

CITY UNIVERSITY OF HONG KONG

Course code & title : CS3342 Software Design

Session : Semester A 2011/12

Time allowed : Two hours

This paper has 12 pages (including this cover page).

1. This paper consists of 5 questions.
 2. Answer ALL questions.
-

This is a closed-book examination.

No materials or aids are allowed during the whole examination. If any unauthorized materials or aids are found on a candidate during the examination, the candidate will be subject to disciplinary action.

Student Number: _____

Programme: _____

Seat Number: _____

**NOT TO BE
TAKEN AWAY**

**NOT TO BE TAKEN AWAY
BUT FORWARDED TO LIB**

CILO 1	CILO 2	CILO 3	CILO 4	CILO 5	Total
Q1	Q2	Q3	Q4	Q5	100%
20%	25%	25%	20%	10%	

1. [CILO 1: Software Process] (20%)

[18%] The following scenario (Scenario 1) attempts to describe an application of the Unified Process (UP) to a software development project. Identify seven mistakes that are related to the wrong application of UP from the Scenario 1 and briefly describe the correct steps to apply to fix each identified mistake.

Scenario 1: *vDonate* is a social networking program that aims to promote the voluntary organ donations after death among young generations in Hong Kong. Jennifer is in charge of this CityU project.

- i. **Inception Phase:** Jennifer firstly interviews with a group of CityU students to observe and understand their behaviors in using the existing social networking applications (e.g., Facebook). She then defines the requirements based on her understanding. To represent the requirement, she writes in English texts. She also judges whether the requirements are good enough because she is also a CityU student. Then, Jennifer draws a class diagram (denoted by CD_1) based on her understanding followed by judging whether CD_1 can meet the defined requirements.
- ii. **Elaboration Phase:** As all the classes in CD_1 are entity classes, for every association between two classes A and B on the class diagram, she replaces the association by firstly connecting the class A to a new control class C followed by connecting the class C to the class B . Now, Jennifer obtains a revised class diagram CD_2 . She then adds methods to all the classes in CD_2 .
- iii. **Construction Phase:** She implements the program based on the class diagram, tests the program.
- iv. **Test and Transition Phase:** Jennifer passes the tested program to CityU. She is also the first user who registers to donate her heart, liver and kidneys via her program.

Mistake (7%)	Correction (13%)

Mistake (7%)	Correction (13%)

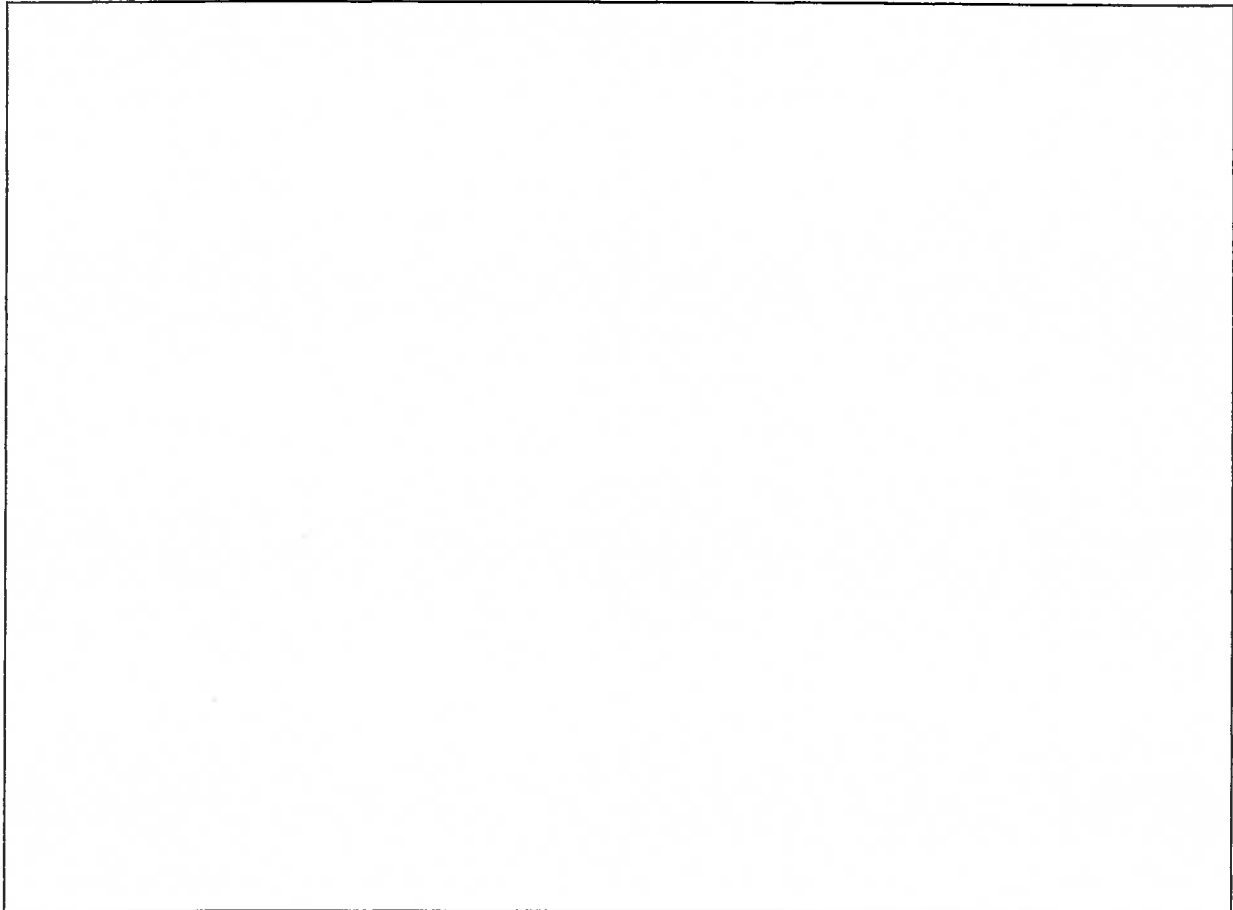
Study Scenario 2 and then answer Question 2 and Question 3:

Scenario 2: The source code of a program is a sequence of many elements such as program statements, each of which may contain multiple declarations, at most one expression, and multiple program variables. When programmer writes their programs in source code, they usually use compilers to assist them for their software development.

A *compiler* (e.g., the C compiler in Visual Studio) is a system producing an object code (e.g., .EXE) based on the source code (e.g., .C and .h). It usually performs a sequence of steps, including syntax checking, rule checking, and type checking, to achieve this purpose. A syntax checking visits each element of the program one by one to check whether the elements of the program appear in the right order, and builds an internal representation (which is known as abstract syntax tree) of the source code. The rule checking validates whether each expression in the abstract syntax tree is well-formed and all the variables in each expression has been properly defined before their usages. The type checking further checks whether the data types of all variables and all expressions in the abstract syntax tree are compatible. After all these actions have been carried out, the compiler translates each expression of the tree in the object code form, and produces the translated abstract syntax tree as its output, which is the object code of the program. If there is any error found, no object code will be generated.

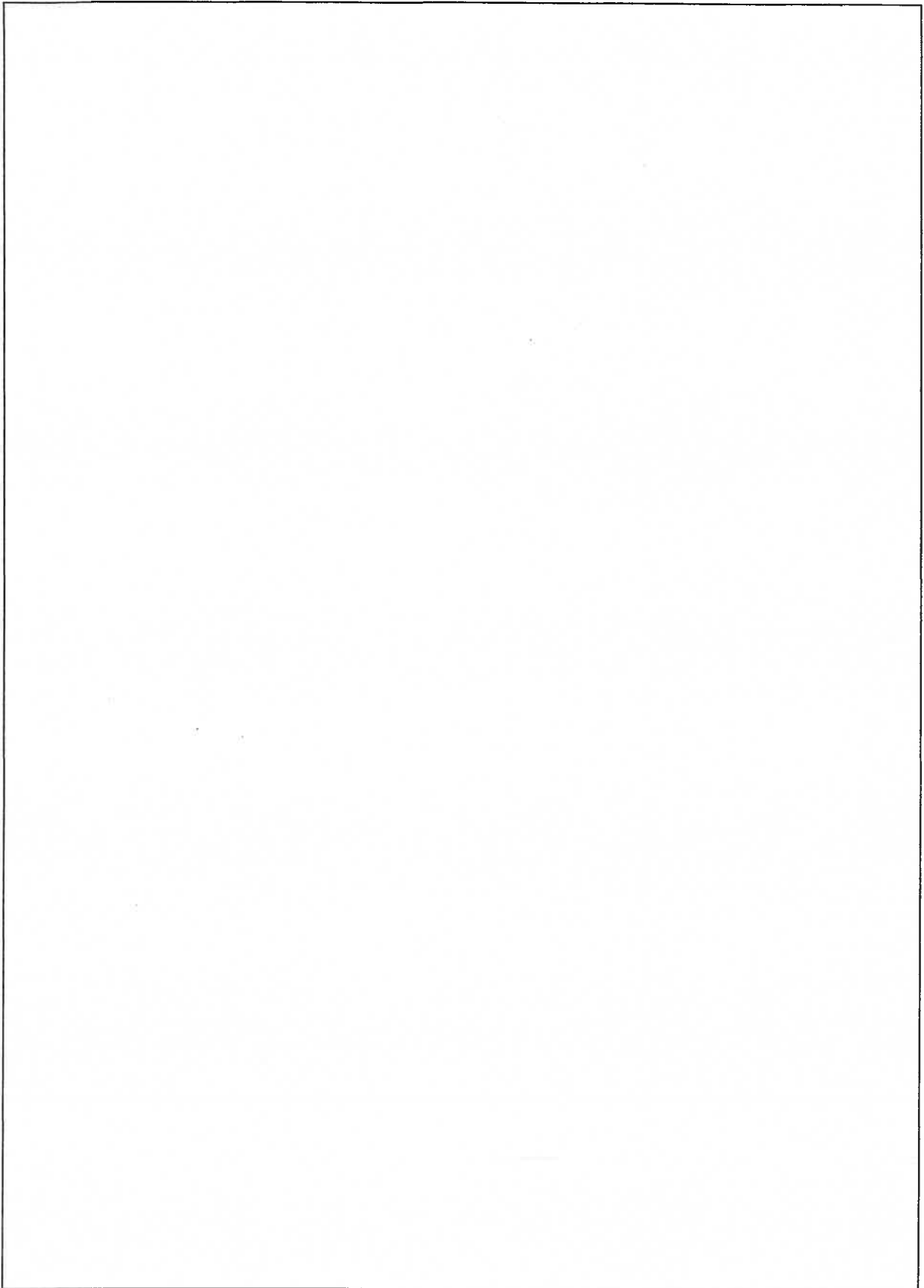
2. [CILO 2: Requirements Analysis] (25%)

(a) [5%] Draw a use case model for Scenario 2.

A large empty rectangular box with a black border, intended for drawing a use case model for Scenario 2. The box is currently blank.

- (b) [5%] Justify your use case model in the answer of Question 2(a) as a valid use case model for the scenario.

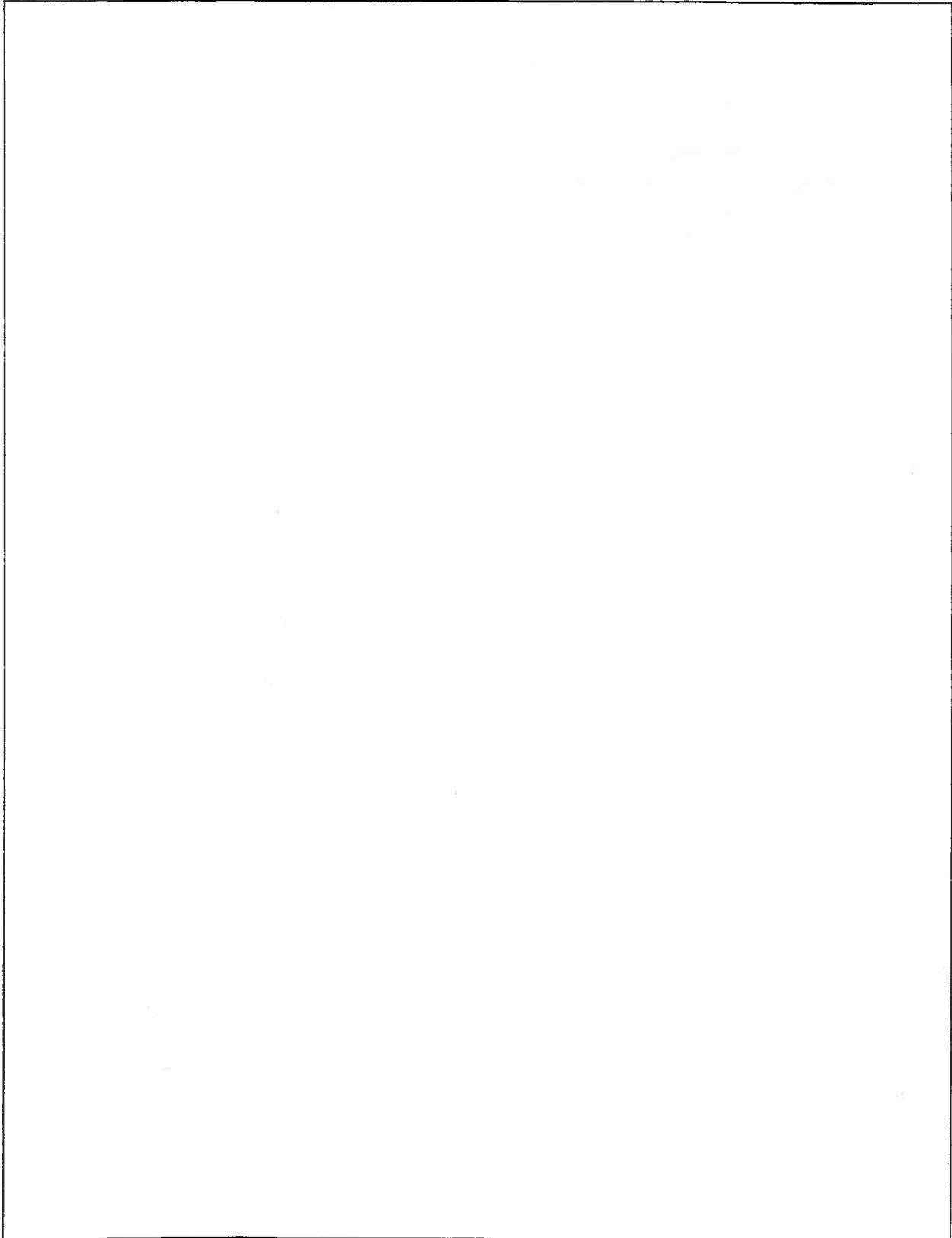
- (c) [10%] Write a use case description in the fully-addressed format for the most complex use cases in your answer for Question 2(a). Your description needs not to show the alternate courses of events.



