. Explain the term "inheritance". (02 Marks)
A feature in OOP which one class automatically include another class's information.

c. What type of members cannot be inherited from the base class? (01 marks)
- its constructor and its destructor
- its operator=() members
- its friends

d. List three types of class member visibilities used in C++. (03 marks)
- Public
- Private
- Protected

(ii) Create simple C++ class "Student" using following description.

Private data member "RegNo" (Registration Number) of type integer, Private data member "Name" of type string, Private data member "Marks" of type float, Private data member "Remark" of type string. Private member function AssignRemark( ) to assign Remarks as per the Marks obtained by a student. Grading range and the respective remarks are shown as follows:

Grade	Remarks
Marks >= to 60	Selected
Marks < than 60	Not selected

Public function Input_Data( ) to enter values for RegNo, Name, Marks and call private member function AssignRemark(). Private member function displayRemark( ) to view the content of all the data members.

(marks 06)

```
class STUDENT
        {
        private:
                int RegNo;
                String Name;
                float Marks;
                String Remark;
        public:
                void AssignRemark( )
                        {
                        if  Marks<60
                                Remark="Not Select";
                        end if
                                Remark="Select";
                                }
                void Input_Data( )
                        cout<<"Enter Reg no";
                        cin>>RegNo;
                        cout<<"Enter Name"  ;
                        cin>>Name;
                        cout<<"Enter Marks"  ;
                        cin>>Marks;
                        }
                void displayRemark( )
                        {
                        cout<<Remark;
                        }
        };
```

(iii)Answer the questions based on the following programme

```
class employee
        {
            char designation[20];
            protected:
                double Salary;
            public:
                employee();
                void startdate();
                void promotions();
        };
        class manager : public employee
        {
            int ID;
            char Position[20];
            double Extrapayment;
            public:
                manager();
                void inputinfor();
                void Show();
        };
```

a. Write the names of all the member functions which are belonging to objects of class manager. (03 marks)
b. Briefly explain the term "Constructor" **and** Identify the constructors in above program (03 marks)

Question 02

(i) What is the important of constructing a use case diagram in system designing?(3 marks)

Explain the interactions between the system and external systems and users

(ii) Who is an actor in use case diagram? (02 Marks)

Actor is a role played by a user or any other system that interacts with the system

(iii)Briefly explain following relationships. (3 marks)

a. Association- On a use case diagram, associations are drawn between actors and use cases to show that an actor carries out a use case
b. Extend- complex use case in order to simplify the original case and thus extend its functionality
c. Uses or include- The base use case explicitly incorporates the behavior of another use case Or The relationship between the abstract use case and use case that uses it.

Used the given scenario to answer the questions

ABC caters are pastry shop. They are going to restructure their pastry shop with implanting software. Here are their new facilities.

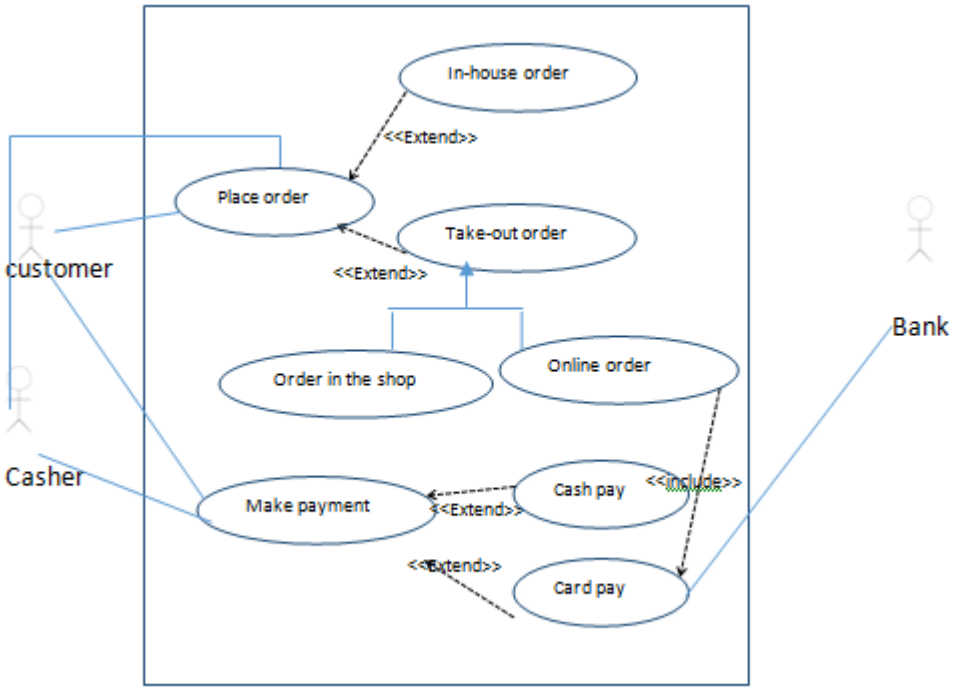
Customers are two types, dine-in and take-away customers. Take- away customers can order in the shop or use online facilities to place order for their functions. Take-away customer can pick it up themselves or get the service from the delivery person. If they use online facilities to make order he/she should pay using the credit card. Normally online facilities are for large orders.

