UNIVERSITY OF COLOMBO, SRI LANKA

UNIVERSITY OF COLOMBO SCHOOL OF COMPUTING

DEGREE OF BACHELOR OF INFORMATION TECHNOLOGY (EXTERNAL)
Academic Year 2017 – 2nd Year Examination – Semester 3

IT3105: Object Oriented Analysis and Design

PART 2 – Structured Question Paper

03rd June, 2017
(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 **12 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.

Questions Answered

Indicate by a cross (×), (e.g. [X]) 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. Read the following case study and answer the questions given below.

Chaya Bus Service (CBS) runs a super luxury bus service between Colombo and several other locations in Sri Lanka. The bus service is in need of a system to handle the ticket bookings. The requirements of the information system of the CBS are as follows:

CBS maintains a bus schedule. Some of the information includes day (e.g., Mon, Tue…..,Sun), departure time, arrival time, departure location, arrival location. It should be noted that there may be more than one bus scheduled on the same day at the same time depending on various factors.

Information on the fleet of busses the CBS has need to be maintained as well. Some important information includes Bus Registration Number, Make (eg. Volvo, Leyland etc…) and number of seats and their location on row.(this is needed since seat plan needs to be displayed per each bus to customers while booking) At present there is only one type of buses(Super Luxury) are in operation but there are plans to introduce Luxury and Semi Luxury bus services as well since there is a demand. Individual seats per bus is numbered.

Information about the drivers, conductors and passengers needs to be maintained. Each staff member has a staff id and their role in CBS(Driver Conductor, etc), Address, name, date of birth, NIC, mobile phone number, contact person, phone number of contact person are important to be available. When it comes to the passengers, their NIC/Passport Number, Mobile phone number, fixed line phone number, name are important.

There is a need to maintain a specific bus schedule as well. For each schedule of a particular day (for example Sunday), there could be multiple specific bus schedules on a given date. A particular bus will be allocated to one specific schedule together with the relevant staff members. Seat price for each is also allocated. The price will be same for any distance between the start and destination. There should be facility to specify whether this particular schedule is cancelled or available.

Booking of seats

Passengers can book seats on a specific bus schedule as follows:

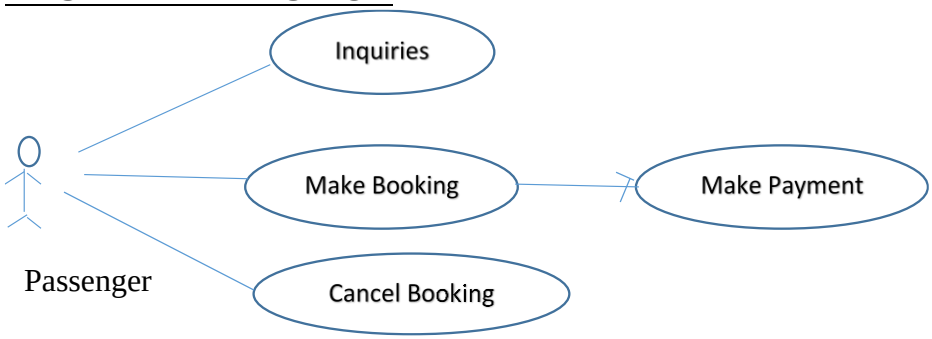
- Select a day, departure location, arrival location and departure time
- System displays specific schedules for the day matching given criteria
- Passenger selects one schedule
- System displays the seating plan for the allocated bus (free and available seats)
- Passenger selects required number of seats and confirms
- System reserves these seats temporarily and displays the total cost,
- Passenger can proceed for payment or Cancel

