INTRODUCTORY DATABASES
EXAMPLE QUESTIONS

Length: 1 ½ hours
Answer all Questions

Q1 [40%]

The two tables below are part of a database for a telephone company. The table *Subscribers* holds data about the customers. The table *calls* holds the data about calls made by the subscribers.

Calls	caller	receiver	starttime	duration
	78774444	78773333	01:52:00	30
	78774444	78773333	01:50:00	60
	78774444	78773333	02:45:00	172
	78774444	78772222	12:07:00	600
	78774444	78772222	14:33:00	755
	78774444	78771111	19:27:00	333
	78772222	78774444	19:22:00	365
	78773333	78774444	11:52:00	178
	78773333	78771111	12:30:23	257
	78772222	78773333	11:15:02	323

Subscribers	phoneno	name	city
	78771111	John Smith	London
	78772222	Ann Smith	London
	78773333	Paul Smith	Birmingham
	78774444	Simon Smith	Edinburgh

Below, you are asked to answer a number of questions about queries to this data base. Where you are asked to write a query you must ensure that your answer is general rather than written just to work with the data set supplied above:

a) Write a SQL query which will return a table containing two columns (Labelled *city* and *Duration of calls received*) which gives the total duration of all calls made to that city (ordered alphabetically by city).

[10]

b) Write an SQL query which will return a table containing the name of all subscribers who have either made or received a call which is 600 seconds or longer.

[10]

c) Write an SQL query which will return a table with the name of all subscribers who have **not** made a call to London – ordered by name.

[10]

d) Write an SQL query which will list those subscribers who have made calls totalling more than 500 seconds. You should return the subscribers name and total duration of calls made by that subscriber.

[10]

Q2 [10%]

Given the ER diagram below, show the relational schema that you would produce.

[10]
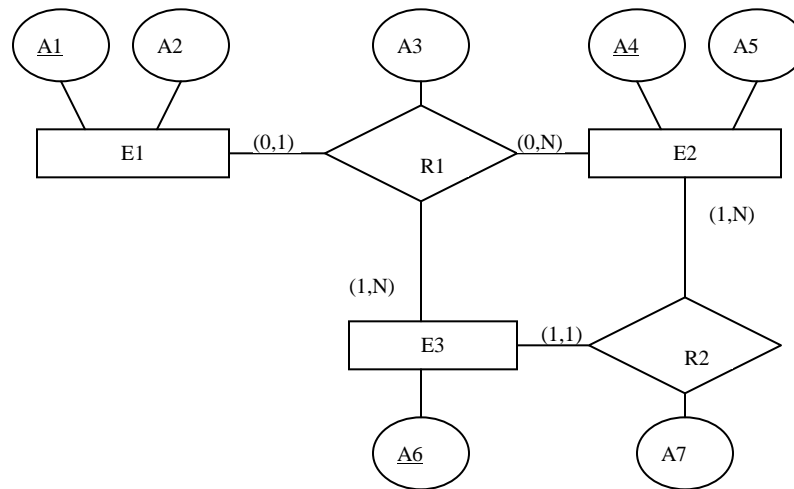
Q3 [15%]

A university needs to build a system for managing room bookings. This is described in more detail below:

There is a set of rooms available to be booked for lectures. Each room has a unique id and a name and also a set of attributes: capacity, whether it has a computer, whether it has a projector. Every course has an informal name as well as a unique code. Every lecturer has a name and a university id. Every booking must specify the room to be booked, the start and end date/times, the course being booked and the lecturer of that course.

Draw an ER diagram that captures the requirements described above.

[15]

Q4 [10%]

What is a transaction? Your answer should explain clearly what is meant by the term transaction and why transactions are necessary. Use an example to demonstrate the problem and also how the use of transactions can solve it.

[10]

Q5 [15%]

Name and define the most common security problem with web-based interfaces to data base systems. Give an example to demonstrate how this vulnerability could be exploited and explain how the vulnerability could be removed.

[10]

Q6 [15%]

You have the following:

Member(memberid, name, address, age, sex, homebranch)
Branch(branchid, branchname, branchcity)
Visit(memberid, branchid)

Where:
In the Member relation, memberid is their unique membership number and homebranch is the id of the branch where they are registered.
In the Branch relation, branchid is the branch's unique id, branchname is a string representing its name and branchcity is a string represention of the city in which it is.
Visit records the memberid and branchid of every visit.

Write SQL DDL statements that would define these tables, including any necessary constraints.

[15]