4.10.4 SQL

1) A garage services and repairs cars. It uses a relational database to keep track of the jobs that customers have booked for it to carry out. The database includes jobs that have been completed and jobs that are waiting to be done.

The details of the jobs that the garage does, together with the parts that it stocks and uses are stored in the database using the four relations shown in **Figure 1**.

Figure 1

Job (JobID, CarRegNo, JobDate, InGarage, JobDuration)

Car (CarRegNo, Make, Model, OwnerName, OwnerEmail, OwnerTelNo)

Part (PartID, Description, Price, QuantityInStock)

PartUsedForJob (JobID, PartID, QuantityUsed)

- The details of a job are stored in the database as soon as a booking is made and others are only added when a job has been completed.
- When the car arrives at the garage the value of the InGarage attribute is changed to True.
- When the job is finished the value of the JobDuration attribute is updated to indicate how long the job took and details of the parts used are recorded in the database.

The Job with JobID 206 has been completed. The job took 1 hour 30 minutes (1:30) and used two of the parts with PartID 12.

a) Write the SQL commands that are required to record the amount of time that the job took in the database.

[3 marks]

```
UPDATE Job
SET JobDuration = "01:30"
WHERE JobID = 206
```

b) Write the SQL commands that are required to record in the database the fact that two of the parts with PartID 12 were uses.

[2 marks]

```
INSERT INTO PartUsedForJob
VALUES (206, 12, 2)
```

A mechanic needs to produce a list of all the parts used on the job with JobID 93 for a customer.

This list must include the PartID, Description, Price (each) and QuantityUsed of each part, and on other details. The parts in the list should be ordered by PartID with the parts with the lowest PartIDs nearest to the top of the list.

c) Write an SQL query to produce the list.

[5 marks]

```
SELECT PartID, Description, Price, QuantityUsed
FROM Part
INNER JOIN PartUsedForJob
ON PartUsedForJob.PartID = Part.PartID
WHERE JobID = 93
ORDER BY PartID
```

2) Athletes, who are members of teams, compete in running events, which are held at fixtures throughout the year.

A relational database is used to store the details of which athletes enter each event at each fixture. The relations used in the database are shown in **Figure 2**.

Figure 2

Athlete (AthleteID, Surname, Forename, DateOfBirth, Gender, TeamName)

EventType (EventTypeID, Gender, Distance, AgeGroup)

Fixture (FixtureID, FixtureDate, LocationName)

EventAtFixture (FixtureID, EventTypeID)

EventEntry (FixtureID, EventTypeID, AthleteID)

a) The SQL statement below is intended to make a table to represent the Athlete relation. The statement contains some errors.

```
CREATE TABLE Athlete (
     PRIMARY KEY AthleteID,
     VARCHAR(50) Surname,
     VARCHAR(30) Forename,
     DATE DateOfBirth,
     VARCHAR(6) Gender,
     VARCHAR(30) TeamName
)
```

State **two** errors that have been made.

[2 marks]

- **There is no data type for the primary key/AthleteID**
- **The data type has been specified before the fieldname**
- **There is a semi-colon missing at the end**

b) A list is to be produced of the names of all athletes who are competing in the fixture that is taking place on 17/09/18. The list must include the Surname, Forename and DateOfBirth of these athletes and no other details. The list should be presented in alphabetical order by Surname.

Write an SQL query to produce the list.

[5 marks]

```
SELECT Surname, Forename, DataOfBirth
FROM Athlete
INNER JOIN EventEntry
ON Athlete.AthleteID = EventEntry.AthleteID
INNER JOIN Fixture
ON EventEntry.FixtureID = Fixture.FixtureID
WHERE FixtureDate = "17/09/2018"
ORDER BY Surname
```

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3) A veterinary practice with four different surgeries intends to use a relational database to store the data that it needs to manage its business.

The SQL query has been written to produce a list of all of the vets who work at the surgery in the town of Torquay. Some errors have been made in the query.

```
SELECT VetForename, VetSurname
FROM Surgery, Vet
WHERE Town = Torquay
```

Describe **two** errors that have been made in the query. You should **not** give the omission of a semi-colon (;) as one of the errors.

[2 marks]

- **Torquay is missing quotation marks**
- **There is no linking join between the two tables**

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4) An estate agency makes details of the properties that it has for sale available to potential customer through a website. The details of the properties and other data that are useful to the agency are stored in a relational database.