Waitress are help to dine-in customers to make order and payment process. It can be large or small orders. Casher feed the dine-in customer information to the system.

a. Identify the actor or actors in the above mentioned system. (3 marks)
Customer,Bank.

b. Identify the use case or use cases in the above system. (2 marks)
Place order, Make payment, dine in order, Take away order. Online order,cash pay, credit pay.

c. Draw a most suitable Use Cases Diagram for the above mentioned system (5 marks)



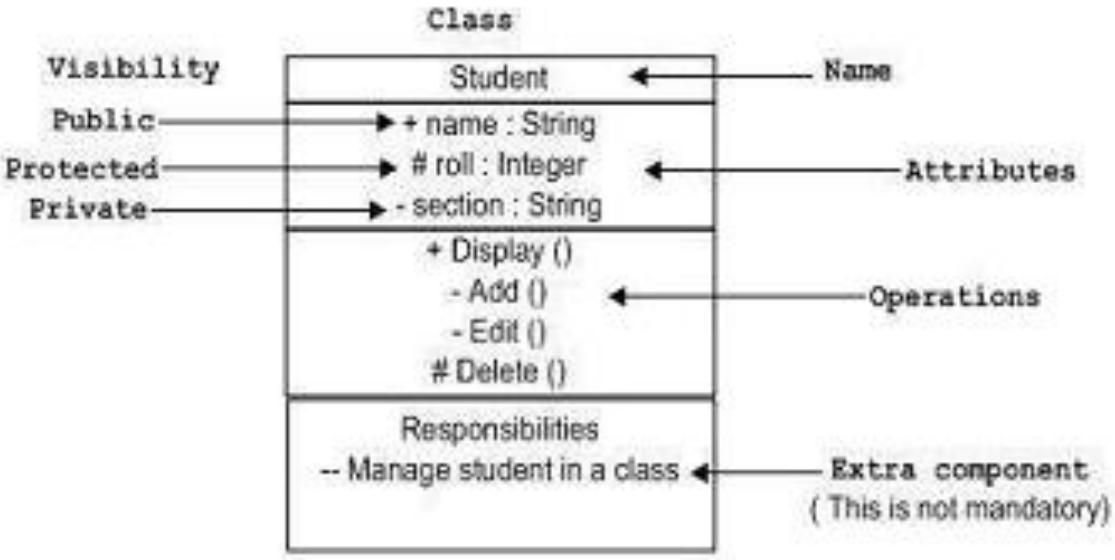
Question 03

(i) UML class diagrams show the classes of the system, their inter-relationships, and the operations and attributes of the classes. What is the importance of Class Diagrams?

