

**This question paper consists
of 4 printed pages, each
of which is identified by the
Code Number COMP1121.**

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School of Computing

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COMP1121

Databases

Answer ALL THREE questions

Time allowed: 2 hours

Question 1

- (a) Draw an Entity-Relationship (ER) diagram which models the scenario described below. Your diagram should include entity types, relationship types, attributes and constraints. The Red Car Company (RCC) is a car hire company, with the distinctive feature that all its cars are the same bright red colour.

Your diagram should model the following:

- Drivers, including their name, driving licence number, date of birth and address.
- Cars, including their registration number, make and model.
- Accidents, including the date and time, and the RCC car and driver involved.
- Each occasion on which a driver hired a car, including the driver, the car, the start date and the length of the hire in days.
- The RCC only permits people to hire cars as long as they have had fewer than four accidents.
- Cars which have had ten accidents are always disposed of and are not used for hiring.

[10 marks]

- (b) It is proposed that when a new student who suffers from epilepsy starts a degree programme in the School of French at the University of Southern England, all the students and staff in the School are informed of that student and given advice on what they should do to help if they witness that student having an epileptic fit. (Epilepsy is a health issue characterised by fits or seizures, such as vigorous shaking.) Comment on this proposal within the considerations of the Data Protection Act. How would you change the proposal in the light of the Act?

[10 marks]

[question 1 total: 20 marks]

Question 2

Data about students, lecturers and modules in the School of Computing is stored in two tables.

| class | | | staff | |
|---------|--------|-------|----------|--------|
| Student | Module | Grade | Lecturer | Module |
| | | | | |

- What SQL statement would you use to create the table "class", including specifying the primary key? **[3 marks]**
- What SQL statement would you use to find out how many students there are in the School of Computing? **[3 marks]**
- What SQL statement would you use to list the students in the module COMP1121? **[3 marks]**
- Write an SQL statement, using the **inner join** construct, that will, for the student John Smith, list all his modules, and his grades in those modules, and the lecturer of each of those modules. **[4 marks]**
- What information does the output from the following SQL query provide?

```
SELECT module, COUNT(Student) AS total
FROM class
GROUP BY Module
HAVING Grade < 40;
```

[2 marks]

- Write an SQL query which would obtain the following information: for each lecturer, what is the average grade obtained by students in each one of the modules they taught? **[5 marks]**

[question 2 total: 20 marks]

Question 3

A clothing manufacturer produces woollen jumpers in a variety of sizes and colours. These are stored in a warehouse and each location in the warehouse contains jumpers that are all the same colour and all the same size. Each of the different sizes is available in all the different colours, and each combination of size and colour can be found in only one location in the warehouse.

The manufacturer uses a relational database to record information about what is stored in each location in the warehouse. There is a table, *Warehouse*, with three attributes: *Size*, *Colour*, *Location*.

- (a) Below are listed four possible functional dependencies for the table. Not all of these hold. For each dependency, state whether it holds or not. Justify the reason for your decision in each case by referring to the description at the start of the question.

Location \rightarrow *Size*, *Colour*

Location, *Size* \rightarrow *Colour*

Colour, *Size* \rightarrow *Location*

Colour \rightarrow *Size*, *Location*

[5 marks]

- (b) What are the candidate keys for the table? State why they are candidate keys.

[6 marks]

- (c) What normal form is the *Warehouse* table in? Justify your answer by referring to specific dependencies for the table.

[5 marks]

- (d) It is suggested that the *Warehouse* table be split into two tables. One table is to have attributes *Size*, *Colour* and the other to have attributes *Location*, *Size*. Explain briefly any advantages or disadvantages of this suggestion.

[4 marks]

[question 3 total: 20 marks]

[grand total: 60 marks]