



THE OPEN UNIVERSITY OF SRI LANKA

DEPARTMENT OF ELECTRICAL AND COMPUTER ENGINEERING

FINAL EXAMINATION 2009/2010

BACHELOR OF SOFTWARE ENGINEERING

ECI 4262 Object Oriented Design and Programming

(Closed book test)

Date: 15th May 2010

Time: 9.30 – 12.30 hrs

Answer Question 1 and any other two

Question 1

a) Explain the following Object Oriented concepts with a **brief description**, **Example code snippet** (Java or C#) and stating its **advantages** in real world programming.

		Brief Explanation	Code Sample (Java /C#)	Advantages
i	Class			
ii	Object			
iii	Information hiding or data encapsulation			
iv	Polymorphism			
v	Generalization and specialization			

(15marks)

b) **Coupling and cohesion** are two more concepts in Object oriented programming.

i) Explain two methods of achieving **coupling** between modules.

ii) It is recommended to have **high coupling** between modules. Do you agree with this statement? Give reasons.

(8marks)

c) Write a code snippet (Java or C#) to demonstrate the **late binding vs. early binding** (3marks)

d) State **three UML diagrams** and their usage in Object Oriented Analysis and design. (4marks)

Question 2

Mega Cinema is a leading theater group in Sri Lanka. Each theater has 3-4 Cinema halls and each Cinema hall has a show schedule for a day. Further, each Cinema hall is divided into sections and prices of seats in each section is different from others and also depend on the show being screened. Mega theatre has recently computerized their operations. Customers can walk in to any Mega theater and purchase ticket from a counter staff by paying money or use an automated machine at the theater by paying through a Credit or Debit Card. Customers can also buy the tickets online before coming to the theater. Customers can cancel ticket purchases at least 4 hours prior to the show start time. Also they have an option to select different show if they wish to cancel a previously booked show.

Apart from this, theater staff can assign movies for Cinema halls and allocate seat prizes for each sections in a hall. All these operations must be authorized by a supervisory staff member before exposing to customers. Also theater staff can cancel the shows. However if a show is cancelled customers must be refunded and should be offered a free show ticket.

- a) Identify the actor and use cases of the system (5 marks)
- b) Draw class diagram identifying attributes, operations and relationships among the classes (20 marks)
- c) Draw the sequence diagram for purchase ticket user case realization. (You must identify the objects and operation) (10 marks)

Here is the sequence of events of purchase ticket

Customer selects a cinema hall

Customer fill the customer details (Name , Age , Address)

Select seat type

Enter payment details

Question 3

- a) What are design patterns and how they differ from re-usable components? (3marks)
- b) Name the design pattern you would use, if you want to ensure that only a single instance of a class exists at any time. Show the implementation code of the pattern in Java or C# (10marks)
- c) Factory design pattern is a creational type design pattern. Draw the UML diagram to explain the factory design pattern. (10marks)
- d) Explain the Observer design pattern using an example code snippet (Java or C#). (8 marks)
- e) Industry best practices and frameworks are very useful in application design and implementation. State two such practices or frameworks and explain how you could use them in design and implementations of an object Oriented systems. (4 marks)

Question 4

i) What is an abstract class? How does abstract class differ from an interface class? (5marks)

ii) When do you use abstract class in your object oriented design? Give an example. (2marks)

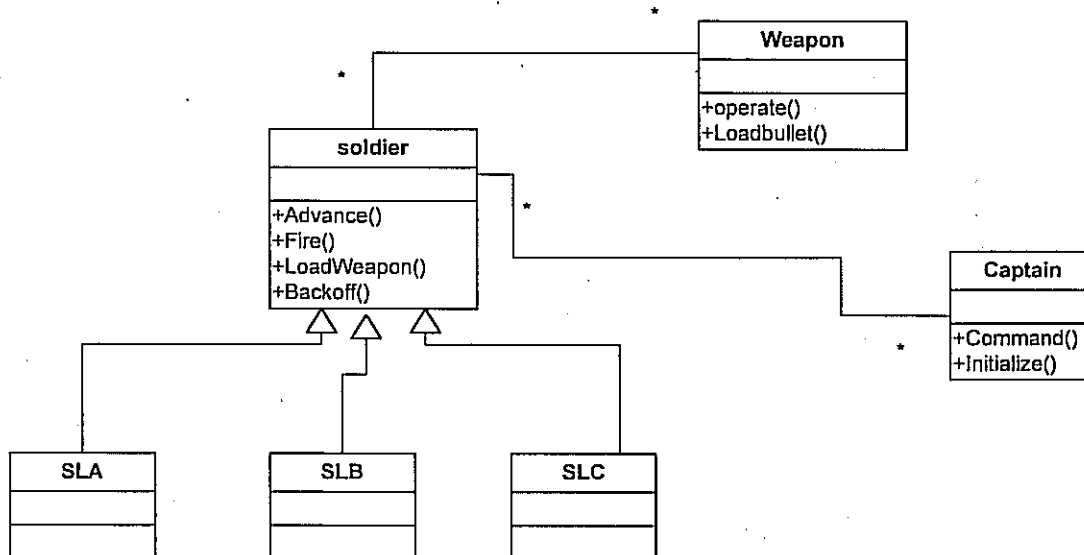
iii) UML class diagram below depicts the classes used to manage set of soldier by their captain in a war operation. There are three soldiers (SLA, SLB, SLC) and one captain. Answer the questions below considering the following statements (you may use C# or Java)

Soldier is an abstract class.

Advance(), wait(), fire() are abstract methods.

Loadweapon() is a non abstract method.

SLA, SLB and SLC are concrete implementations of Soldier.



a) Write the code for Soldier class. (Loadweapon method create a new instance of weapon class and invoke loadBullet.) (5 marks)

b) Write the code for SLA, SLB and SLC classes. (5 marks)

c) Write the code for captain class. (Create only the Initialize method) (3 marks)

** During the initialization method, Captain load SLA, SLB and SLC to his battalion.

d) Implement the Command method in captain class as follows (9 marks)

Bring the SLC forward

Ask SLC to fire

Bring SLA forward

Ask SLC to back off

Bring SLB forward

ASK SLA to fire

e) Extend the UML diagram to include the followings

(6 marks)

One more soldier called SLD became a soldier.

Only SLD has a special skill. i.e Climb.