(3 marks)

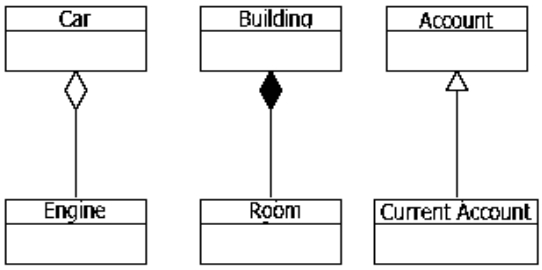
Explore domain concepts in the form of a domain model
Analyze requirements in the form of a conceptual/analysis model
Depict the detailed design of object-oriented or object-based software

(ii) Represent the given information of Student class using class notation.
Data members: Public name string, protected role integer, private section string.
Function members: public method Display(), private method Add() and Edit(), protected method Delete()



(6 marks)

(iii)Identify the relationships between the given classes of following diagrams. (3 marks)

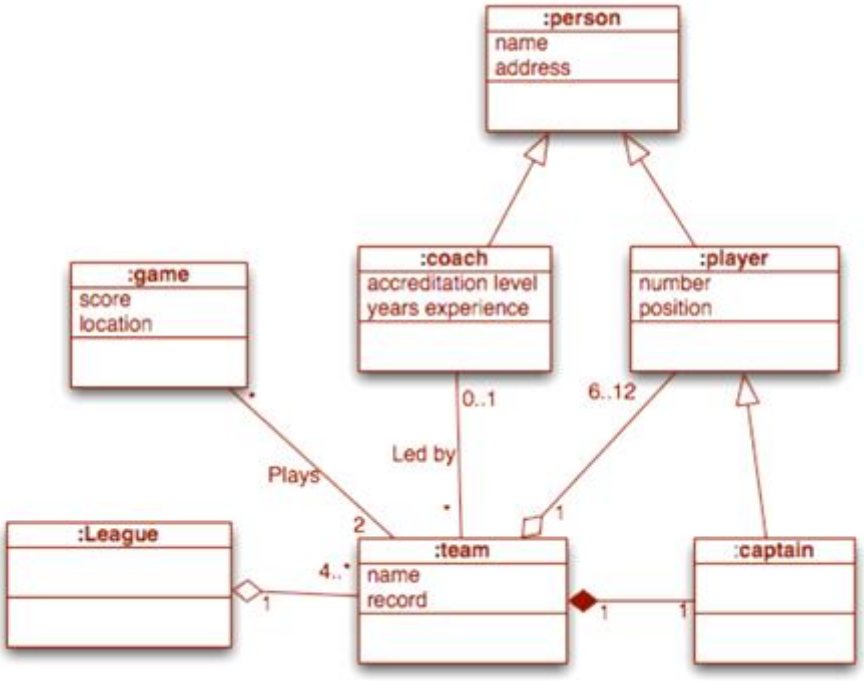


a) Car and Engine - Aggregation
b) Building and Room - Composition
c) Account and Current Account - Generalization

(iv)Consider the following scenario, draw a class diagram for this information, and be sure to label all associations with appropriate multiplicities

A hockey league is made up of at least four hockey teams. Each hockey team is composed of six to twelve players, and one player captains the team. A team has a name and a record. Players have a number and a position. Hockey teams play games against each other. Each game has a score and a location. Teams are sometimes lead by a coach. A coach has a level of accreditation and a number of years of experience, and can coach multiple teams. Coaches and players are people, and people have names and addresses.

(08 Marks)

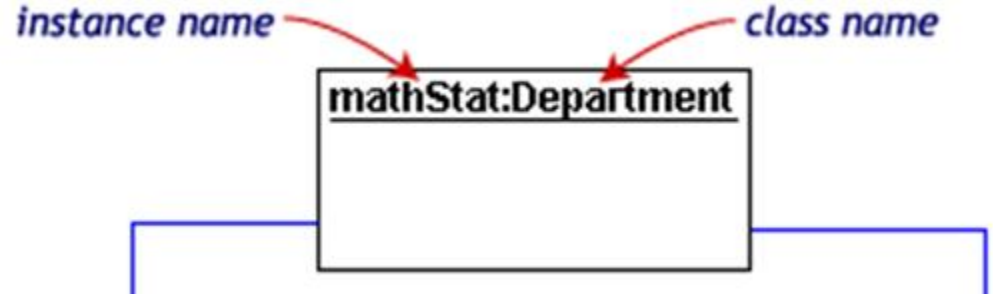


Question 04

(i) What is the purpose of drawing an object diagram? (03 Marks)

Forward and reverse engineering. Display the object relationships of a system. Create the static view of an interaction. Understand object behavior and their relationship from practical perspective

(ii) Draw an example for an object diagram. (03 Marks)



(iii)Describe the importance of State Chart Diagram. (04 Marks)

To model dynamic aspect of a system. To model life time of a reactive system. To describe different states of an object during its life time. Define a state machine to model states of an object.