(d) [5%] Comment on the quality of the use case in your answer of Question 2(c).

3. [CILO 3: Object Modeling] (25%)

Perform object modelling for Scenario 2 on Page 4 by drawing a class diagram (that shows classes, attributes, and relationships among classes).

A large, empty rectangular box with a thin black border, intended for the student to draw a class diagram. The box occupies the majority of the lower half of the page.

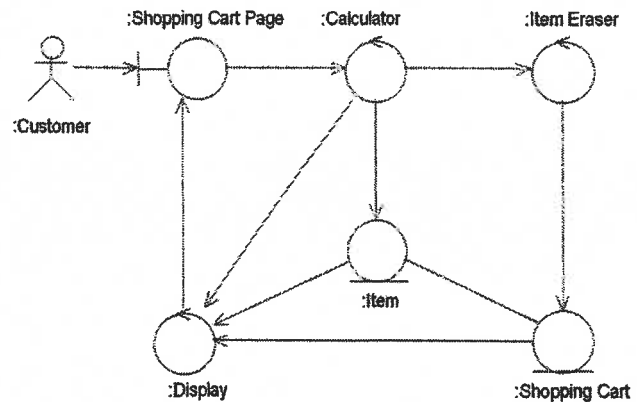
4. [CILO 4: Object-Oriented Design] (20%)

Study the following scenario and then answer questions 4(a)-(b).

