



ORDRE DES INGÉNIEURS DU QUÉBEC
November 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 – 30%

- a) (20%) Write the Main Success scenario and at least two Alternate scenarios for the process of registering in a course section:

The first thing that occurs is the reception of the registration request. Then the process checks whether the course is full or not, and whether the student is allowed to register: first it checks the prerequisites for the course, and, if negative, checks whether the student has special permission that can override the lack of prerequisites.

If the student is allowed to register and the course is not full, then the next step is to complete the registration, otherwise the registration is disallowed.

- b) (10%) Derive the acceptance test case for your main success scenario of the registering in a course section.

2. Requirements Validation – 10%

Review the following requirements text for potential problems:

Consider the life of your home's thermostat on one crisp fall day.

In the wee hours of the morning, things are pretty quiet for the thermostat because the temperature of the house is stable. Toward dawn, however, the ambient temperature rises slightly, and/or a family member might twist the thermostat's dial.

In case the temperature of the house is higher than the desired temperature, the thermostat starts behaving by commanding the home's air conditioner to lower the insider temperature.

In case the temperature of the house is lower than the desired temperature, the thermostat starts behaving by commanding the home's heater to raise the inside temperature.

In the evening, with the heat from cooking, the thermostat has a lot of work to do to keep the temperature even when it runs the heater and cooler efficiently. Finally, at night, things return to a quiet state.

3. Methods for Requirements Engineering – 30%

You are developing a system for managing the processes of a small town public library. The current problem facing the town's library is that their library system is not computerized. The library contains about 2000 holdings that include books, CD-ROMs, journals, and on-line electronic books. The users of the library are borrowers and librarians. Computerizing the library system will allow users to search for holdings by title, author name, and by subject. The librarians will be using the system for managing (add / delete / change) the information the system has recorded about the holdings, and to manage (add / delete / change) the borrowers' records. Since the system will keep track of all holdings and all users, it will improve the performance of the library. This system will be a stand-alone system available only for users in library.

- a) (15%) Construct a two-level DFD of the Library showing the services that are provided.
- b) (15%) Construct an object model of the Library system.

4. Non-functional Requirements – 20%

- a) (15%) Explain the differences between functional requirement, non-functional requirement and design constraint. For each of the above categories of requirements give a brief description and illustrate on an example taken from the Library system (see Question 3).
- b) (5%) Classify the following requirements statements into F for "functional", NF for "non-functional", DC for "design constraint", and X for "should not be a requirement". Circle the right choice and briefly justify your answer below.

Sentence ID : 1

The system must use 128-bit encryption for all transactions

— Which type of requirements is the above statement? **F / NF / DC / X**

Justification:

Sentence ID : 2

If the alarm system is ringing, then the elevators (lifts) will proceed to the ground floor, open their doors and suspend further operations

— Which type of requirements is the above statement? **F / NF / DC / X**

Justification:

Sentence ID : 3

The student information system will give output from all commands within one second

— Which type of requirements is the above statement? **F / NF/ DC / X**

Justification:

Sentence ID : 4

The system will be able to print to an LC-9 plotter

— Which type of requirements is the above statement? **F / NF/ DC / X**

Justification:

5. Requirements Management – 10%

- a) (5%) State why the prioritization of software requirements is necessary. List three attributes of the requirements priorities.
- b) (5%) Sometimes users think (and are convinced) that they know what they want but later on during the project it turns out that they didn't quite accurately know (and hence express) their own needs. In such cases part of software may be built quickly to demonstrate feasibility or functionality to a customer. This prototype is usually incomplete; the real software is constructed after the customer and developer evaluate the prototype. Should the software requirements document be written before or after a prototype is developed? Why?