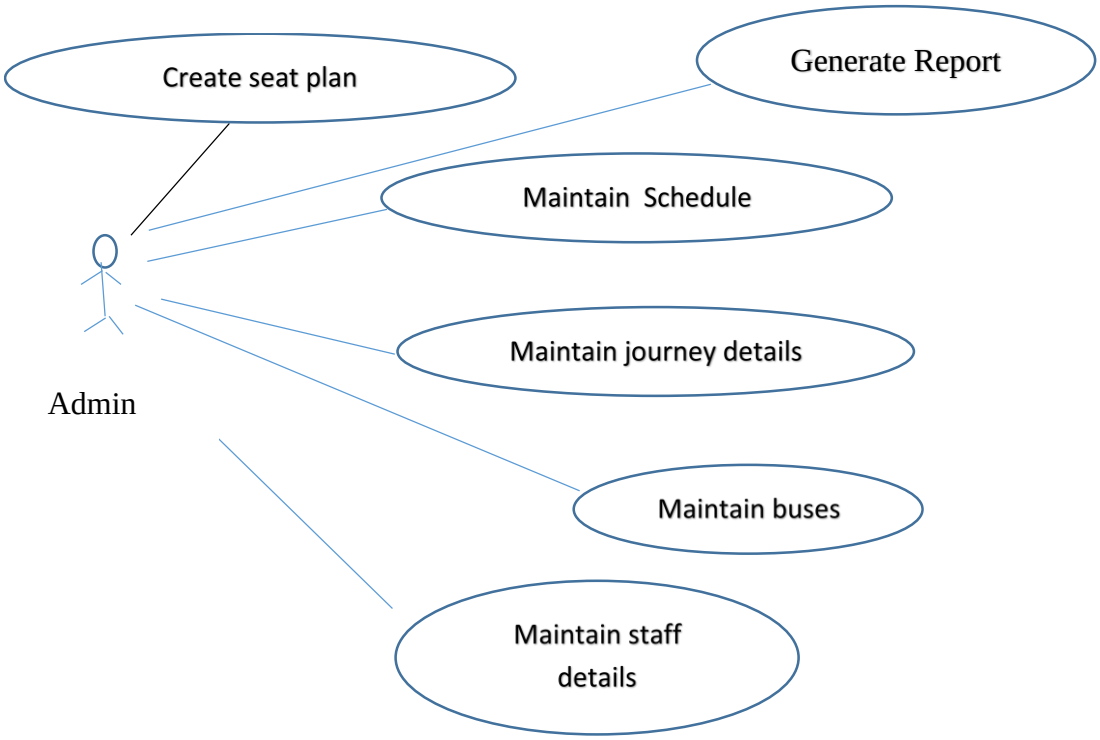
Payment

If the passenger decides to proceed with the booking he/she can make the payment as the next step.

	• System will display the payment information including total cost, number of seats, departure and destination locations, date and time selected by the passenger. • The required passenger information including name, NIC/Passport number, mobile number, fixed line phone number and email address needs to be entered. • Passenger can select either credit card or Paypal options in making the payment. • The system will validate the payment information. • If successful a receipt will be generated with the following information and also text message is generated and sent to the mobile. Receipt number, Date and Time of departure, Departure and Arrival locations, Bus registration number, Contact number of the conductor, Seat number(s) Passengers need to show their ticket/ text message received to the conductor at the start of the journey. If there are any delays a SMS will be send to the passenger indicating the delay.
	a) Identify the actors and draw the Use Case diagram for the booking system.

ANSWER IN THIS BOX





(30 Marks)

b) According to the requirements described, two classes can be identified as ‘Schedule’ to maintain bus schedule details and ‘Journey details’ to maintain details about specific journeys.

i. Model the relationship between the two classes using UML showing the multiplicities.

ANSWER IN THIS BOX

(15 Marks)

ii. Write down the attributes of each class ‘Schedule’ and ‘Journey details’?

