UNIVERSITY OF COLOMBO, SRI LANKA

UNIVERSITY OF COLOMBO SCHOOL OF COMPUTING

DEGREE OF BACHELOR OF INFORMATION TECHNOLOGY (EXTERNAL)
Academic Year 2012/2013 – 2nd Year Examination – Semester 3

IT3104: Object Oriented Analysis and Design
PART 2 – Structured Question Paper

21st March, 2013
(ONE HOUR)

To be completed by the candidate

BIT Examination Index No: _____

Important Instructions:

- The duration of the paper is **1 (one) hour**.
- The medium of instruction and questions is English.
- This paper has **2 questions** and **10 pages**.
- **Answer All questions**.
- All questions will carry equal marks.
- **Write your answers** in English using the space provided **in this question paper**.
- Do not tear off any part of this answer book.
- Under no circumstances may this book, used or unused, be removed from the Examination Hall by a candidate.
- Note that questions appear on both sides of the paper.
  If a page is not printed, please inform the supervisor immediately.
- **Non-programmable Calculators may be used.**

Questions Answered

Indicate by a cross (✗), (e.g. ☒) the numbers of the questions answered.

	Question numbers		
To be completed by the candidate by marking a cross (✗).	1	2	
To be completed by the examiners:			

Case Study

A company is in need of a Time Management System for its executives to easily manage their appointments and schedule their meetings. It is decided that the system would be an extension to the existing open source e-mail client.

Each executive has a personal calendar consisting of Calendar Entries where he/she maintains his/her daily appointments. Each entry has the date, description about the appointment, venue (if any), and start and end times. Planned vacations of each executive are also marked in the Calendar and each executive is responsible for maintaining this information.

There are a number of conference rooms available for having meetings/presentations. Each conference room has a specific capacity and different facilities such as overhead projectors installed, video conferencing capabilities etc. A calendar of its own is there for each room which can be used to view its availability or unavailability status, duration of bookings and also who has booked it for each time slot.

The system should provide a facility to view Calendars of any executive and conference rooms and thereby book a meeting for any available time slot in any day. The anticipated practice would be to pick a free time slot of the required conference room and book the meeting indicating the day, start time, end time and participants for the meeting. The system should validate that the conference room is actually free (somebody else might have booked it during the time period of creating the booking) and an e-mail message will be received by the meeting organizer whether the booking is accepted or rejected by the conference room. If successful, individual e-mail messages to each participant will be sent inviting him to the meeting indicating the date, time and venue for the meeting. Their calendars (inclusive of conference room) need to be automatically updated with the details of the meeting. Booking details need to be maintained for each booking to indicate the date of booking, start-time and end-time. Details of the participants are also stored in the system which will be needed to manage the responses they send to the invitation as described below.

Upon receiving a meeting invitation, each executive can respond to it in different ways. They can 'Accept' the meeting request if they are Ok with the time date etc. If they are not sure whether they can participate in the meeting the response should be 'Tentative'. If they are unable to participate then the response would be 'Declined'. In all cases, the meeting organizer needs to be informed via e-mail regarding the response of each participant. Depending on the responses, the meeting organizer can proceed with, cancel or re-schedule the meeting. When an intended participant makes a response, the corresponding entry in the participant information stored earlier needs to be updated.

If a meeting is cancelled, all participants are informed by email about the cancellation and their calendars need to be automatically updated indicating the booked time as free. The conference room's calendar should also get updated. It should be noted that a meeting can only be cancelled by the meeting organizer (person who has scheduled the meeting). All the booking details and participant information should also get deleted.

If a meeting is re-scheduled then the availability of the conference room is validated as before and each participant is informed about the change. They need to respond as described above. .

The system should remind all participants about the meeting 15 minutes before the scheduled start time.

Sometimes it is necessary to schedule recurring meetings. For example there can be a meeting scheduled to discuss the status of a certain project every Monday at 9.00 AM for one hour for a designated period of time. The system should be able to cater to this need too. When such a meeting is scheduled, one booking is created with multiple booking details for each meeting date until the end date. The conference room and all participants' calendars should get updated until the end date..

Based on the above case study answer question 1.

1)

(a) Identify the actor(s) in the above system.

