The Open University of Sri Lanka
Department of Electrical and Computer Engineering
Bachelor of Software Engineering
ECX4267 – Software Engineering Concepts
Final Examination – 2016/2017

(Closed Book Test)

Date: 9th December 2017	Time: 9.30 – 12.30 hrs

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

Part A

Question 1

Answer all questions considering the scenario given below.

> The Management Board of a supermarket chain wants a mobile application developed to be given for their customers which would make their grocery shopping easy.
>
> Their main requirements are listed here;
> 1. When the barcode of a grocery item is scanned to generate a bill, the data about that item is captured and stored in a way that can be used in future. For example, if a customer wants to see when he/she bought sugar last time, the date will be shown in the mobile app.
>
> 2. Based on the previous shopping details the customer would know when to buy a particular item (e.g. sugar) again.
>
> 3. The app should predict weekly and monthly consumption of selected items such as sugar.
>
> 4. Management Board of the supermarket also would get to see a monthly report showing the consumption pattern of those selected items.
>
> 5. Registered suppliers will be notified of the consumption pattern of those selected items

Please state your assumptions clearly when answering the questions.

(a) Draw a complete use case diagram to illustrate the given requirements. (16 marks)

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

(c) Write two non-functional requirements that should be given for this scenario. (04 marks)

(d) When does code reviews are carried out on code? Name the review techniques performed by the development team. (05 marks)

Part B Answer only three (3) Questions

Question 2

Software developers make errors, which lead to faults in the product. Types of fault are categorized into being documentation or usability problems. Fault manifest themselves by causing failure when the product is being used. Failures vary in severity, which is a cost to the user.

(Hint: Failure - departure from expected behavior. If the user complains a failure has occurred.)

    a) Use a coding example to briefly explain the terms error and fault.   (04 marks)

    b) To increase the reliability of safety critical system from failure you may decide to use;
             i. Design diversity or
           ii. Redundancy

      Briefly describe how reliability is obtained in each.   (06 marks)

    c) What are the test that should be applied to a simple loop where n is the maximum number of allowable passes through the loop (Consider White box testing and state any assumptions made).   (04 marks)

    d) Design test cases for a login page with two text boxes and one button.   (06 marks)
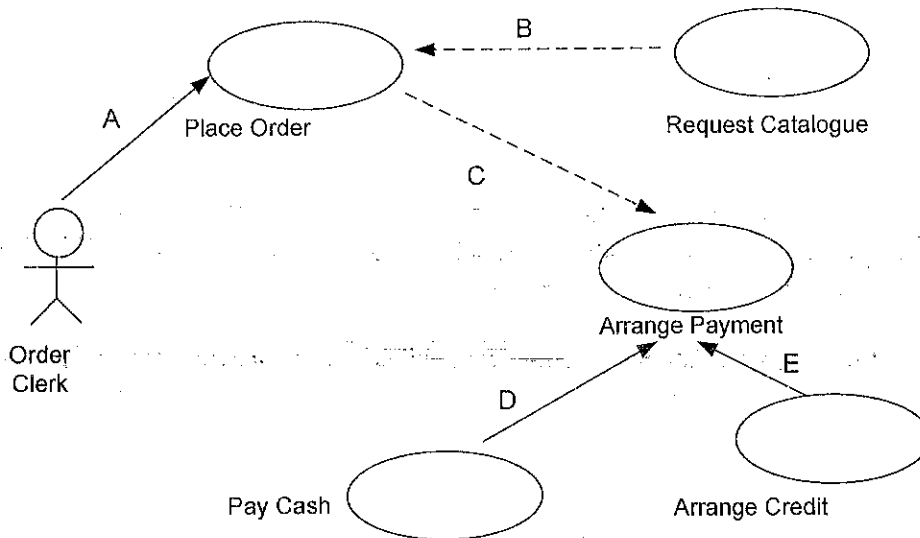
Question 3

      As software development company has a metric program which the following measurements are collected for each separate development project;
          total effort (in person years)
          total number of lines of Code
          total number of faults recorded during testing

    a) Describe 3 objectives that could be addressed by this set of measures   (06 marks)

    b) In each measurement describe the goal to be addressed and how the metrics may enable you to understand or meet the goal.   (03 marks)

    c) What is the main advantage of using functions or object points compared to estimates of program size in lines of code?   (04 marks)

    d) What is the process model you would select for a medium size software system, if it is given that; the phases of software construction are interleaved, i.e. in several stages, and user feedback is necessary throughout the entire process as the requirements are not well understood? Justify your answer.   (07 marks)

Question 4

    a) Describe the use case diagram below in your own words explaining the relationships between the processes.   (8 marks)

B

A
Place Order

Request Catalogue

C

Arrange Payment

E

Order
Clerk

D

Pay Cash

Arrange Credit

b) Differentiate between composition and aggregation relationships. (04 marks)

c) Draw the class diagrams for the class structure given below and identify the relationships among those.
(08 marks)

```
/** Bank Interface */
public interface Bank {
    public abstract String getAccount();
}
/** Ithuru Bank class */
public class IthuruIBank implements Bank {
    public String getAccount() {
        return "Ithuru Savings Account";
    }
}
/** SavingsTop Bank class */
public class SavingsTopBank implements Bank {
    public String getAccount() {
        return SavingsTop Savings Account";
    }
}
/** Customer class */
public class Customer {
    private Bank bank;
    public Investor(Bank bank) {
        this.bank = bank;
    }
public void setBank(Bank bank) {
        this.bank = bank;
    }
 public String openAccount() {
        return "I have an account of " + this.bank.getAdvice();
    }
}
```

Question 5

a) Briefly explain why eliciting and understanding requirements are difficult.   (04 marks)

b) How do you resolve platitudes and ambiguities given in a customer's requirement document? (02 marks)

c) Define the term 'stakeholder' in the context of a software system. Name three possible stakeholders of a 'student data management system' of a University with few faculties and more than 2000 students.
                                                                                    (05 marks)

d) Using an example, explain the possibility of arising conflicting requirements among above mentioned stakeholders.   (03 marks)

e) Identify three non-functional requirements of the 'student data management system' described in (c).
                                                                                    (06 marks)