COMP 23420

One and a half hours

QUESTION PAPER MUST NOT BE REMOVED FROM
THE EXAM ROOM AND MUST BE RETURNED

UNIVERSITY OF MANCHESTER
SCHOOL OF COMPUTER SCIENCE

Software Engineering

Date: Monday 19th January 2015

Time: 14:00 - 15:30

Answer ALL the multiple choice questions in Section A

and

answer ONE Question from Section B

This is a CLOSED book examination

The use of electronic calculators is NOT permitted

[PTO]

Section A

This Section contains Multiple Choice Questions and is therefore restricted

Section B

Answer one of the two questions in this part.

2. Consider the following scenario:

SpendAndSave is a proposed software system for on-line shopping that needs to work on both desktop and mobile devices, with up to 10 000 customers using it concurrently. Customers must be able to browse the product catalogue, add items to a shopping basket, change their mind about the basket's content, then pay for the content of their basket. After purchase, a receipt needs to be sent to their email address.

There should be a list of *favourite* purchased items that the customer can manage. The customer must also be able to manage their details on the system about their name, address and payment details and so on.

The SpendAndSave system will use two third party services, one for processing payments and one for retrieving product data. The SpendAndSave system will use its own database to store information about customers. The company's system administrator needs to interact with the SpendAndSave system to manage the customer records and retrieve information about sales to pass on to his or her manager for further analysis.

The following table shows use cases and their participating actors from this scenario.

Use Case	**Actor(s)**
Remove product from basket	Customer; Product catalogue
Purchase product	Customer; product catalogue; payment service; customer and sales database
Manage favourites list	Customer; customer and sales database
Print receipt	Customer
Analyse sales	Manager; sys admin

a) Consider the **actors** in the use case table. Are there any actors that are poorly named, or who should not be included? State which actors should not be there, and rename any that are poorly named. Give your reasons, stating any assumptions you make. (4 marks)

b) Consider the use case **names** in the use case table. Are there any use cases in the table that should not be included? Give your reasons, stating any assumptions you make. (6 marks)

c) Are any use cases missing? If so, give the use case and participating actors, illustrating your answer by quoting the relevant portion of text from the scenario. State any assumptions you make. (6 marks)

d) What non-functional requirements can be identified from the scenario? (4 marks)

3. a) i) Briefly explain what a structural model is. (2 marks)
ii) Briefly explain what a behavioural model is. (3 marks)

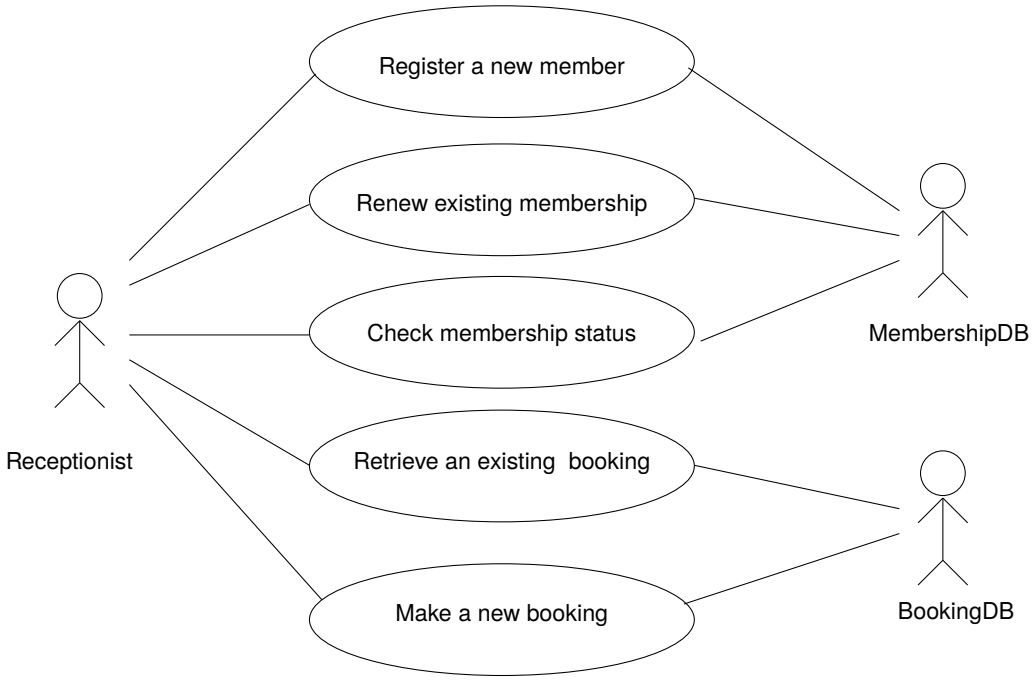
b) Consider the following scenario:

A health club has a swimming pool and a gym with treadmills, weights systems and cross trainers. Membership is by monthly or annual subscription. Members have access to all the facilities; for the gym equipment, members have to book sessions in advance.

The club does not offer any on-line or telephone booking system, but is considering to install a software system which the receptionist can use to deal with members arriving at the club to use its facilities. Members will have to produce their membership cards on every visit. On arrival, new members will be able to join the club by registering with the receptionist and paying the desired subscription; existing members will be able to ask the receptionist to renew their membership; members with valid cards will be able to ask the receptionist to book sessions on any gym equipment.

A piece of gym equipment can be booked for a specified time slot. The receptionist has to first check that the equipment is available for the chosen period. If it is available, the receptionist enters the booking in the booking system. Future bookings can be made by a member as long as they fall within the membership expiry date for that member.

The use case diagram for the software system is as follows:



i) Identify domain classes that realise the use cases, and draw a class diagram for the domain model. Explain and justify your answer. (5 marks)

ii) Suggest suitable system classes that refine the domain classes. Draw a class diagram for the system classes. (5 marks)

iii) Draw a sequence diagram to show how the use case 'Make a new booking' is realised by your system classes. (5 marks)

END OF EXAMINATION