> **ANSWER IN THIS BOX**
>
> *Executive*
>
> **(10 Marks)**

(b) In analyzing the system one has identified Make a Booking, Make a recurring Booking and Validate availability as some of the usecases in this system. Name and Briefly describe the remaining use cases that needs to be included in the system.

> **ANSWER IN THIS BOX**
>
> a. Rescheduling bookings
>
> b. Cancel booking
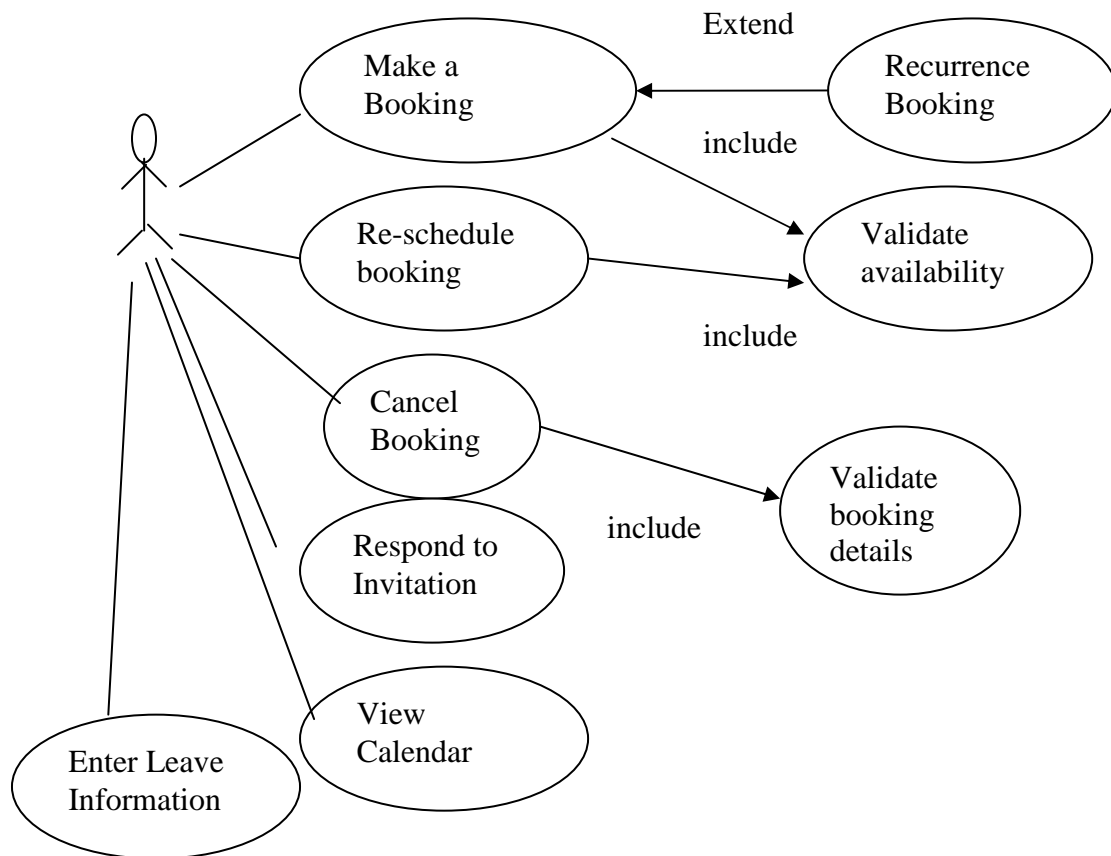> c. Validate booking details
>
> d. Respond to invitation
>
> e. View calendar
>
> f. Enter leave information
>
> **(15 Marks)**

(c) Draw a usecase diagram showing the types of relationships for all identified usecases.

ANSWER IN THIS BOX

Extend

Make a Booking

Recurrence Booking

include

Re-schedule booking

Validate availability

include

Cancel Booking

Validate booking details

include

Respond to Invitation

View Calendar

Enter Leave Information

(15 Marks)

Answer the questions from (d) to (g) based on the following description.

One has identified following list of classes in designing the system.

A.	ParticipantInfo	B.	Executive
C.	Calendar	D.	CalendarEntry
E.	Booking		

(d) Identify the attributes of CalendarEntry class.

