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AS - Computer Science 9618
Sir Aaqib Khan
Paper - 1

Topic: P1- Chapter | 8 Database

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Class:

Question No. 1 [Sir Aaqib Khan]

[May / June - 2025 / Paper - 11 / Question No 5]

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)

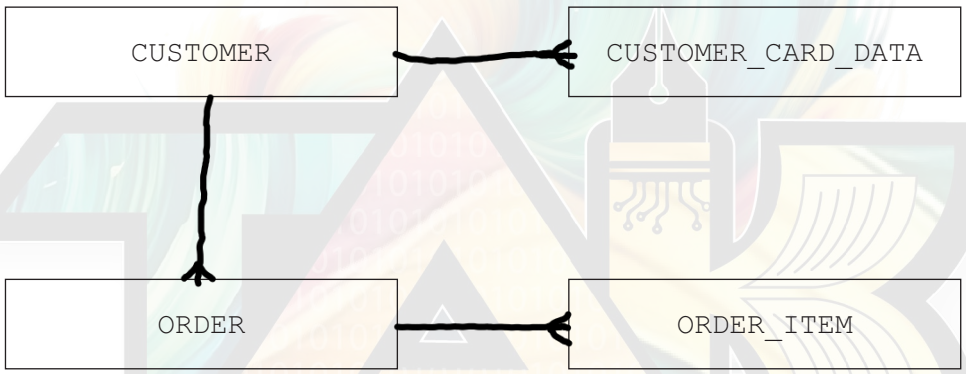
ORDER(OrderID, CustomerID, TotalCost, Paid, OrderDate, Complete)

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 ID ..... [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	customer data type	customer ID
2	order item	order ID

[2]

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

order item contains line-item details for each order. which have a many to many relationship with the order table. storing order item data in the order table is not possible

[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 ID, Customer name, Sum,
From,
    Customer,
Join,
    order on customer ID = customer ID,
Join,
    order Item on order ID = order ID,
where,
    Payment status = unpaid
group by
    customer ID, customer name,
```

[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 that a specific character has been created multiple times or not, Item name stores the name of items purchased for a character multiple times [2] Or once

(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 authentication & access control

Explanation The DBMS requires user to log in with credentials and enforces access privileges.

Method 2 encryption

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

[4]

(ii) The DBMS also supports data integrity.

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

1 enforcing constraints, implement Primary key, foreign Key and e.t.c.

2 transaction management in which data consistency is maintained.

[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(itemID) = total_items_Purchased,
FROM,
    Purchases,
WHERE,
    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
    Characters
SET
    level = 3, money = 10000.00
WHERE
    ID = 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)

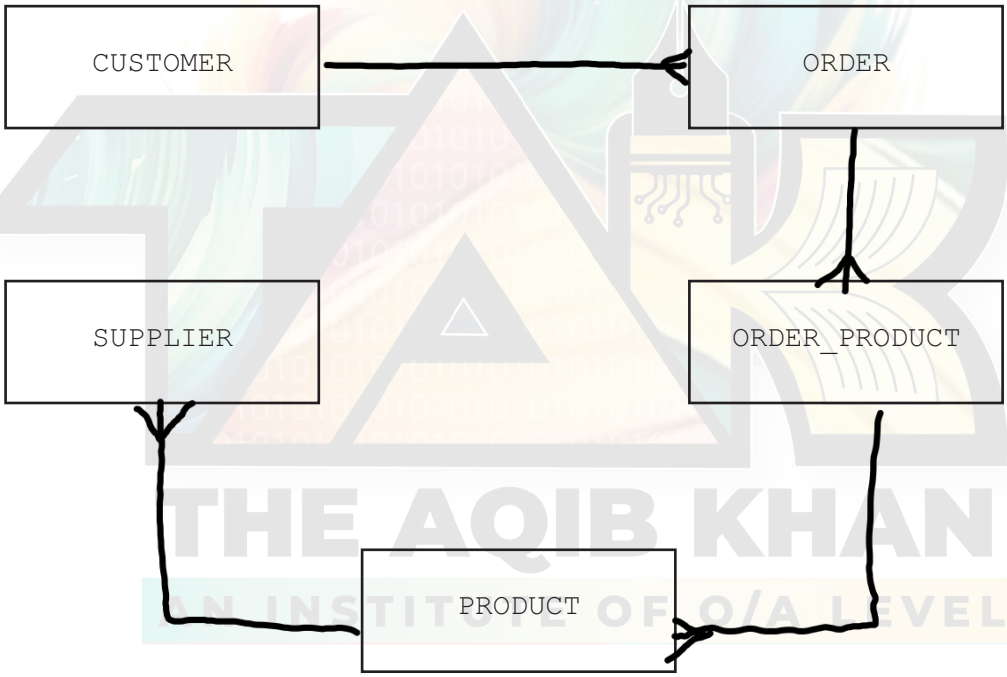
ORDER_PRODUCT(OrderID, ProductID, Quantity)

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 002323, the product name 'Blue ball point 2mm', there are 50 in a box, the product costs $5.00 and the supplier has the ID SFX223.

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

```
INSERT INTO
    Product(ProductID, Product_name, quantity_per_box,
    cost, SupplierID),
VALUES
    ("002323",'Blue ball point 2mm',50,5.00,'SFX223')
```

[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,
    customer_Name, count(), Not_collected,
FROM,
    order,
WHERE,
    collected = false,
GROUP BY,
    customer_name,
ORDER BY, not collected,
```

[4]

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(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 Data types

2 constraints

3 Relationship

[3]

(ii) The DBMS provides a developer interface.