ANSWER IN THIS BOX

(i) Schedule – Schedule_id, Day, Departure time, Arrival time, Departure location, Arrival location -

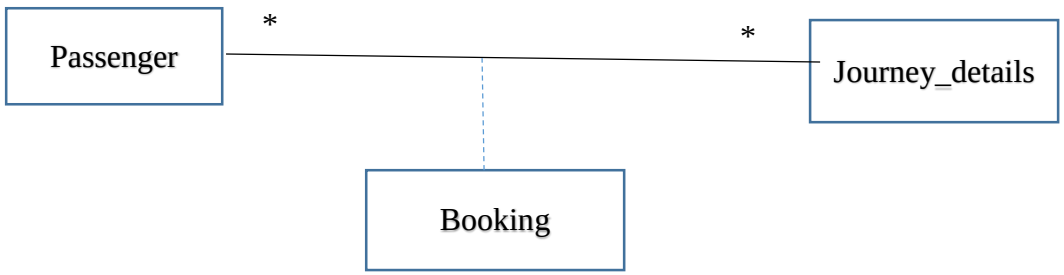
(ii) Journey-details - Journey_id, Date

(15 Marks)

c) Consider the following Diagram. Where do you include the booking details of the system? Modify the following diagram to show your answer.

ANSWER IN THIS BOX

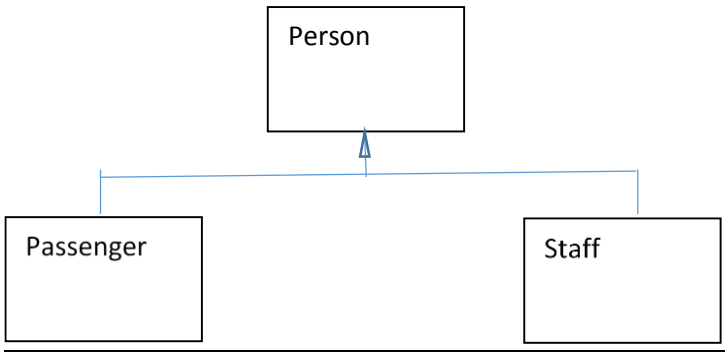
Using an Association Class



(10 Marks)

d) Identify and model the classes involved in a generalization/specialization relationship in the system.

ANSWER IN THIS BOX



.(10 Marks)

e)

Identify the most appropriate classes to add the following attributes and methods in the booking system.

Write down if there are any assumptions.

i. Seat Number
ii. Route number
iii. Make booking()
iv. Get Employee name()

v. Specify bus()

