The Open University of Sri Lanka
Department of Electrical and Computer Engineering

ECX4237 – Software Engineering I
Final Examination – 2007/2008 ***(Closed Book Test)***

Date : 8th May 2008	**Time: 9.30 – 12.30 hrs**

You must answer one question from Part A and any 3 questions from Part B.

Part A Answer Question 1 or Question 2.

Read this scenario to answer the questions asked.

A language school offers registered students with individual lessons with expert instructors in English, Tamil or Japanese. The school needs a computer system that will be used for managing appointments with students. There are many part-time instructors, who are expert on one or more language each, and offer one-hour lessons with a flexible schedule. You are asked to write a requirement specification for the Language Instruction Scheduler for this school.

Intended uses of the Language Instruction Scheduler are as follows:
All students or prospective students will be able to use the system through the web to see a list of instructors and their profiles. Students can reserve specific one-hour slot lessons with instructor of their choice through the web.

One become a student by registering (by post) and paying in advance, (by post) a certain amount for future lessons, and then repeating payments (by post) as necessary to maintain a positive balance. After registering each student receives (by post) a user name and password to use for logging into the web. With these, they can go to welcome page, be asked to enter their user name and password, and enter them. Once logged in, students will see a query form in which they can select a language, either list of free 1-hour slots, or a page with instructor's profiles. After seeing the list of slots, they can select individual slots that they wish to receive lessons, upto a maximum number per students. This system will not handle payments but will have up-to-date record of student's credit, so not to allow them book more lessons than they have paid for after a student conform a choice the system will record the slots selected as booked.

Please state your assumptions clearly when answering the questions.

Use the above scenario to answer Question 1 **or** Question 2.

1. (a) Draw a use case diagram. (15 marks)
   (b) Draw a class diagram with relationships. (25 marks)

OR

2. (a) Draw a dataflow diagram (DFD) for 2 levels (20 marks)
   (b) Describe functional and non-functional requirements of the system. (20 marks)

Part B Answer any 3 Questions.

3. (a) What are the different types of support that can be obtained by using CASE tools in software development projects? (5 marks)

   (b) Give an example of a CASE tool that you are familiar and describe its features and capabilities comparing them with the "ideal" functionality you expect from a CASE tool. (10 marks)

   (c) What are the problems that arise when using CASE tools? (5 marks)

4. (a) Discuss the difference between software verification and software validation and explain why software validation is a difficult process. (6 marks)

   (b) Who should be performing the acceptance testing ? (2 marks)

   (c) What do you expect by beta-testing? (2 marks)

   (d) "Someone who does not know the internal implementation can do black box testing better than somebody who knows it." Do you agree with this statement? Justify your answer. (4 marks)

   (e) What are roles of the requirements, partitioning and boundary value analysis in black box testing? (6 marks)

5. (a) What are the activities involved in requirement definition phase ? (4 marks)

   (b) *"The roster system for the instructors for Electricity lab should be able to print each instructors name, assigned lab, instructor Id, for each day of the week. 20 names should be printed per page."*

   Is this a functional or a non-functional requirement? Briefly explain your answer. (4 marks)

   (c) Write 2 functional and non-functional requirements for development of a web-search engine. (8 marks)

   (d) What is the importance of documentation in software development? (4 marks)

6. (a) Describe a minimum of 4 factors that should be considered when selecting a software development model (process model). (8 marks)

   (b) Discuss the criteria that you would use to determine a suitable software development model (process model) for following projects. (12 marks)
   i) A billing system for a telephone company which has a lot of user interactions via web
   ii) A desktop application for inventory control of a pharmacy
   iii) A Video game that should be improved upon user requests during beta testing
   iv) Air-craft wing manufacturing sub-system that use simulations and multimedia

7. Following is a part of a requirement document for security system for OUSL laboratories.

"The system will allow staff and students to access the computer lab out of working hours, while preventing un-authorized persons from entering. It must be simple to use, and provide maximum protection with minimum of inconvenience.

It will consist of a card reader with a key-pad and a small display screen on each door, and a central computer in the security office to which the card-readers are connected. A PIN and a card number will be associated with each card. To enter the building, the user must insert the card to the reader and enter the PIN on keypad.

The system will keep records of user name, student or staff number, and PIN. At any time the security office can access the system and find out who is in the building, in which room and the telephone extension in the room. The system will keep a record of all out-of- hour access and reports will be printed on demand.

a. What are the ambiguities, platitudes and omissions in this requirement statement? (6 marks)

b. Draw a Data Flow Diagram (DFD) for analysis of this system (up to 3 levels). Clearly state your assumptions. (14 marks)