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

Query development: It Provides tools for writing, testing and optimized SQL queries to ensure efficient data retrieval and manipulation. Performance tuning helps designer to analyze query execution Plans, monitor Performance and apply Optimization. [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.

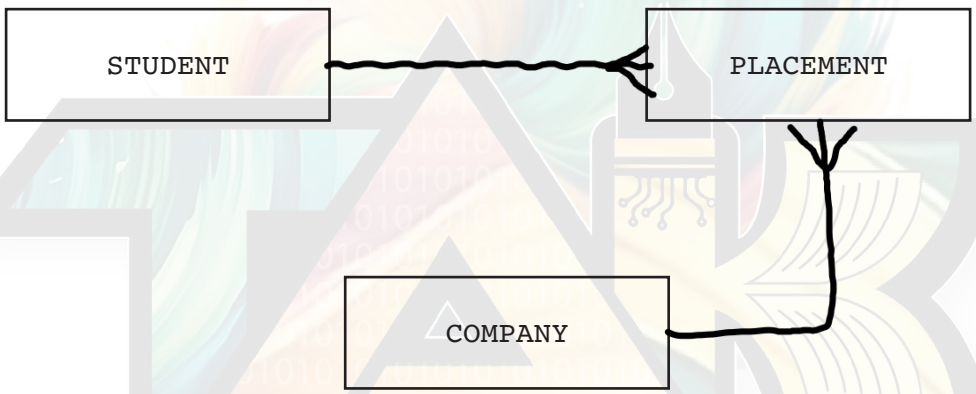
Part of the database is shown:

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 in 3NF because there is no trahsitive 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 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*
FROM
  Placement
WHERE
  StudentID = 'LDEA01' and companyID = Neam 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 means that relationships between tables must be consistent. In this database: every student ID in Placement exists in student and every company ID in Placement exists in Company. This prevents orphaned records and maintains data consistency.

..... [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.

The relationship between the two tables is a one to many relationship. The Primary key in tables (ship: shipID, container: containerID). The container table has a foreign key shipID in the 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 lastinspectiondate, 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 *
FROM
    Container
JOIN SHIP ON CONTAINER
        shipID = ship, ship ID,
WHERE
    Ship, Shipname = caledonia
```

[4]

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

(1) Interact with database: Allows developers to query, insert, update and delete data.

(2) design and manage database: Provides tools for creating, modifying and optimize database structure. [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:

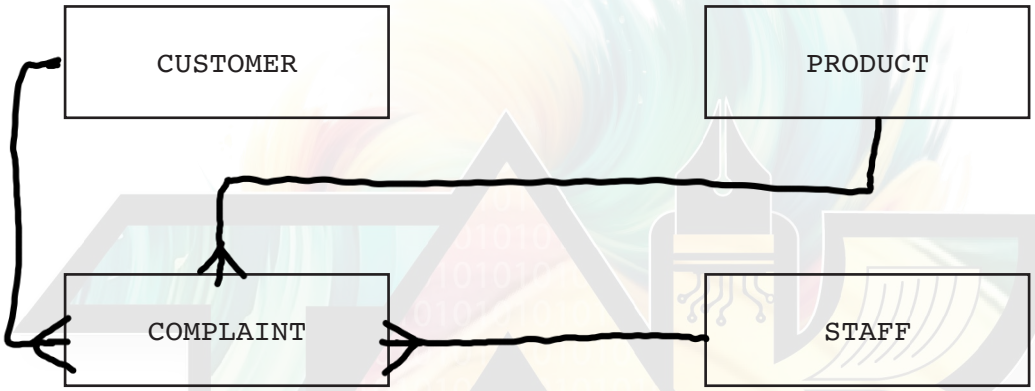
CUSTOMER(CustomerID, CustomerFirstName, CustomerLastName, CustomerEmail)

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(
Staff ID : Primary key,
Staff first name: varchar (50),
Staff last name: varchar (50),
Department: char(1),
Remote worker : varchar (3)),
```

[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
    Produd ID, Product name, complaint Details,
FROM
    Products
WHERE
    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 authentication & access control

The DBMS requires user to log in with credentials and enforces access privileges.

2 encryption

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

[4]

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