ANSWER IN THIS BOX

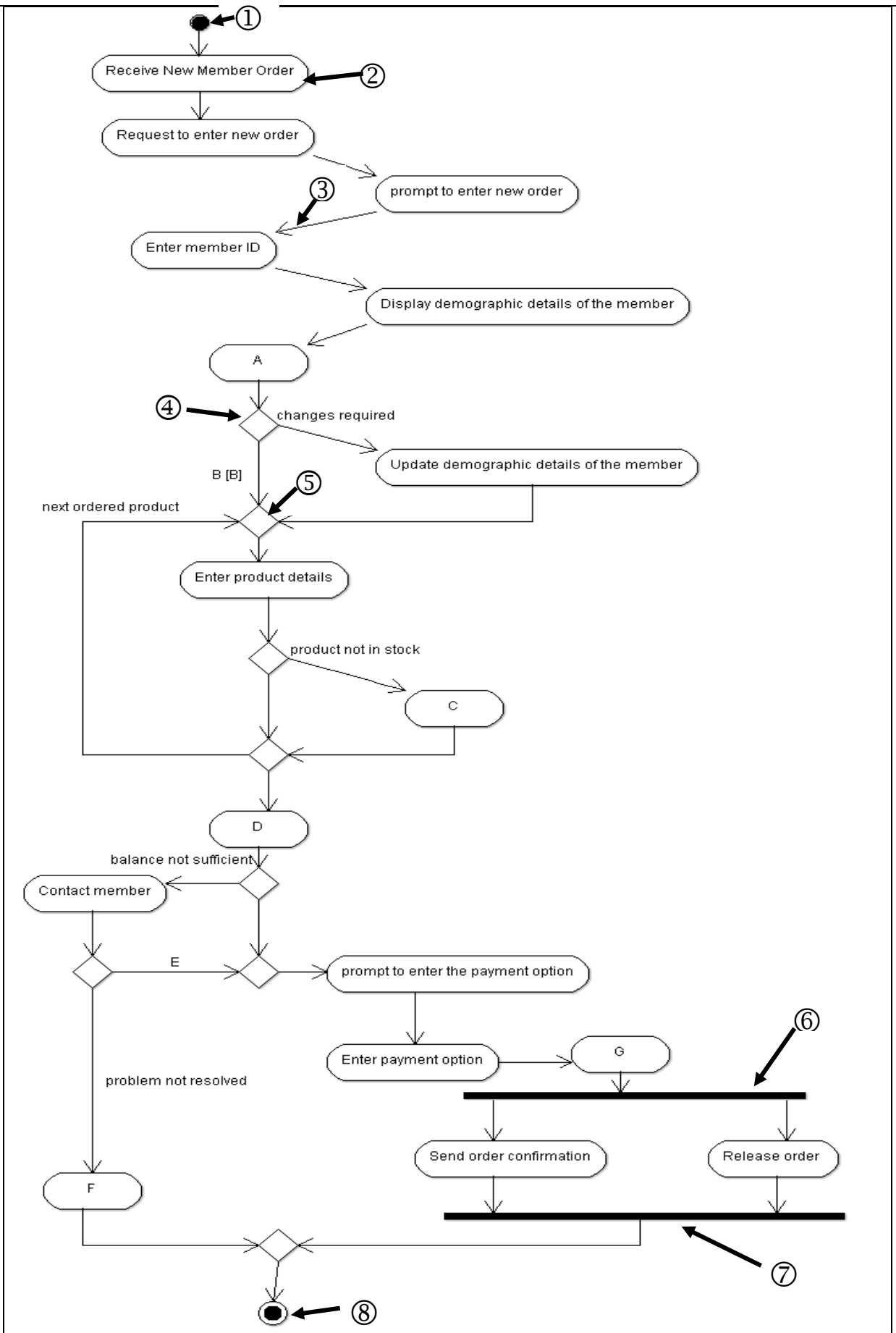
	Attribute	Class
i.	Seat Number	Bus
ii.	Route number	Schedule
iii.	Make booking()	Booking
iv.	Get Employee name()	Employee
v.	Specify bus()	Journey

(20 Marks)

2) a) Consider the following use case narration which describes the event of a member service assistant entering a new product order that has been submitted by a member of the ABC Private Ltd.

Action	System Response
Step 1: The member services associate request the option to enter a new order.	**Step 2:** the system responds by prompting the user to enter the ID of the member submitting the order.
Step 3: The member services associate provides the member ID.	**Step 4:** The system retrieves the member's demographics information on file and displays it to the user.
Step 5: The member services associate verifies the demographic information (shipping and billing address). If changes are required update the information and respond accordingly.	**Step 6:** The system responds by prompting the user to enter the ID and quantity of each item to be ordered.
Step 7: The member services associate enters the ID and quantity of each item provided.	**Step 8:** For each product ordered, the system validates the product identity.
	Step 9: for each product ordered, the system verifies the product availability and determines an expected ship date, determines the cost of the total order if an item is not

	Step 10: The member service associate verifies the order with the information provided by the member. If no changes are necessary the associate responds accordingly. **Step12:** the member service associate responds by selecting the corresponding payment option indicated by the member.	immediately available, it indicates that the product is back-ordered or that it has not been released for shipping. **Step 11:** The system checks the status of the member's account. If satisfactory, the system prompts the user to select the desired payment option. **Step 13:** the system finalize the order and displays a final summary of the order **Step 14:** the system sends the order confirmation to the user and release the order.
	Alt-Step 11: If the members account balance is not sufficient, the system displays the current status of the member's account balance, and what action to be taken to resolve the issue. The member associate will contact the member to resolve the issue at a later time. The system prompts to hold the order for later processing or cancel the order.	
	The following diagram shows an activity diagram drawn for the above scenario. Answer the questions from (i) to (iii) based on this activity diagram.	