ANSWER IN THIS BOX

EntryId , Description

Date

StartTime

EndTime

(10 Marks)

(e) With what class(es) does the PartipantInfo class has relationships with?
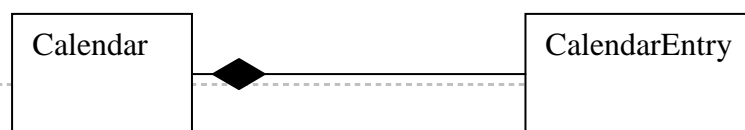
ANSWER IN THIS BOX

Booking

(05 Marks)

(f) Draw the type of relationships between the following classes and indicate multiplicity where applicable.
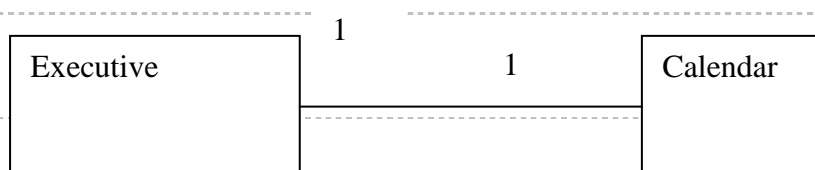 i. Calendar and CalendarEntry

ANSWER IN THIS BOX

(05 Marks)

  ii. Executive and Calendar

ANSWER IN THIS BOX

(05 Marks)

5

(g).

i. What is/are missing class (es) in the given class listing? Give reasons for your answer.

ANSWER IN THIS BOX

Class name : ConferenceRoom

To keep conference room information

(15 Marks)

ii. Identify the class(es) from the given class list with which the class(es) mentioned in g (i) has the relationships?

ANSWER IN THIS BOX

Booking

CalendarEntry

(10 Marks)

(h) Identify the class(es) that will participate in Making a Booking for a meeting.

ANSWER IN THIS BOX

Booking, ConferenceRoom, Executive

(10 Marks)

2)   (a) Identify the best diagram type(s) that can be used to represent the following.

(i)   The physical relationship between software components and the hardware in the delivered system.

ANSWER IN THIS BOX

Deployment diagram

(03 Marks)

(ii)   Conditions changing within and among Lifelines along a linear time axis

ANSWER IN THIS BOX

Timing diagrams

(03 Marks)

(iii)   The message interactions between lifelines

ANSWER IN THIS BOX

Sequence diagram

(03 Marks)

(iv)   A set of actions that some system or systems should or can perform in collaboration with one or more external users of the system to provide some observable and valuable results to the actors or other stakeholders of the system(s)

