UNIVERSITY OF COLOMBO, SRI LANKA

UNIVERSITY OF COLOMBO SCHOOL OF COMPUTING

DEGREE OF BACHELOR OF INFORMATION TECHNOLOGY (EXTERNAL)
Academic Year 2009/2010 – 2nd Year Examination – Semester 3

IT3103: *Object Oriented Analysis and Design*
PART 2 – Structured Question Paper

20th March, 2010
(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:			

1) | Based on the following case study answer question 1.

Circuit Bungalow and Campsite Reservation System

Case Study

A System to be used for reservation of Circuit Bungalows and Campsites close to the National Parks has to be developed for the Department of Wildlife Conservation (DWC).

Currently all the reservations are done manually in the Head Office located in Colombo. The proposed system should have the facility to make reservations from the Head Office and also from seven Regional Offices. There are 10 National Parks each having several bungalows and campsites. In each Circuit Bungalow there are 2 rooms with attached toilets, a veranda and a kitchen.

Reservations by paying the full amount are done through the ticketing officers. There are several ticketing officers attached to the Head Office and the Regional Offices. Reservations are done from 9.00 am to 5.00 pm. Directors of DWC want the proposed system to have the facility for online payments so that visitors can reserve Bungalows or Campsites using credit cards. Ticketing officers do not accept foreign currency. Rates will be the same for foreigners and locals. Rates may change from time to time. Children under 5years will not be charged and children between 5-12 will be charged half rate. Daily cash collections will be noted and are deposited to the bank at the end of each day.

At the time of reservation, the ticketing officer will take the following particulars from the customer, if customer wishes to proceed with the reservation.

Customer's name, Contact number, NIC No if local, Passport Number if a foreigner, Country, Sex, No. of Adults, No. of Children, Local/Foreign, Type of accommodation, the period of stay, expected check in date and mode of payment.

A customer can cancel the reservation at any time thereafter. 10% will be charged if the cancellation is done 48 hours before the checking date and otherwise 50% will be charged. It can be done at the Head Office and Regional Offices through the ticketing officers. Customers who have cancelled their reservation can only collect the refund from the same office they made the reservation. It is not possible to cancel the reservations online.

The different payment modes and their discounts are as follows:

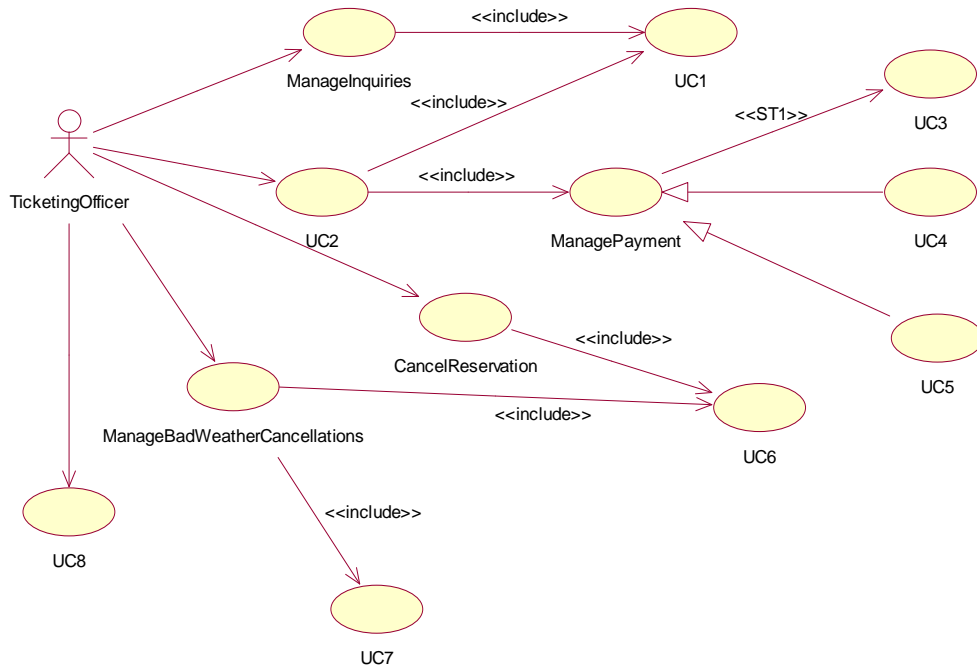| Payment Modes	Discount
Cash	-No discount
Credit Card	-3% eg. Diners, Master etc.

If the customer needs to extend the stay he/she may do so by applying to the person in charge of the Bungalow or Camp site. He will check the availability from the head office or the regional office. Person in charge of the Bungalows and Camp sites will collect the additional payments if any.