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

Figure 3

Property (PropertyID, HouseNum, Street, Area, Postcode, Bedrooms, Bathrooms, AskingPrice, SellerID)

Seller (BuyerID, Title, Forename, Surname, Telephone)

Buyer (BuyerID, Title, Forename, Surname, Telephone, DesiredArea, MinBedrooms, MaxPrice)

Viewing (BuyerID, PropertyID, ViewingDate, ViewingTime)

Sale (SaleID, PropertyID, BuyerID, SalePrice)

Write an SQL query that will retrieve from the database the list of all properties that the buyer with BuyerID 23 might be interested in buying. The properties should:

- Be in the buyer's desired area
- Have at least the minimum number of bedrooms the buyer requires
- Cost no more than the maximum price that the buyer is prepared to pay

The list of properties returned should only include, for each property, the following details:

- The PropertyID
- The street that the property is on
- The number of bedrooms that the property has
- The asking price for the property.

The list should be ordered with the most expensive property at the top of the list and the least expensive at the bottom of the list.

[5 marks]

```
SELECT PropertyID, Street, Bedrooms, AskingPrice
FROM Buyer
INNER JOIN Property
ON Buyer.DesiredArea = Property.Area
WHERE BuyerID = 23
AND MinBedrooms <= Bedrooms
AND MaxPrice >= AskingPrice
ORDER BY AskingPrice DESC
```

5) A sport 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 4 shows the structure of the relations in the database.

Figure 4

Facility (FacilityID, Description, MaxPeople, PricePerHour)

FacilityForSport (Sport, FacilityID)

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

Customer (CustomerID, Forename, Surname, EmailAddress)

a) Write an SQL statement to create the Facility table specified in **Figure 4**, including the primary key.

[3 marks]

```
CREATE TABLE Facility (
FacilityID INT PRIMARY KEY,
Description VARCHAR(100),
MaxPeople INT,
PricePerHour REAL)
```

b) A customer wants to book a facility that is suitable for playing basketball on the 15/06/2025 between 13:15 and 15:15

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]

```
SELECT FacilityID, StartTime, EndTime
FROM FacilityForSport
INNER JOIN Booking
ON Booking.FacilityID = FacilityForSport.FacilityID
WHERE Sport = “Basketball”
AND BookingDate = “15/06/2025”
AND (StartTime <= “13:15” AND EndTime >= “15:15”
    OR StartTime >= “13:15” AND StartTime <=”15:15”
    OR EndTime >= “13:15” AND EndTime <= “15:15”)
```

6) A network of zoos uses a relational database system to store information about the animals that they have so that they can be matched up with animals at other zoos in a breeding programme.

Figure 5 shows the structure of the relations in the database.

Figure 5

Zoo (ZooName, Town, Country)

AnimalLocation (AnimalID, ZooName, DateArrived, DateLeft)

Animal (AnimalID, IndividualName, Species, DataOfBirth, Sex)

Match (AnimalFemaleID, AnimalMaleID, DateOfMatch, Successful)

- The AnimalLocation relation identifies which zoos each animal has lived at. The zoo that the animal is currently at can be identified because the DateLeft attribute is set to 01/01/0001 to indicate that the animal has not left.
- The Match relation stores details of matches that have been made. The attributes AnimalFemaleID and AnimalMaleID refer to the AnimalID values of the two matched animals in the Animal relation.

a) Write an SQL statement to create the Animal relation, including the key field.

[3 marks]

```
CREATE TABLE Animal (
AnimalID INT PRIMARY KEY,
IndividualName VARCHAR(50),
Species VARCHAR(40),
DateOfBirth DATE,
Sex VARCHAR(6) )
```

b) There is a requirement to identify all the red pandas that were present at the zoo called 'Ashdale Park' at any time between 01/04/2025 and 31/05/2025, inclusive.

The animals might still be at the zoo or may have moved to another zoo.

Write a query that will list all the red pandas that were at the zoo on any day between these dates.

For each red panda on the list, the animal's individual name and the date that the animal arrives at the zoo, and other fields, should be listed.

[7 marks]

```
SELECT IndividualName, DateArrived
FROM Animal
INNER JOIN AnimalLocation
ON Animal.AnimalID = AnimalLocation.AnimalID
WHERE Species = "Red Panda"
AND ZooName = "Ashdale Park"
AND (DataArrived < "01/04/2025" AND DateLeft > "31/05/2025"
    OR DataArrived <=  "31/05/2025" AND DateLeft = "01/01/0001"
    OR DataArrived >=  "01/04/2025" AND DateArrived <=  "31/05/2025"
    OR DataLeft >= "01/04/2025" AND DateLeft <=  "31/05/2025"
```

7) A company operates a cinema which has three different screens. Each screen has a capacity determined by the number of seats the screen has.

On a particular day, there will be several showings of films in each of the screens. A screen might show the same film multiple times or it might show different films at different times of day.