(iv)Clearly illustrate the following symbols used in State Chart diagrams. (05 Marks)

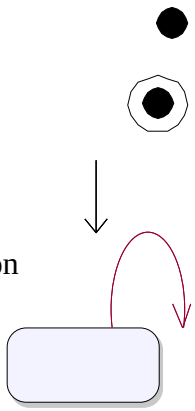
a. Start State

b. Stop State

Transition

c. Self-Transition

d. State

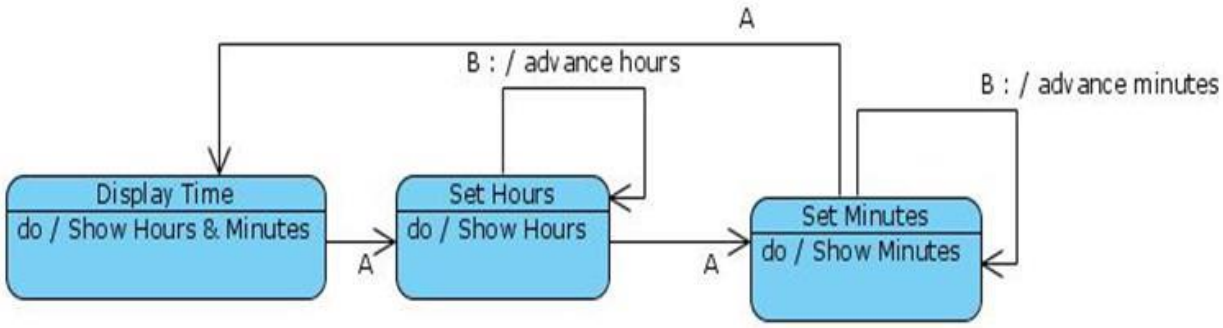


(v) Consider the Following Description and Draw the state transition diagram for described digital watch.
(05 Marks)

Consider a simple digital watch which has a display and two buttons to set it, the A button and the B button. The watch has two modes of operation, display time mode, the watch displays hours and minutes, separated by a flashing colon.

The set time mode has two sub modes: set hours and set minutes. The A button selects modes. Each time it is pressed, the mode advances in sequence: display, set hours, set minutes, display etc.

Within the sub modes, the B button advances the hours or minutes once each time it is pressed. Buttons must be released before they can generate another event.



Question 05

(i) What is a Model? (02 Marks)
Model is a schematic description or representation of something, especially a system

(ii) What is UML? (02 marks)

UML is a standard modeling language for specifying, visualizing, constructing, and documenting the artifacts of systems.

(iii) What are the advantages of creating a UML model? (04 marks)
Model helps to specify the structural and behavior of the system by simplifying the reality

(iv) Briefly explain three basic building blocks of UML. (06 marks)
Things: Things are the most important building blocks of UML. Things can be: Structural, Behavioral, Grouping, and Annotational.
Relationships: It shows how elements are associated with each other and this association describes the functionality of an application.
Diagrams: UML diagrams are the ultimate output of the entire discussion. All the elements, relationships are used to make a complete UML diagram and the diagram represents a system.

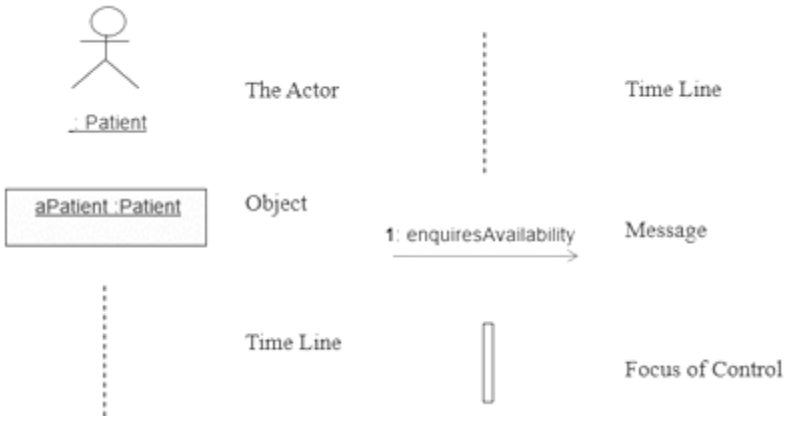
(v) Explain the following relationships in UML (06 marks)
Dependency: Dependency is a relationship between two things in which change in one element also affects the other one.
Association: Association is basically a set of links that connects elements of an UML model. It also describes how many objects are taking part in that relationship.
Generalization: Generalization can be defined as a relationship which connects a specialized element with a generalized element. It basically describes inheritance relationship in the world of objects.
Realization: Realization can be defined as a relationship in which two elements are connected. One element describes some responsibility which is not implemented and the other one implements them. This relationship exists in case of interfaces.