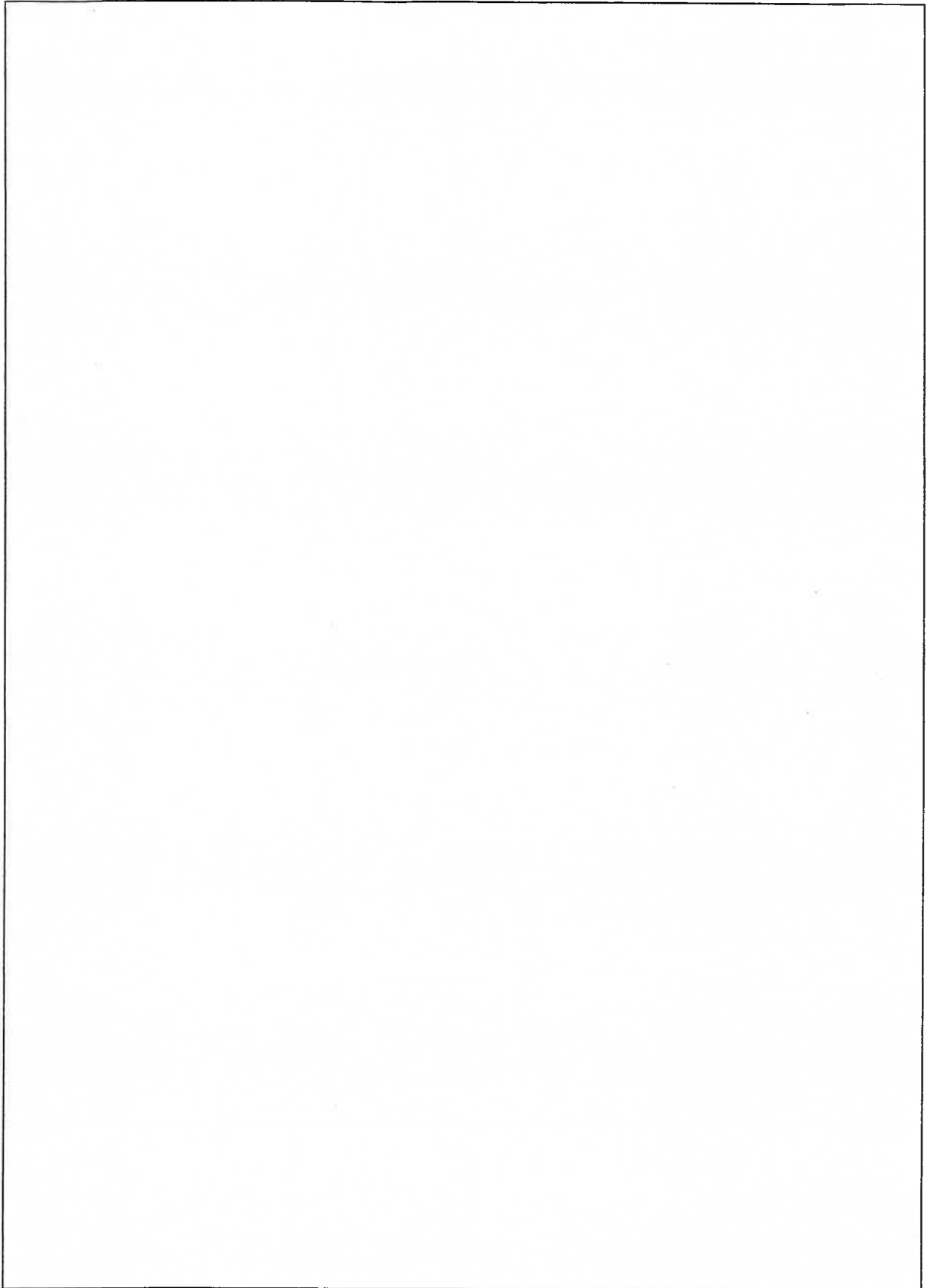
Main Success Scenario:

On the Shopping Cart Page, a customer modifies the quantity of an item in the Shopping Cart and then presses the [Update] button. If the quantity of the item is nonzero, the system stores the new quantity, and then computes and displays the new cost for that Item. If the quantity of the item is now 0, the system deletes that item from the Shopping Cart. Moreover, if the customer presses the [Delete] button, the system deletes that item from the Shopping Cart.

Communication Diagram for the use case:



- (a) [10%] Write sequence diagrams to elaborate the detailed plan of object interaction. Your diagrams should illustrate your design skills.



- (b) [10%] Explain which part of your design is good and what part of your design is bad. Give four reasons in total.

5. [CILO 5: Professional Ethics] (10%)

You have developed a software application that it has passed the internal testing requirements of your company. However, when you demonstrate your application to your clients at the first time, you notice an unexpected but important calculation result on the screen. Your clients also find this result surprising. Hence, they raise a question on this result during the meeting.

- (a) [3%] Will you inform the clients that this is a bug? Give your rationale in terms of professional ethics.

- (b) Right before you want to inform your clients about your response as described in Question 5(a), your manger informs the clients that what they notice is a new feature of the software application and because it is new, and so you are demonstrating this feature to them. You however know that your manager has no technical knowledge about the detail requirements to judge whether the result is correct or not.

- [3%] Will you inform your manager that it is a bug? Give your rationale in terms of professional ethics.

- (c) Irrespective to your answer in Question 5(b), after listening to your manager, your clients consider that it is a good feature and should be a part of the requirements of the software application.

- [4%] Will you inform your manager that it is a bug? Give your rationale in terms of professional ethics.