ORDRE DES INGÉNIEURS DU QUÉBEC

NOVEMBER 2016 SESSION

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

14-LO-A4 Requirements and Specifications
This exam has five (5) questions

1. Requirements Engineering (24%)

1.1 (20%) Describe the main activities involved in software requirements engineering. For each activity, give a description and state its inputs and outputs.

1.2 (4%) 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, 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?

2. Requirements Validation (6%)

Briefly explain the meaning of the following desirable properties of requirements and specifications. Illustrate your answers with examples:

2.1 Consistency

2.2 Unambiguity

3. Methods for Requirements Specification: use case modeling (20%)

3.1 (15%) Write a use case including the precondition, post-condition, 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 if 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 by adding the course number to the student's registered courses and displaying the student's list of registered courses; otherwise the registration is disallowed.

3.2 (5%) Derive and document the acceptance test cases for the process of registering in a course section**.**

4. Non-functional Requirements and Design Constraints (20%)

4.1 (12%) Explain the differences between functional requirements, non-functional requirements and design constraints. For each of the above categories of requirements give a brief description and illustrate with an example.

4.2 (8%) 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 – 30%

5.1 (10%) Requirements management is the process of documenting, analyzing, tracing, prioritizing and agreeing on requirements and then controlling change and communicating to relevant stakeholders. Define the meaning of the term "priority". List two important benefits of requirements prioritization.

5.2 (10%) Requirements Prioritization Techniques. Various techniques can be used to determine, negotiate, and develop a consensus regarding the priorities of the requirements. Describe briefly one requirement prioritization technique.

5.3 (10%) Requirements traceability is a sub-discipline of requirements management. State why the traceability of software requirements is necessary. List two major purposes of the requirements traceability and illustrate each one with an example.