ANSWER IN THIS BOX
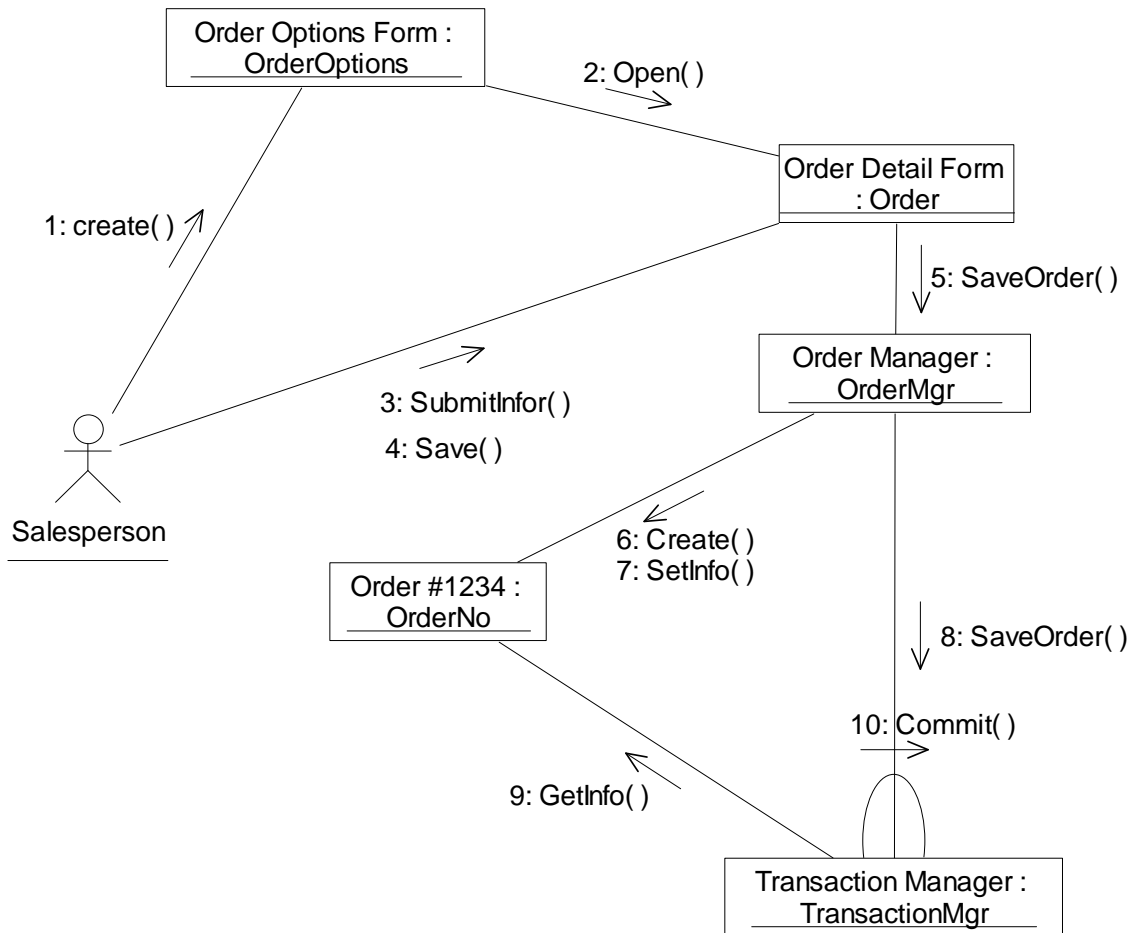
Use case diagram

(03 Marks)

(v)   Specialization of user roles and their interactions with a system

ANSWER IN THIS BOX

Class Diagram

(03 Marks)

(b) Consider the following collaboration diagram drawn, to add a new order to the Order Processing System.

(i) Name three (03) different elements of a collaboration diagram. Provide an example for each element from the above collaboration diagram.

> **<u>ANSWER IN THIS BOX</u>**
>
> (I) Object :
>
> e.g. OrderOptions
>
> (II) Relation/Association:
>
> e.g. association between OrderMgr and OrderNo
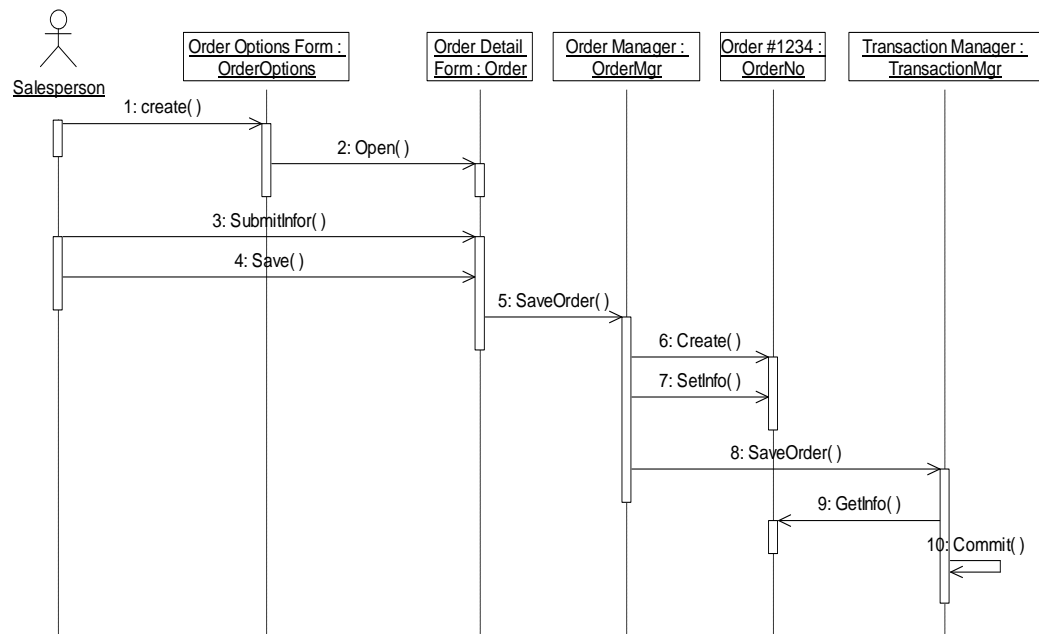>
> (III) Messages:
>
> e.g. GetInfo
>
> **(15 Marks)**

