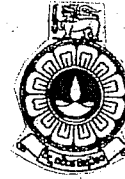


The Open University of Sri Lanka  
 Department of Electrical and Computer Engineering  
 Bachelor of Software Engineering Programme



ECX4267 – Software Engineering Concepts  
 Final Examination – 2012/2013

(Closed Book Test)

Date: 4<sup>th</sup> August 2013

Time: 9.30 – 12.30 hrs

*You must answer question 1 from Part A and any 3 questions from Part B.*

**Part A**

ii Answer all questions considering the scenario given below.

*The IT manager of a CD lending shop, "Leisure Park", has decided to automate their business operations.*

*The system is to keep track of CDs and the customers who hire them. Before customers can rent CDs they must become members. To do this a customer supplies personal details along with two forms of identification. The CD store then assigns them a unique membership number, which is subsequently used to identify the member in their dealings with the CD store.*

*Customers can cancel their memberships at anytime – for example, if they move to another city. Customers can also update their membership details – for example, if they move to another address. In both cases they must provide valid membership numbers.*

*Each CD has a unique barcode. When a customer wants to borrow a CD they must provide a valid membership number. The assistant then uses the CD barcode to update an inventory showing that the CD is now on loan. The assistant takes payment from the member and issues a docket indicating the due date, which varies according to whether the CD is for overnight or weekly hire. All payments are made in cash because the CD store cannot afford to provide credit card facilities.*

*When a member return a CD, the assistant checks the due date; if the CD is overdue a fine is calculated and recorded against the memberships. Members cannot hire CDs if they have overdue loans or unpaid fines. After payment of a fine the member is given a receipt, and is allowed to hire CDs again.*

*At the end of each week a report is produced from the CD inventory. The report includes details of all CDs overdue by more than seven days. The manager sends the overdue notices to the members concerned. The report shows the top-ten titles based on the number of rentals, and details of all CDs that have not been rented at least once in a previous four weeks.*

**Question 1**

Please state your assumptions clearly when answering the questions.

- (a) Draw a complete use case diagram to illustrate the given requirements. (15 marks)
- (b) Draw a class diagram with attributes, relationships and operations to support the business processes in the use case diagram. (25 marks)

**Part B Answer only three (3) Questions****Question 2**

- a) What are the main components of Software Requirement specification? (5 marks)
- b) Which life cycle model would you follow to develop software for each of the following applications? Justify your answer. (state any assumptions that you make) (9 marks)
- A small, well understood accounting application
  - A software product that will connect two networks via satellite communication. (assume developers have no prior experience developing this type of software)
  - Marketing website with heavy GUI and lot of interaction
- c) Re-write the following requirements so that they may be objectively validated. You may make any reasonable assumptions about the requirements (6 marks)
- The software system should provide acceptable performance under maximum load conditions
  - Even the inexperienced users should be able to use the system easily

**Question 3**

- a) List two of the common prototyping methods used in User Interface design. (4 marks)
- b) Identify the key principles of user interface design. (3 marks)
- c) Distinguish between quality control and quality assurance. (4 marks)
- d) Cost of quality include prevention, appraisal and failure. Briefly explain these terms with regards to quality. (9 marks)

**Question 4**

- a) What are the 4 test levels in 'V' model? Briefly explain. (8 marks)
- b) Why is it necessary to load test an application? (4 marks)
- c) What can a software engineer derive from White box testing? (4 marks)
- d) What type of errors does Black box testing attempt to find? (4 marks)

**Question 5**

Consider the procedure given below in pseudo-code and answer the questions.

Assume that all variables are defined with suitable data types and value is an array of real numbers

```

PROCEDURE AVERAGE

CONSTANT minimum = 0, maximum = 100;
i = 1; total_input = 0, total_valid = 0; sum = 0;

DO WHILE value[i] <> -999 and total_input < 100
    Increase total_input by 1
    IF value[i] >= minimum AND value[i] <= maximum
        THEN increment total_valid by 1;
        Sum = sum + value[i];
    ELSE skip;
    ENDIF
    Increment i by 1;
END DO
    IF total_valid > 0
        THEN average = sum/total_valid;
    ELSE average = -999
    ENDIF
END procedure AVERAGE

```

- Draw a flow graph for the procedure given above. (10 marks)
- Determine Cyclomatic Complexity of the resultant flow graph. (4 marks)
- Write a basis set of linearly independent paths. (6 marks)

**Question 6**

- Why do we need software maintenance? (6 marks)
- What are the 4 categories of software maintenance? (8 marks)
- List the management issues regarding software maintenance. (4 marks)
- Briefly explain what is 'legacy software'? (2 marks)