①
Receive New Member Order
②
Request to enter new order
prompt to enter new order
③
Enter member ID
Display demographic details of the member
A
④
changes required
Update demographic details of the member
B [B]
⑤
next ordered product
Enter product details
product not in stock
C
D
balance not sufficient
Contact member
E
prompt to enter the payment option
Enter payment option
G
⑥
problem not resolved
Send order confirmation
Release order
F
⑦
⑧

(i) Without making any assumptions, complete the above activity diagram to suit the given description.

ANSWER IN THIS BOX

ANSWER IN THIS BOX

A. **Verify Demographic details of the member**

B. **No changes are required**

C. **Create back order**

D. **Check members account details**

E. **Resolved**

F. **Cancel order**

G. **Finalized order**

(35 Marks)

(ii) Identify and name the notations of the activity diagram denoted by ② to ⑧. ① is done for you.

ANSWER IN THIS BOX

① **Initial Node**

② Action or Activity

③ Flow or Transition

④ Decision node

⑤ Merge node

⑥ Fork

⑦ Join

⑧ Final Node

(35 Marks)

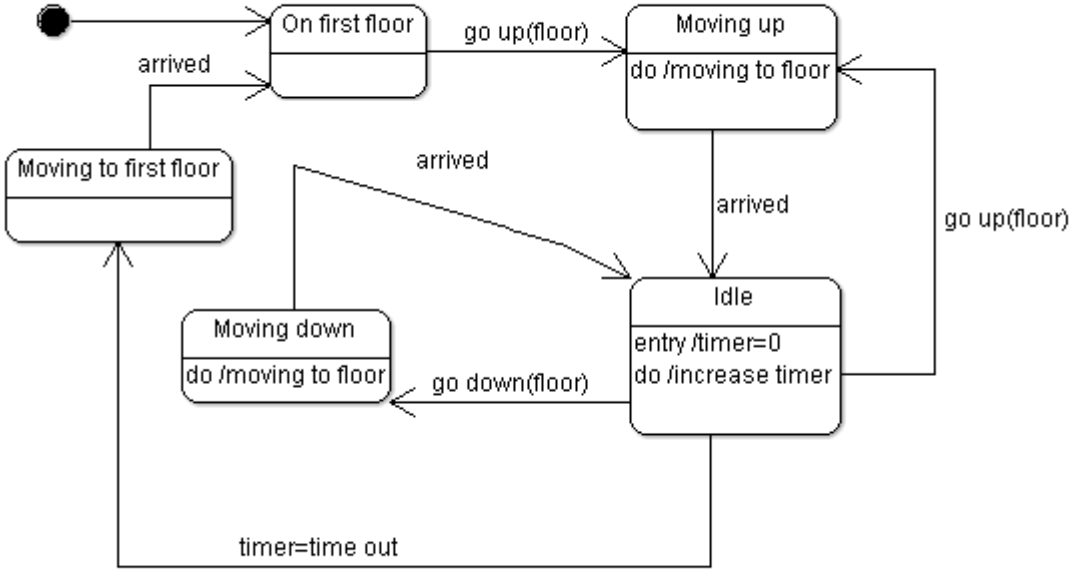
(iii) Name two activities that can be done in parallel. (5 Marks)

ANSWER IN THIS BOX

Send order confirmation and Release order

(06 Marks)

(b) Questions (i) to (v) are based on the following state chart diagram.
State whether the given statements are true or false.



ANSWER IN THIS BOX

(i) The Idle state assigns *zero* to the attribute *timer* and then it increases the timer continuously until the event go down or go up occurs or until timer=time out becomes true. (True / False)

True

(ii) 'arrived' is an activity. (True / False)

False

(iii) 'moving to floor' is an activity. (True / False)

True

(iv) The state changes from 'on the first floor' to the state 'Moving up' once the activity go up(floor) occurs. (True / False)

False

(24 Marks)

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