INFORMATICS

OXFORD BROOKES UNIVERSITY

BACHELOR OF SCIENCE (HONS) COMPUTING AND INFORMATION SYSTEMS

APRIL 2004 EXAMINATION

23th APRIL 2004

M8748: INFORMATION SYSTEMS ANALYSIS AND DESIGN

TIME : **2 Hours + 10 Minutes Reading**

NUMBER OF PAGES : **1 Cover sheet and 5 Pages of questions**

INSTRUCTIONS :

- ☐ **All Questions** in **SECTION A** are **COMPULSORY** and choose any **TWO** questions in **SECTION B**.
- ☐ Section A carries 40 marks.
- ☐ All questions in Section B carry 30 marks each.
- ☐ Please start every question on a new page.
- ☐ Answers will not be marked if they are illegible.
- ☐ Enter the question numbers (in the order you have attempted) in the boxes provided in the answer script.
- ☐ Write your **INDEX NUMBER** and **MODULE NUMBER** on the cover page of the answer script.

SECTION A

(Answer ALL questions)

QUESTION 1

(a) Here is a scenario of a Elevator. The operations goes like this: -

The elevator starts at the first floor. It can be moving up or down. If the elevator is idle on one floor, a time-out event occurs after a period of time and moves the elevator back to the first floor.

Note: This State diagram does not have an end point (final state).

Draw a **State diagram** based on above scenario.

[7 Marks]

(b) Prepare a **State diagram** for the above scenario with **Zero timing or idle state**.

Note: Correct annotations should be applied

[13 Marks]

The **Idle state assigns zero to the attribute timer**, then it increases the timer continuously until the event go down or go up occurs or until the guard-condition timer = time-out becomes true.

Note: This state diagram does not have an end point (final state).

Draw a **State diagram** based on above scenario where **Idle state assigns zero to the attribute timer**.

(c) The Digital watch has mode button to set or change the time. The Digital watch class diagram shows how events in the state diagram are related to operations within the class. The watch has three states: its normal display state showing the time, and two states for setting the clock (hours and minutes, respectively).

Draw a **Class diagram** and **State diagram**. **[10 Marks]**

Note: Students need to draw one class diagram, which points to the state diagram of the above scenario.

(d) Printing documents for printing, has to pass from computer to Printer Server and then to the Printer. If the printer is free, the documents should be printed or it should be stored in the queue if the printer is busy for later printing. The printing status should be reflected to the computer. You are required to draw a sequence diagram for the above scenario.

[7 Marks]

Use appropriate graphical notations to depict the requirements the system. (Required to draw Sequence diagram).

(e) Booting computer follows of series of tasks and loading of software before it is ready to use by end user. Draw a state diagram that shows the states from booting computer to loading applications until it is ready for end user to use.

[3 Marks]

Use appropriate graphical notations to depict the requirements the system. (Required to draw State diagram) [Students need to identify only 3 states only]

[TOTAL MARKS FOR QUESTION 1: 40 MARKS]

Section B

(Answer any TWO Questions)

QUESTION 2

Here is a ascenario of an alarm activation. Most messages are sent asynchronously except for the reading of the Cell Configuration Information, which is done synchronously with a normal operation call.Shows again the activation sequence of the system where the System Handler gives an order to the Cell Handler to activate itself. The Cell Configuration object asking for information; it returns the configuration data. The Cell Handler then sends self-test signals to all devices, to acknowdge that they are working correctly. The sensor devices also need an activate signal to become activated. Note that the Sensor and Alarm rectangles' names are not underlined, indicating that they actually represent the classes. Instead of drawing a number of sensors and alarm objects in this sequence diagram, the alternative of using classes to show a number of objects has been used. The communication with sensors and alarms, which is done through asynchronous messages, is repeated for each installed device(described in the left margin). When all devices have been correctly tested and activated, an acknowledgment signal is sent to the System Handler.

This sequence diagram describes the exact scenario of a successful activation. It is also possible to describe a more general case, in which error alternatives would also have been documented. Note that time specifications can be added in the script in the left margin of the diagram. In this case, the time from activation to the point at which the system actually is activated should not take longer than five seconds.

(a) Draw a **Sequence diagram** for the above scenario. **[Correct annotations should be applied]**

[10 Marks]

(b) A sensor has detected a movement and initiates an alarm in the system.

Draw a **Collaboration diagram.** **[Correct annotations should be applied]**

[15 Marks]

(c) A Person or a Company can have zero or more Insurance Contracts. A contract can be owned by one or many Persons or by one or many Companies.Draw a class diagram which shows the relationship or asociation with Insurance company, insurance contract, company and person.

Draw a Class diagram. **[Correct annotations should be applied]**

[5 Marks]

[TOTAL MARKS FOR QUESTION 2: 30 MARKS]

QUESTION 3

a) A Library system uses Lend Item (the borrower does not have a reservation). The applications have several menu like lending, reserving, returning, maintenance. When identifying classes, you must have at least the following classes: Reservation, Loan etc. Your class diagram should contain appropriate attribute, methods etc .The Lend item can either be book or magazine.

Draw a **Class diagram**. **[Correct annotations should be applied]**

Note: You should add title class as well.

[15 Marks]

b) Draw a **Sequence diagram** for the use case **Lend Item** (the borrower does not have a reservation for the title)

[10 Marks]

c) Draw a **Collaboration diagram** for the above scenario for the **add title case**. **[Correct annotations should be applied]**

[5 Marks]

[TOTAL MARKS FOR QUESTION 3: 30 MARKS]

QUESTION 4

(a) Consider a scenario of Insurance company, where

- Customers sign Insurance policy
- Customer can have 1 or more than policy
- Insurance sales person prepare the Insurance contract for the customer
- Process monthly sales statistics as well as customer statistics.

A use-case diagram shows actors, use cases, and their relationships. The system is defined through system boundaries.

Use appropriate graphical notations to depict the requirements. Draw a **Case diagram** for the above scenario. **[Correct annotations should be applied]**

[3 Marks]

(b) Compare between validation and verification in software testing.

[13 Marks]

(c) Define the reason, when to use V model? Describe the disadvantages of Prototyping.

[10 Marks]

(d) What do you understand by "Static" and "Dynamic" testing method?

[4 Marks]

[TOTAL MARKS FOR QUESTION 4: 30 MARKS]

- END OF PAPER -