5 A company builds and sells furniture to customers. The company stores data about customers, their payment cards and their furniture orders in a database.

The database, FURNITURE, has the following tables:

CUSTOMER (CustomerID, Name, Phone)

CUSTOMER_CARD_DATA (CardID, CustomerID, CardType, CardNumber, EndDate)

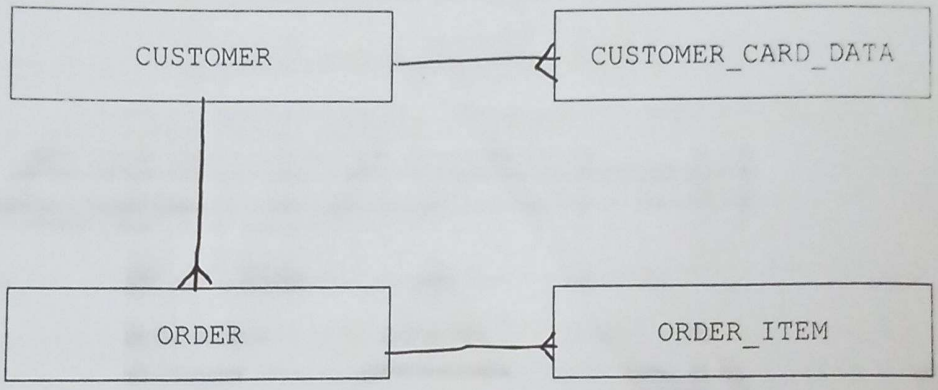
ORDER (OrderID, CustomerID, TotalCost, Paid, OrderDate, Complete)

ORDER_ITEM (OrderItemID, OrderID, Type, Height, Width, Depth, Details)

The primary keys are underlined in each table.

The attribute Complete in the table ORDER stores the Boolean value TRUE if the order has been built and FALSE if the order has not been built.

(a) Complete the entity-relationship (E-R) diagram for the database.



[3]

(b) Identify **one** attribute in the table CUSTOMER_CARD_DATA that could be a candidate key.

Customer Card Number [1]

(c) Identify **two** tables in the database that contain one or more foreign keys.
Give **one** attribute that is a foreign key in each table.

	Table	Foreign key
1	Order_Item	Order ID
2	CUSTOMER_CARD_DATA	~~Card ID~~ CustomerID

[2]

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(d) Explain the reasons why the data in the table ORDER_ITEM cannot be stored in the table ORDER

It is because of repeated groups of attributes in order table. Each order would only be able to have one item in the table

[3]

(e) Write an Structured Query Language (SQL) script to output the customer ID, the customer's name and the total cost of the customer's orders that have **not** been paid.

The output of the total cost must have an appropriate title.

```
SELECT CUSTOMER (customer.ID, Name, SUM (TOTAL(cost) AS Total Unpaid
FROM CUSTOMER
INNER JOIN ORDER
ON CUSTOMER (customerID = ORDER (customer ID
WHERE Paid = ~~TRUE~~ FALSE
~~GROUP~~ GROUP BY
```

[4]

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Question No. 2 [Sir Aaqib Khan]

[May / June - 2025 / Paper - 12 / Question No 5]

5 An online game has a database that stores data about users and the characters each user creates in the game. Each user can create multiple characters and purchase multiple items for each character.

The normalised database has the following design:

USER(Username, Password, DateOfBirth)

CHARACTER(CharacterName, CharacterID, Username, Level, Money)

ITEM(ItemName, MinimumLevel, Cost)

CHARACTER_ITEM(CharacterID, ItemName)

(a) Explain the purpose of the table CHARACTER_ITEM in the database.

It stores character ID of characters created in the game and helps to identify the specific character that has been created multiple times or not. [2]

(b) Underline the attribute, or attributes, that form the primary key in each of the tables.

USER(Username, Password, DateOfBirth)

CHARACTER(CharacterName, CharacterID, Username, Level, Money)

ITEM(ItemName, MinimumLevel, Cost)

CHARACTER_ITEM(CharacterID, ItemName)

[2]

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(c) A Database Management System (DBMS) provides data security.

(i) Identify **two** methods the DBMS can use to protect the data in the table USER from unauthorised access.

Explain how each method protects the data.

Method 1 Views

Explanation Users can be given a view to the database that does not include the data in the table USER.

Method 2 Encryption

Explanation The DBMS encrypts the data stored in the user table even if an authorised user gains physical access to storage.

[4]

(ii) The DBMS also supports data integrity.

Give **two** ways that a DBMS can support data integrity.

