ORDRE DES INGÉNIEURS DU QUÉBEC
May 2010 SESSION

Open book examination
Calculators : only authorized models
Duration : 3 hours

04-SOFT-A5 Requirements and Specifications
This exam has five (5) questions

# 1. Requirements Elicitation and Analysis – 20%

Write scenarios and draw the corresponding graphical representations for the following activities:

a. (10%) Registering for a university course: registration is validated in terms of candidate prerequisite and course capacity.
b. (10%) Searching a library catalogue for books on the topic of requirements elicitation. If there are no books with this title, you should extend your search to related areas.

# 2. Requirements Validation – 20%

A centralized lock control system which controls the locks of all external doors in University buildings is to be implemented. Review the following requirements for potential problems.

a. (5%) Staff and students are issued with a card which provides them with access to those buildings which they are authorized to use after normal working hours.
b. (5%) Access is implemented by wiping a personalized card through a card reader and, if entry is allowed, the door lock is released.
c. (5%) Users must use the card to both enter and leave locked buildings.
d. (5%) If a card is lost, it should be reported to the security officer who will issue a new card and arrange for all access rights associated with the old card to be cancelled.

## 3. Methods for Requirements Engineering – 20%

Consider an auto-teller machine (ATM). The ATM accepts customer requests and dispenses cash, displays and prints out mini statements, and provides the bank manager with a daily transaction report. Users interact with the ATM through a video display unit and a keypad. The user must have a valid cash card and PIN before accessing the services of the ATM. Cash withdrawal must be less than or equal to the user's balance. The ATM is also requested to update the customer account database each time there is cash withdrawal. The bank manager uses a staff PIN to access the system for transaction reports.

a) (10%) Construct a two-level DFD of the ATM showing the services that are provided.
b) (10%) Construct an object model of the ATM system.

## 4. Non-functional Requirements – 20%

a) (5%) What are non-functional requirements?
b) (15%) Explain the differences between process, product, and external non-functional requirement and give an example of each.

## 5. Requirements Management – 20%

a) (10%) Explain why traceability matrices become difficult to manage when there are a large number of requirements for a system.
b) (10%) Suggest how the uses of viewpoints may be used to help address this problem.