Question 06

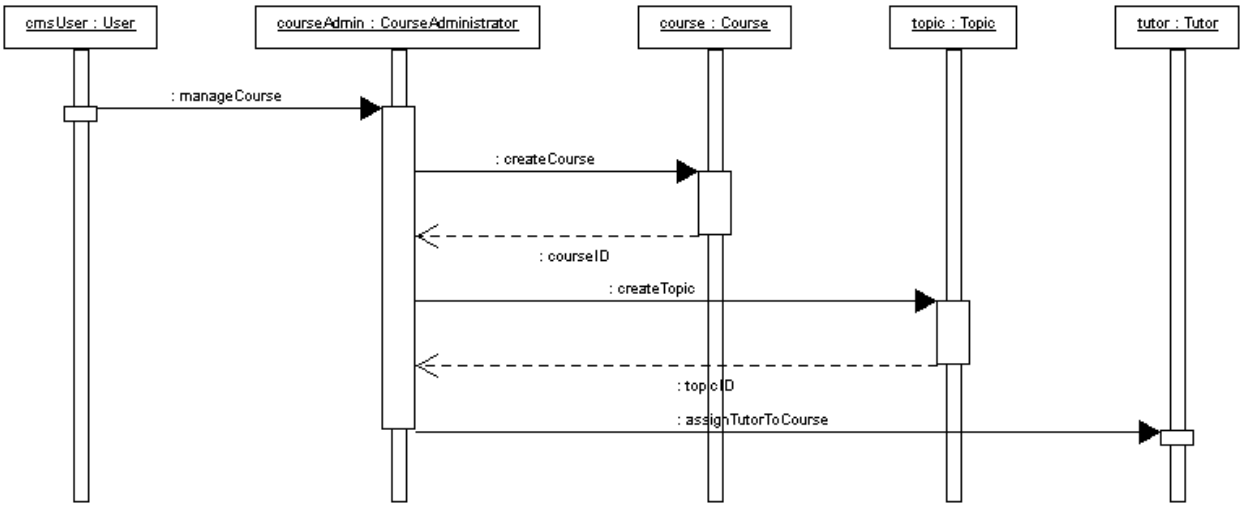
(i) Briefly describe what is UML Sequence Diagram (02 Marks)

Sequence diagram represents the dynamic interaction between objects, or between actors and objects ordered in time.

(ii) Give the symbols for the followings used in a Sequence Diagram: Actor, Object, Timeline, Message and Focus of Control. (04 Marks)



(iii)By carefully observing the following sequence diagram, write down the scenario used (06 Marks)



A user who is a course administrator invokes the manage course functionality. The manage course functionality of the course administrator invokes either the course creation or course modification functionality of a course. After the course is either created or modified, the manage topic functionality of the course administrator calls the topic creation or modification functionality of a topic. Finally, the user invokes the assign tutor to course functionality of the course administrator to assign a tutor to the selected course. Now, let us model these steps into a Sequence diagram for the "Manage course information" functionality.

(iv)Draw an Activity Diagram for Airline Reservation System based on the scenario given below.

First, you have to enter arrival/departure dates. Then you can enter your personal information and at the same time the system could be searching availability. The system flow then joins back into one and you can select the specific flight on the dates you want to fly. Then the system takes two different paths depend on whether you are using reward points or not. If you are using reward points, you have to enter points and at the same time the system hold reservation. After entering payment information, the system performs two processes at the same time that is marking seats as reserved and processing payment. Finally it sends out a confirmation email. (08 Marks)