(ii)   Draw the corresponding sequence diagram from the above collaboration diagram.
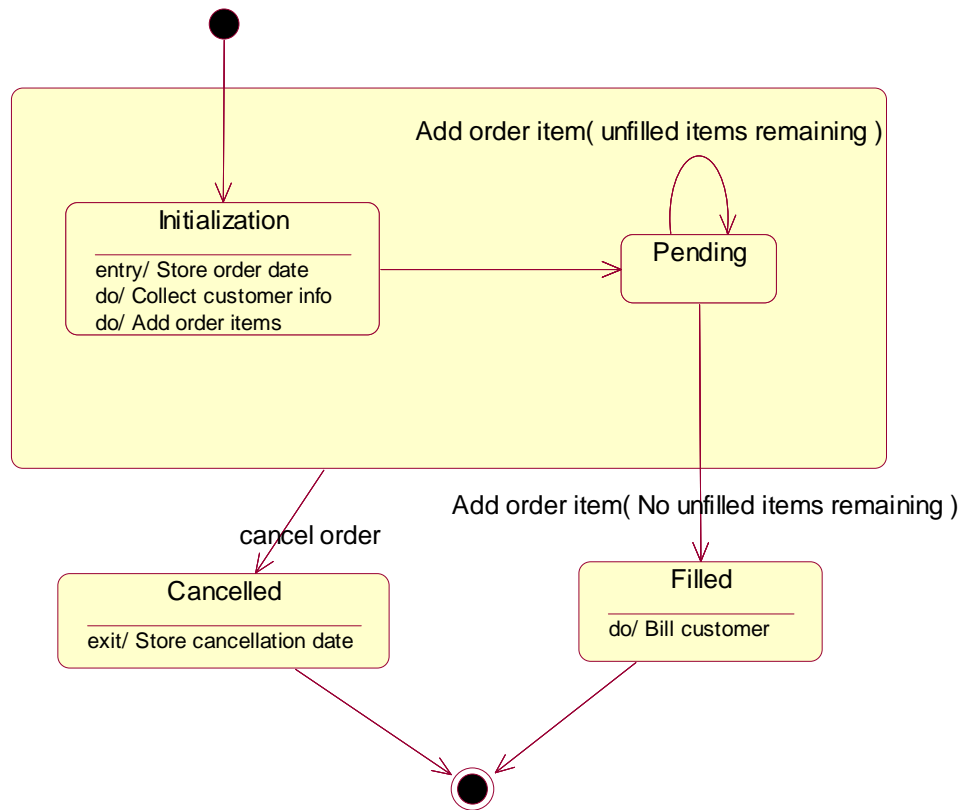
ANSWER IN THIS BOX

(30 Marks)

(c) Draw a state chart diagram for the following description given for an order class in an order processing system.

Once the order is placed the order is being created and the date in which the order is placed is stored. In order to finalize the order all information regarding the customer and the order items are being collected. However, while unfilled items are remaining, the order is been treated as a pending order. Once the order is completed by entering all the items in the order processing system the order is treated as a filled order which will in turn bill the customer. On the other hand the customer may cancel the order any time during the initialization or while the order is in the pending stage. If the order is being canceled the corresponding cancellation date will be stored for further reference.

ANSWER IN THIS BOX

Add order item(unfilled items remaining)

Initialization
___
entry/ Store order date
do/ Collect customer info
do/ Add order items

Pending

Add order item(No unfilled items remaining)

cancel order

Cancelled
___
exit/ Store cancellation date

Filled
___
do/ Bill customer

(40 Marks)

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