1 cascade update

2 validation

[2]

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(d) (i) Write a Structured Query Language (SQL) script to count the number of items purchased by the user with the username "KAT123".

```
SELECT COUNT (ItemName)
FROM CHARACTER_ITEM, CHARACTER
WHERE CHARACTER.CharacterID = CHARACTER_ITEM.CharacterID
AND CHARACTER.UserName = "KAT123"
```

[3]

(ii) The following changes need to be made to the character with the ID "0002":

- level changed to 3
- money changed to 10000.00

Write an SQL script to change the character's data.

```
UPDATE CHARACTER
SET Level = 3, Money = 10000.00
WHERE CharacterID = "0002"
```

[3]

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Question No. 3 [Sir Aaqib Khan]

[May / June - 2025 / Paper - 13 / Question No 6]

6 A shop sells pens to customers. Customers place an order with the shop and collect the items the next day. The shop uses a database to store the information about the orders.

The database contains the following tables:

CUSTOMER(CustomerID, CustomerName, Email)

ORDER(OrderID, CustomerID, Date, Collected)

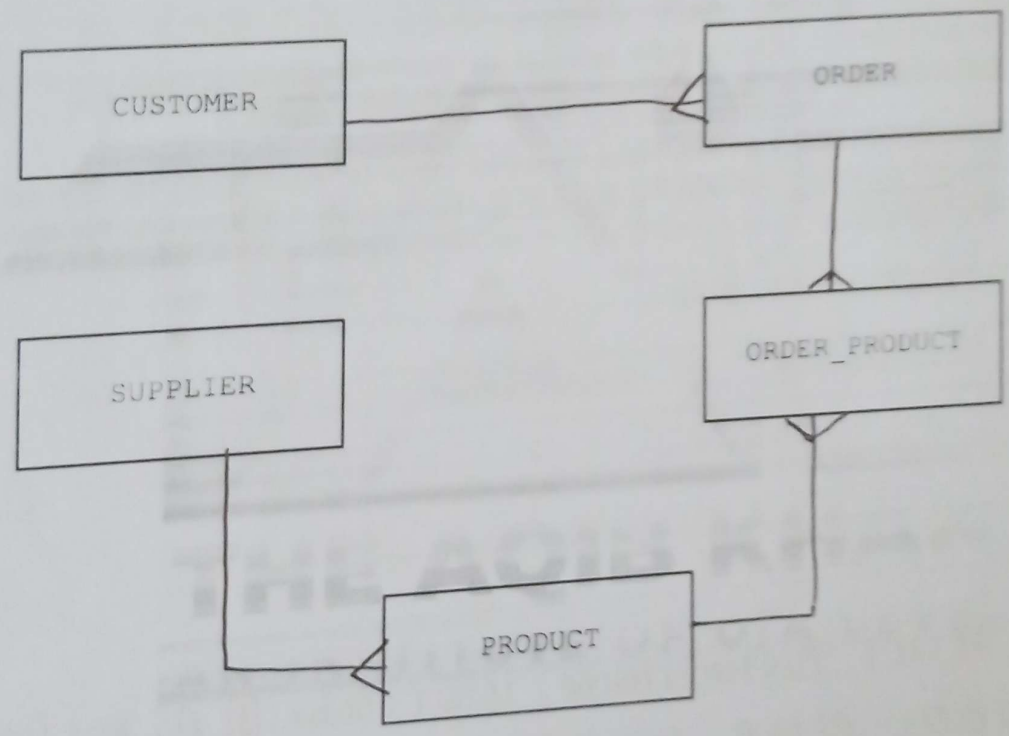
ORDER_PRODUCT(OrderID, ProductID, Quantity)

PRODUCT(ProductID, ProductName, QuantityInBox, Cost, SupplierID)

SUPPLIER(SupplierID, SupplierName, SupplierEmail)

The primary keys are underlined.

(a) Complete the entity-relationship (E-R) diagram for the database.



[4]

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(b) A new product needs to be entered into the database. The product has the ID 0223, the product name 'Blue ball point 2mm', there are 50 in a box, the product costs $5.00 and the supplier has the ID SF223

Write a Structured Query Language (SQL) script to enter the new product into the table PRODUCT.

```
INSERT INTO PRODUCT
VALUES ("0223","Blue ball point 2mm",50,5.00,"SF223");
```

[4]

(c) The attribute Collected in the table ORDER stores the Boolean value TRUE if the order has been collected and FALSE if the order has not been collected.

Write an SQL script to return the customer name for each customer that has orders they have not collected. Include the number of orders each customer has not collected with an appropriate title.

An example output might be:

CustomerName	NotCollected
Jack Wright	2
Lin Cho	1
Santaya Yui	1

```
SELECT CustomerName, COUNT(OrderID) AS NotCollected
FROM ORDER, CUSTOMER
WHERE ORDER.CustomerID = CUSTOMER.CustomerID
AND Collected = FALSE
GROUP BY CUSTOMER.CustomerID
```

[4]

(d) The shop uses a Database Management System (DBMS).