Reservations of Bungalows and Campsites may be cancelled due to bad weather. Certain Campsites and Bungalows may be flooded during rainy seasons. When such a situation arises the person in charge of the Bungalow or Campsite will inform the Head Office or the Regional Office. The ticketing officers will publish a message regarding the cancellation on their web site and inform the Customers who have already made the reservations and all the other ticketing officers. They can collect the refund in such cases from the Head Office or the relevant Regional Office.

The proposed system should provide online reservations and have a facility for the ticketing officers, regional managers and the directors to find out the reservations, availability of Bungalows and Campsites for a given day or period.

(a) Consider the following use case diagram drawn for the actor ticketing officer and the list of use cases identified by a student for the above case study.

Use case diagram

List of Use cases

A. ManageCashPayments   B. CalculateRefund
C. CheckAvailability   D. GetDiscount
E. PublishMessage   F. ManageCrCardPayments
G. ManageDailyCashCollections H. MakeReservation

i.   Identify the appropriate use cases from the list for UC1-UC8 in the diagram.

ANSWER IN THIS BOX

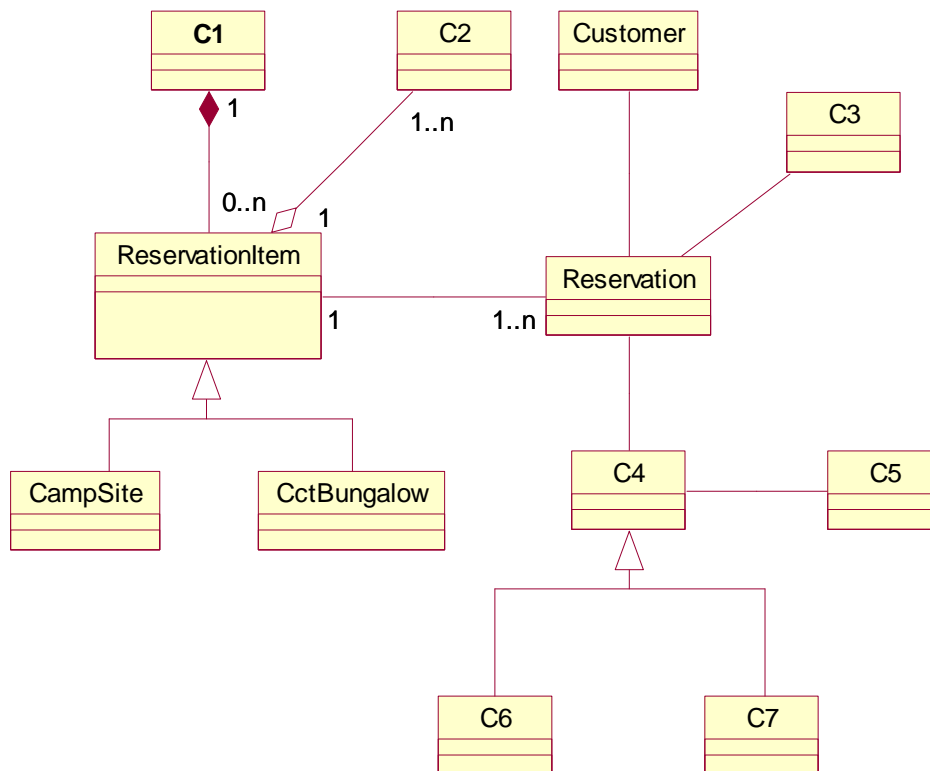| Identifier	Use case
UC1	**C**
UC2	**H**
UC3	**D**
UC4	**A**
UC5	**F**
UC6	**B**
UC7	**E**
UC8	**G**

(30 Marks)

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ii.   What is the stereotype <<ST1>> in the use case diagram?

ANSWER IN THIS BOX

<Include>

(05 Marks)

(b) Consider the following Class diagram and the list of classes identified by the student for the case study .

List of classes:

A. Payment
B. CashPayment
C. Discount
D. NationalPark
E. TicketingOffice
F. Rate
G. CreditCardPayment

i.   Identify the appropriate classes for C1-C7 from the list of classes.

Identifier	Class
C1	**D**
C2	**F**
C3	**E**
C4	**A**
C5	**C**
C6	**B**
C7	**G**

(35 Marks)

(c) At present, when a reservation is cancelled, a flat rate is charged for all camp sites or circuit bungalows. Since certain camp sites and circuit bungalows are in high demand, the management has decided that the system should be capable of designating different rates of cancellation charges for different camp sites and bungalows valid through different periods of time.

When this new requirement is posed to two different students two suggestions given below were suggested in terms of changes required in the class diagram above to accommodate this.

