1(a) A company sells garden furniture. It has decided to create a relational database. A first, incomplete database design includes two tables PRODUCT and ORDER.

PRODUCT (ProductId, ProductType, Size, Price,…)
ORDER (OrderId, OrderDate, ProductId,…)

For example, the product which has ProductId 12345 is a large bench which has a price of £150.

You should use only the data given above.

(i) Explain the use of a primary key in this database.

---

[2]

(ii) Explain the use of a foreign key in this database.

---

[4]

(b) A CUSTOMER table is added. An entity-relationship (E-R) diagram is shown.

Explain why this design would be inefficient for customers.

---

[2]

(c) Some of the Structured Query Language (SQL) for this database is

```
SELECT Surname, Title, PhoneNo
FROM CUSTOMER
WHERE Town = “Coventry”
ORDER BY Surname
```

Describe the purpose of this code and give **one** situation in which it may be used.

---

[5]

(d) State **one** additional piece of data which should be included in PRODUCT and give **one** reason why it is needed.

---

[2]

2 An insurance company's offices have a large number of black and white printers.

The company's technicians keep accurate records of the printers in the building, and the quantity of toner cartridges in stock, in a flat file database. An extract of the database is shown in Fig. 1.

Printer Model	Location	Notes	Cartridge Code	Quantity in stock	Re-order URL
LasPrint LP753	office 3		LP-7XB	12	www.megacheapprint.com / toner / LP-7XB
LasPrint LP710	office 6	drum replaced	LP-7XB	12	www.megacheapprint.com / toner / LP-7XB
Zodiac ZN217	reception		Zod17	4	www.zodiaclaserprinting.com / shop / Z17
Zodiac ZN217	conference Room 2	had to add RAM	Zod17	4	www.megacheapprint.com / toner / LP-7XB
LasPrint LP753	office 8		LP-7XB	12	www.megacheapprint.com / toner / LP-7XB

Fig. 1

A relational database is created with three tables:

- PrinterModel: this stores all the data about each model of printer
- PrinterInstance: this stores the data about each individual printer in the building
- Cartridge: this stores information about the toner cartridges.

Draw an entity-relationship diagram to show the relationships between the three tables.

[4]

3(a) RestaurantReview is a website that allows users to leave reviews and ratings for different restaurants.

The website uses a database with the following structure.

The database management system ensures referential integrity is maintained.

Explain what is meant by referential integrity, giving an example which refers to the database described above.

---

[3]

(b) Whenever a review is added to the system, the restaurant's average rating is updated. This transaction is ACID.

The A in ACID refers to Atomic.

State what the letters CID refer to in ACID.

C ---

I ---

D ---

[3]

(c) Whenever a review is added to the system, the restaurant's average rating is updated. This transaction is ACID.

The A in ACID refers to Atomic.

Describe what is meant by the term 'Atomic' in the context of ACID transactions. You should refer to the example of a review being added.

[2]

4 InterMovie is a service that allows users to stream movies over the Internet.

InterMovie has a relational database of the films it offers. The database has the field *Film Title* which stores the name of a film (e.g. 'Aliens Attack').

(i) Describe why *Film Title* is not a suitable primary key.

---

[2]

(ii) Describe why *Film Title* would make a suitable secondary key.

---

[2]

5(a) Every bank account has an account number and sort code. The sort code identifies the bank branch (location of the bank) with which the account is held and the account number uniquely identifies the bank account. An extract from a bank's database table is shown in Fig. 5.1.

CustomerID	Forename	Surname	Acc No	Sort Code	Branch Name
145204	Elaine	Murray	14725200	67-34-56	Hull
657875	Jordan	Rogers	62703441	67-45-67	Truro
735951	Monim	Khan	96385547	67-00-11	Cambridge
744078	Tom	Banner	45623929	67-00-11	Cambridge

Fig. 5.1

State why the table in Fig. 5.1 is not in Third Normal Form.

---

[1]

(b) Explain how the database could be put into Third Normal Form.

---

[3]

6 A delivery company sends parcels across the UK.

Details of customers sending parcels are stored in a database. The database contains a table called `parcel` and a table called `customer`.

Draw an entity relationship diagram showing the `parcel` and `customer` tables.

[2]

END OF QUESTION PAPER