(i) One feature provided by a DBMS is a data dictionary.

The data dictionary stores the attribute names, table names, foreign keys and primary keys in the database.

Identify **three** other items stored in a data dictionary.

1 Relationships

2 Views

3 Data types

[3]

(ii) The DBMS provides a developer interface.

Explain how a database designer can make use of the developer interface.

To modify the database objects and to create a form for data input. Add tools to form for eg drop down boxes.

[3]

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Question No. 4 [Sir Aaqib Khan]

[Oct / Nov - 2025 / Paper - 11 / Question No 2]

2 A relational database, WORKEXPERIENCE, stores data about students and the companies where they complete work experience.

Students can complete multiple work experience placements but can only complete one placement at a time.

Students can complete more than one placement at the same company.

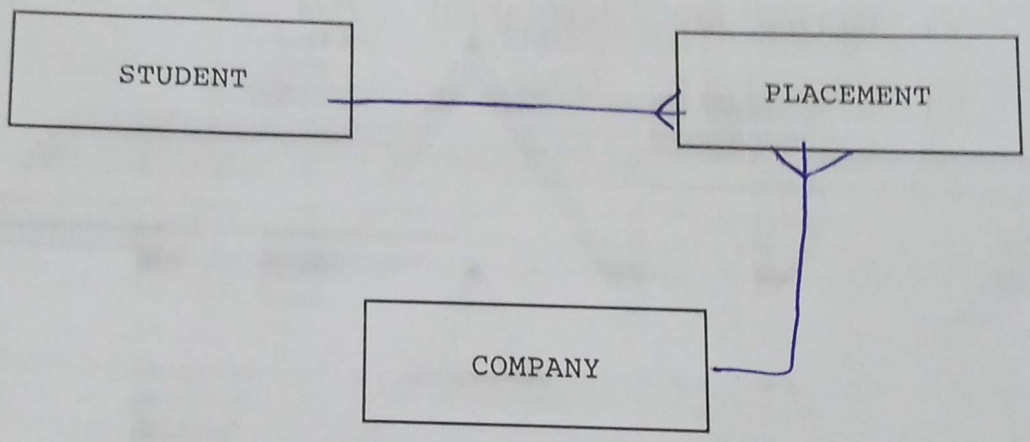
Part of the database is shown:

STUDENT (StudentID, FirstName, TelephoneNumber, UniversityName)

PLACEMENT (PlacementID, StudentID, CompanyID, StartDate, EndDate, Complete)

COMPANY (CompanyID, CompanyName, MaxStudentsPerPlacement)

(a) Complete the entity-relationship (E-R) diagram for the database WORKEXPERIENCE.



[2]

(b) Explain why the database WORKEXPERIENCE is in Third Normal Form (3NF).

It is in 3NF because there is no transitive dependencies and Non key attributes.

[2]

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(c) Some example data from the PLACEMENT table is shown:

PlacementID	StudentID	CompanyID	StartDate	EndDate	Complete
PC001	LDEA01	MSCM	01/01/2023	12/07/2023	TRUE
PC002	LDEA01	MSCM	01/04/2024	08/05/2024	FALSE
PC003	ALAU02	NEAM	09/03/2020	10/03/2021	FALSE
PC004	LOLI75	GOUZ	07/06/2018	11/09/2018	TRUE

(i) Write a Structured Query Language (SQL) script to delete all placements that have been completed.

```
DELETE FROM PLACEMENT
WHERE Complete = TRUE;
```

[2]

(ii) Write an SQL script to return the total number (Count) of placements completed by the student with ID LDEA01 at the company with ID NEAM. The total should be given an appropriate name.

```
SELECT COUNT(CompanyID) AS TotalPlacement
FROM PLACEMENT
WHERE CompanyID = NEAM
AND StudentID = LDEA01
AND Complete = TRUE;
```

[4]

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(d) The database tables are repeated here:

STUDENT(StudentID, FirstName, TelephoneNumber, UniversityName)

PLACEMENT(PlacementID, StudentID, CompanyID, StartDate, EndDate, Complete)

COMPANY(CompanyID, CompanyName, MaxStudentsPerPlacement)

Explain what is meant by referential integrity, and how it applies to this database.

Referential integrity ensures that related data is consistent.

Referential integrity provides for cascading update or deletes.

Example: company I.D is Fk in placement Table and is depend on Pk in company Table. [3]

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Question No. 5 [Sir Aaqib Khan]

[Oct / Nov - 2025 / Paper - 12 / Question No 4]

4 A relational database, SHIPPING, stores data about the ships in a company and the containers that are carried on the ships.

