0 1 . 1 Develop a **fully normalised design** for a relational database to store the information required by the veterinary practice. To help you, the Pet, Surgery and Vet relations have already been defined in **Figure 3**.

Figure 3

Pet(PetID, PetName, Type, DateOfBirth)

Surgery(SurgeryName, Town, TelephoneNumber)

Vet(VetID, VetForename, VetSurname, SurgeryName)

Using the format shown in **Figure 3** list all the other relations that will need to be created, together with the attributes that each will contain.

Underline the attribute(s) that will form the entity identifier (primary key) in each relation.

[4 marks]

0 2 . 1 A composite primary key has been selected for the Viewing relation. This consists of the attributes BuyerID, PropertyID and ViewingDate.

In selecting these attributes to form the primary key, what assumption has the database designer made about the behaviour of the buyers?

[1 mark]

0 3 A sports centre uses a relational database to store information about its facilities (such as the swimming pool) and the bookings that have been made to use them.

Figure 3 shows the structure of the relations in the database.

Figure 3

Facility(FacilityID, Description, MaxPeople, PricePerHour)

FacilityForSport(Sport, FacilityID)

Booking(FacilityID, BookingDate, StartTime, EndTime, CustomerID)

Customer(CustomerID, Forename, Surname, EmailAddress)

- The Facility relation stores the different facilities available at the sports centre. Each one is identified by a unique number and has a brief description. For example, the facility with FacilityID 1 has the description 'Outdoor Pitch A'. PricePerHour is the price of hiring a facility for 1 hour. For example, the facility with FacilityID 1 has a price per hour of £17.50.
- The FacilityForSport relation identifies which facilities are suitable for which sports. For example, the facility with FacilityID 1 is suitable for football, rugby and hockey and would therefore require three separate records in this relation.
- The Booking relation stores the bookings that have been made. Bookings must start and end either on the hour, at quarter past, half past or quarter to the hour. A customer can make bookings for more than one facility for the same time. For example, a badminton club secretary might book both of the indoor sports halls for the same time. However, each facility can only be booked by one customer at any one time.
- The Customer relation stores the details of customers who have made bookings.

0 3 . 1 The entity identifier (primary key) for the Booking relation is a composite entity identifier, consisting of these three attributes:

FacilityID, BookingDate, StartTime

An alternative entity identifier could have been chosen, composed of different attributes.

Shade **one** lozenge to indicate which of the following groups of attributes would form a valid alternative entity identifier for the Booking relation.

[1 mark]

A BookingDate, StartTime, EndTime ⬭

B FacilityID, BookingDate, EndTime ⬭

C FacilityID, StartTime, CustomerID ⬭

D FacilityID, BookingDate, EndTime, Sport ⬭

0 3 . 2 A different design was originally proposed for the database. This design did not have the Customer relation and had the following design for the Booking relation:

Booking(FacilityID, BookingDate, StartTime, EndTime, Forename, Surname, EmailAddress)

Explain why this alternative design would have been rejected in favour of the design in **Figure 3**.

[2 marks]

0 3 . 3 Complete the following SQL statement to create the Facility relation specified in **Figure 3**, including the primary key.

[3 marks]

```
CREATE TABLE Facility (
                                                    )
```

Figure 3 is repeated below to help you answer Question **03.4** without having to turn back in the question paper.

Figure 3 (repeated)

Facility(FacilityID, Description, MaxPeople, PricePerHour)

FacilityForSport(Sport, FacilityID)

Booking(FacilityID, BookingDate, StartTime, EndTime, CustomerID)

Customer(CustomerID, Forename, Surname, EmailAddress)

0 3 . 4 A customer wants to book a facility that is suitable for playing basketball on the 15/06/2021 between 14:15 and 16:15

As part of the booking process, a query is needed to list all the existing bookings that would overlap with the new booking.

Write a query that will list all the bookings for facilities that are suitable for playing basketball and which would overlap with the booking that the customer wants to make.

For each booking which would overlap with the new booking only the FacilityID, StartTime and EndTime fields should be listed.

[7 marks]

0 4 A shop that sells items through a website uses a relational database to store information about the products that it sells and the sales that it has made.

Figure 6 shows the structure of the relations in the database.

Figure 6

Product(ProductID, Description, QuantityInStock, SupplierID)

Sale(SaleID, CustomerID, SaleDate)

SaleLine(SaleID, ProductID, QuantitySold)

Customer(CustomerID, Forename, Surname, EmailAddress)

Supplier(SupplierID, SupplierName, SupplierEmail)

- The Product relation stores information about the products that the shop sells and who supplies them. Each type of product is identified by a unique number and has a brief description. For example, ProductID 1 has the Description 'A4 Ring Binder – Purple'. The QuantityInStock indicates how many of the product the shop currently has in stock.
- The Sale and SaleLine relations are used to record the details of the sale of products to a customer. Each sale is identified by a unique SaleID, which is a number.
- The Customer relation stores the details of customers who have registered on the website so that they can purchase products. Each customer is identified by a unique CustomerID, which is a number.
- The Supplier relation records the details of companies who supply the products to the shop. Each supplier is identified by a unique SupplierID, which is a number.

0 4 . 1 Shade **one** lozenge to indicate which of the listed assumptions has been made when the database was designed.

[1 mark]

A A customer cannot be added to the database until a sale has been made to them. ⬭

B Each product is only supplied by one supplier. ⬭

C Each supplier only supplies one product. ⬭

D Only one sale can be made to a customer on a particular date. ⬭

E Two different products cannot be purchased as part of the same sale. ⬭