Suggestion 1:

Introduce a new class called CancellationRate with necessary attributes and operations and by creating the required relationships with existing classes.

Suggestion 2:

Add the required attributes to an existing class with new operations to accommodate the change

(i)   Do you agree with the *suggestion 1* above? If Yes, between which classes do the relationships need to be created?

ANSWER IN THIS BOX

    Yes. Between the new class CancellationRate and the ReservationItem class

(15 Marks)

(ii)   Do you agree with the suggestion 2 given above? If Yes, what is best class in the above class diagram to be changed by adding attributes and operations ?
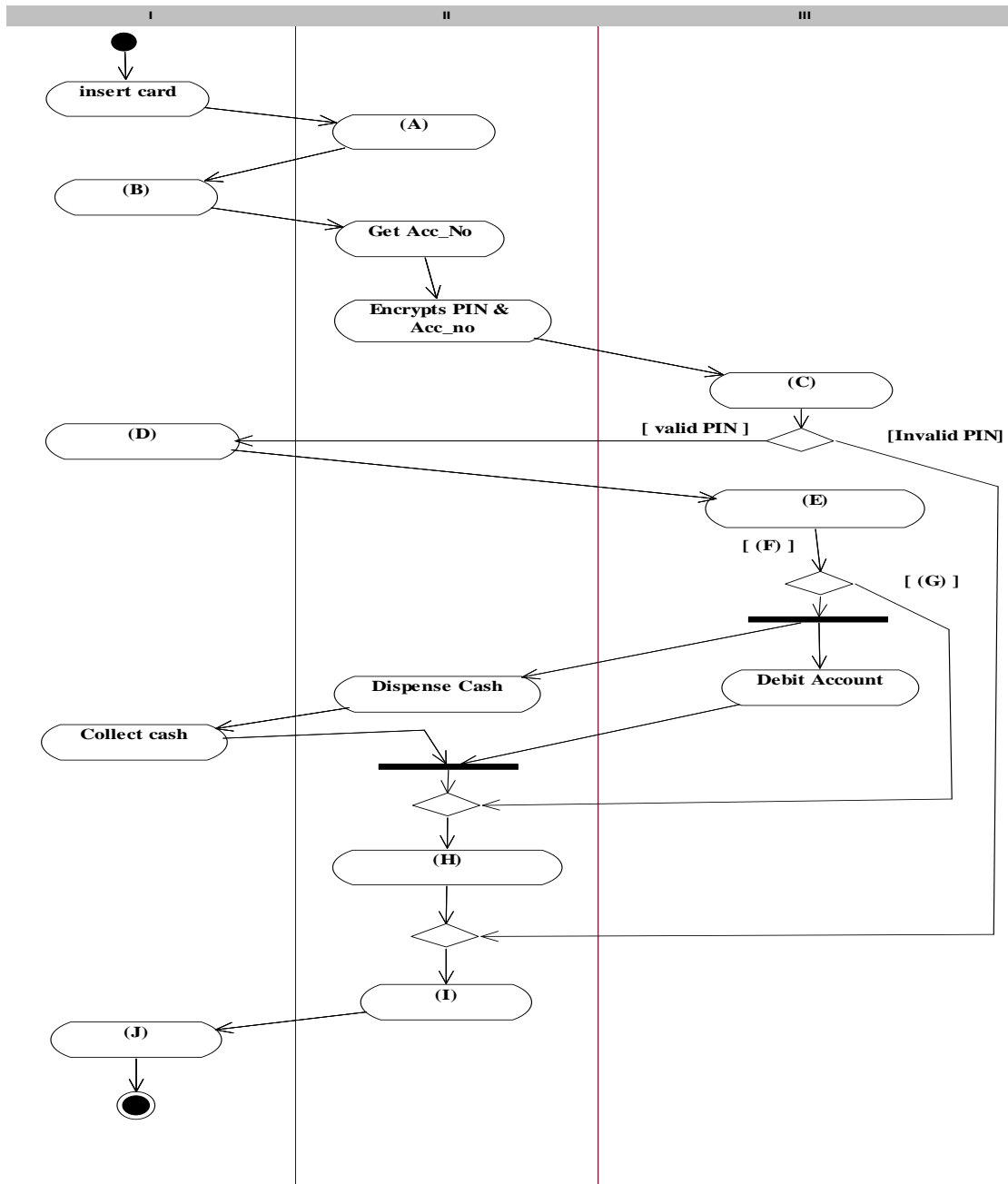
ANSWER IN THIS BOX

    Yes. Rate class

(15 Marks)

2)   (a) The following describes a scenario of a customer, withdrawing money from an Automated Teller Machine (ATM).