The database has the following tables:

CONTAINER(ContainerID, Type, Weight, OwnerName, ShipID)

SHIP(ShipID, Type, Capacity, ShipName)

(a) Describe the relationship between the two tables. Refer to the primary and foreign keys in your answer.

Primary key shipID in shipTable is linked to foreign key in container table.
One to many relationship between container and ship Table. [2]

(b) The table CONTAINER needs an additional field to store the data for the last inspection date.

Write a Structured Query Language (SQL) script to add **one** field to the table CONTAINER to store the date of last inspection of the container, for example 08/07/2019.

```
ALTER TABLE CONTAINER
ADD Inspection Date DATE;
```

[2]

(c) Write an SQL script to return the number of containers stored in the database for the ship with the name Caledonia.

```
SELECT COUNT( containerID)
FROM CONTAINER INNER JOIN SHIP
    ON CONTAINER.shipID = SHIP.ShipID
WHERE ShipName = "Caledonia"
```

[4]

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(d) Describe the purpose of a developer interface in a Database Management System (DBMS).

- Allow user to count or modify table
- Run different SQL Queries
- Allow user to design report

[2]

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Question No. 6 [Sir Aaqib Khan]

[Oct / Nov - 2025 / Paper - 13 / Question No 5]

5 A company creates a relational database to store data about its customers.

The database, REVIEWS, stores data about the customers, products, complaints and staff.

The database has four tables:

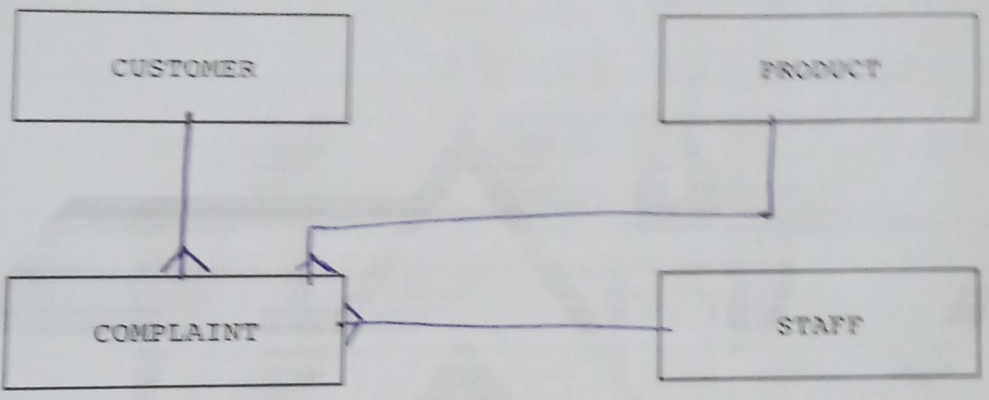
CUSTOMER (CustomerID, CustomerFirstName, CustomerLastName, CustomerEmail)

PRODUCT (ProductID, ProductName, ProductDetail, Price, Rating)

COMPLAINT (ComplaintID, ProductID, CustomerID, ComplaintDetails, StaffID)

STAFF (StaffID, StaffFirstName, StaffLastName, Department, RemoteWorker)

(a) Complete the entity-relationship (E-R) diagram for the database REVIEWS.



[3]

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(b) Some example data from the STAFF table is shown.

StaffID	StaffFirstName	StaffLastName	Department	RemoteWorker
1	Ralph	Jura	E	Yes
2	Luca	Emcee	A	Yes
3	Darwin	Acula	F	No

Write a Structured Query Language (SQL) script to define the table STAFF.

```
CREATE TABLE STAFF (
StaffID INTEGER NOT NULL PRIMARY KEY,
StaffFirstName VARCHAR,
StaffLastName VARCHAR,
Department CHAR,
RemoteWorker BOOLEAN
);
```

[4]

(c) Products are given a rating between 1 and 10 inclusive.

Write an SQL script to return only the ProductID, ProductName and ComplaintDetails for all products with a rating of 5 or less. The results need to be displayed in descending order of rating.

```
SELECT PRODUCT.ProductID, ProductName, ComplaintDetails
FROM PRODUCT, COMPLAINT
WHERE PRODUCT.ProductID = COMPLAINT.ProductID
AND Rating <= 5
ORDER BY Rating DESC;
```

[5]

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(d) A Database Management System (DBMS) is used to maintain and manage the database.

Describe **two** ways in which the DBMS can be used to ensure the security of the customer data.

1 Regular backups can be scheduled so that a second copy of the customer's data is available in case of loss data.

2 The data can be encrypted so that the customer's data cannot be understood by anyone.

[4]

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