Customers make bookings to go to the cinema. Each booking is for one specific showing of a film. A booking is for one or more seats, and the customer can select the individual seats that they want to book when they make the booking.

a) The cinema had to be closed on the 29th March 2025 so that some maintenance could take place.

The SQL query in **Figure 6** was written to delete all of the showings on this date. Some errors were made in the query.

Figure 6

```
DELETE FROM Showing, Film
WHERE ShowDate = 29/03/25
```

Describe **two** errors that have been made in the query. Do **not** refer to the use of semi-colons in your response.

[2 marks]

- **The Film table should not be included**
- **The date is missing quotation marks/delimiters**

b) Describe an issue that could arise in the database if a query to delete all of the showings that had been scheduled to take place on the 29th March 2025 was executed.

[2 marks]

- **There might already be bookings for a showing on this date**
- **The database would prevent the query from running as there would be records in the Bookings table that referenced showings that no longer existed**

8) 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 7 shows the structure of the relations in the database.

Figure 7

Product(ProductID, Description, QuantityInStock, SupplierID)

Sale(SaleID, CustomerID, SaleDate)

SaleLine(SaleID, ProductID, QuantitySold)

Customer(CustomerID, Forename, Surname, EmailAddress)

Supplier(SupplierID, SupplierName, SupplierEmail)

a) When a sale is made to a customer, three changes need to be made to the data in the database:

- a new record is created in the Sale table
- a new record is created in the SaleLine table for each different product that is part of the sale
- the records in the Product table are updated to reduce the QuantityInStock by the purchased quantity for each type of product that has been sold.

A sale is made on the 29/09/2024 to the Customer with CustomerID 48. The sale is for 3 of the products with ProductID 1. The sale is to be given the SaleID 4072.

Write an SQL query that will create the new record for sale 4072 in the Sale table.

[2 marks]

```
INSERT INTO Sale
VALUES (4072, 48, "29/09/2024")
```

b) Write an SQL query that will update the QuantityInStock of the product with ProductID 1 when this sale is made. The value 3 should be subtracted from the current quantity in stock.

[3 marks]

```
UPDATE Product
SET QuantityInStock = QuantityInStock – 3
WHERE ProductID = 1
```

9) A school stores information about its sports day in a relational database.

Figure 9 shows the structure of the relations in the database.

Figure 9

Athlete (AthleteNumber, Forename, Surname, Class, Gender, DateOfBirth)

Race (RaceNumber, Gender, Distance, Type, StartTime)

RaceEntryAndResult (RaceNumber, AthleteNumber, TimeSet)

Each athlete who takes part in a race is given a unique AthleteNumber. Athletes can run in more than one race. If they do, they keep the same AthleteNumber for the entire day.

Many races are run throughout the day. An example race would be the boys 80m hurdles, the third race of the day, which starts at 13:30.

When an athlete is entered into a race, a record of the entry is created in the RaceEntryAndResult table. Initially, the TimeSet is recorded as 00:00.00 (meaning 0 minutes, 0 seconds, 0 hundredths of a second) to indicate that the race has not yet been run. After the race has been run, if the athlete successfully completes it, then their TimeSet value is updated to record the time that they achieved in minutes, seconds and hundredths of a second. The TimeSet value remains at 00:00.00 for athletes who fail to complete the race.

a) Athlete number 27 is to be entered into race number 6.

Write the SQL commands that are required to make this entry.

[2 marks]

```
INSERT INTO RaceEntryAndResult
VALUES (6,27,"00:00.00")
```

b) Athlete number 27 sets a time of 0:18.76 (0 minutes, 18 seconds, 76 hundredths of a second) for race number 6.

Write the SQL commands that are required to update the athlete's entry for this race, to store this time in the TimeSet field.

[3 marks]

```
UPDATE RaceEntryAndResult
SET TimeSet = "00:18.76"
WHERE AthleteNumber = 27 AND RaceNumber = 6
```

c) The competition organisers want to produce a list of all of the athletes who took part in race number 6 with the athlete who won (set the lowest time) at the top and the other athletes below the winner in the order in which they finished.

Only athletes who finished the race should be included in the list.
The following information should appear for each athlete: AthleteNumber, Forename, Surname and TimeSet.

Write an SQL query to produce the list.

[5 marks]

```
SELECT AthleteNumber, Forename, Surname, TimeSet
FROM Athlete
INNER JOIN RaceEntryAndResult
ON Athlete.AthleteNumber = RaceEntryAndResult.AthleteNumber
WHERE RaceNumber = 6
AND TimeSet <> "00:00.00"
ORDER BY TimeSet
```