   "A customer arrives at an ATM with an ATM Card to withdraw cash. The customer inserts his card into the ATM. The ATM machine prompts the customer to enter PIN. The customer enters his PIN. The ATM (internally) retrieves the bank account number from the card, encrypts the PIN and the account number and sends it over to the bank. The bank verifies the encrypted Account and PIN number. If the PIN number is correct, the system authorizes the withdrawal and prompts the user to enter the amount to be withdrawn. The specified amount will be sent to the bank and verifies with the account balance. If the balance is sufficient, the account will be debited and the ATM dispenses the cash. On completion, it shows the balance and ejects the card from the ATM."

The following diagram shows an incomplete activity diagram created by a student for the above scenario.

(i)   Name the swim lanes drawn for the above scenario?

ANSWER IN THIS BOX

 Customer
ATM
Bank

(12 Marks)

(ii)   Without making any assumptions, identify the activities and expressions, denoted using the identifiers A to J accurately and fill in the blanks.

Identifier	Activity
A	**Request Pin**
B	**Enter Pin**
C	**Validate User**
D	**Enter Amount**
E	**Check account balance**
F	**Balance>=amount**
G	**Balance<amount**
H	**Show balance**
I	**Eject Card**
J	**Take Card**

(30 Marks)

(iii)   The above activity diagram shows some typical activities which can be done in parallel. Identify and list such activities?

 Debit account and Collect Cash.

(08 Marks)

(b) Consider the following use case scenario for adding a new book to a catalogue in which a book seller may use to add new book titles to an internet bookstore website.

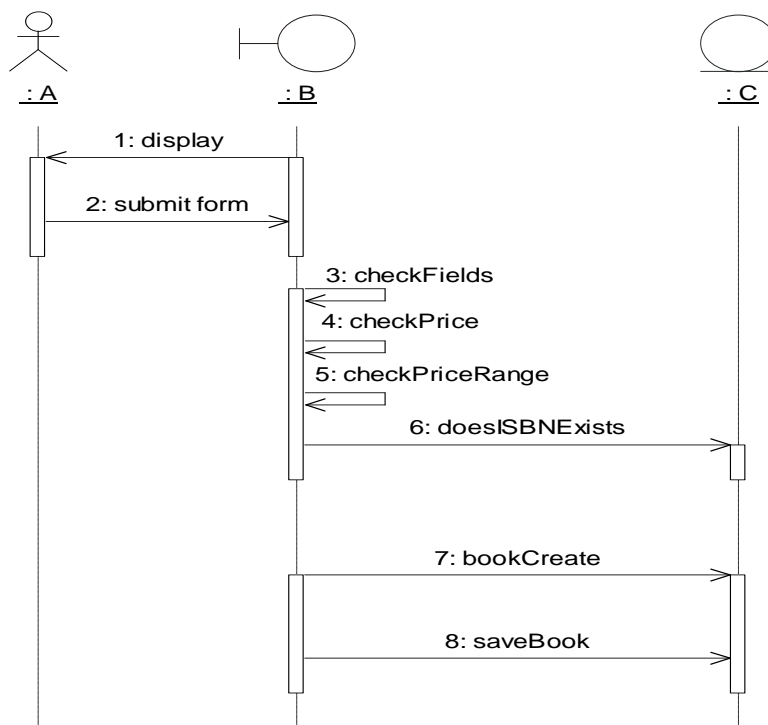Main flow:
The system displays, "add new book page".
The seller types in the book details (title, ISBN, price etc.) and clicks the Add Book button.
The system checks whether each field has a value, and whether the price is numeric (>0).
The system also checks whether there is a matching ISBN in the bookstore database.
Once all the conditions are satisfied the system will create and add the new book in the database.

The following diagram shows a segment of a sequence diagram drawn for the above scenario.

(i)   Identify the objects labeled from A to C correctly and fill in the blanks?

ANSWER IN THIS BOX

Notation	
A	**Seller**
B	**Add New book Page**
C	**Book**

(16 Marks)

(ii)   Identify the Boundary, Entity and Control classes from the above sequence diagram.

> **ANSWER IN THIS BOX**
>
> Boundary: B
> Entity: C
> Control: None
>
>
>
>
> **(10 Marks)**

(iii)   The above diagram contains one or more typical modeling errors. Identify and list down those errors.

> **ANSWER IN THIS BOX**
>
> **(2) Submit form :Label does not match the use case text**
>
> **(5) Check PricelnRange: „**
>
> **(6) does ISBNExist : allocated to wrong object**
>
> **(8) Save Book : „**
>
>
> **(24 Marks)**

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