

**\*Question 1\***

Create database Bookshop;

Create table Publisher

PublisherID int Primary key not null,

PublisherName varchar(50),

Address varchar(50)

};

Create table Author

AuthorID int Primary key not null,

AuthorName varchar

(50),

Gender varchar(10),

BirthDate date,

Country varchar(50)

};

Create table Book

ISBN int Primary key not null,

AuthorID int Foreign key references Author(AuthorID),

PublisherID int,

PublishDate date,

BookTitle varchar(50)

};

Primary Keys:

Publisher: PublisherID

Author: AuthorID

Book: ISBN



Foreign Keys:

Author: AuthorID (References AuthorID in Author table)

Book: PublisherID, AuthorID (References PublisherID and AuthorID in Publisher and Author table respectively)

Insert into Publisher

Values(1, "Harper Collins", "New York, USA"),

Values(2, "Penguin Books", "London, UK"),

Values(3, "Hachette Books", "Paris, France"),

Values(4, "Simon & Schuster", "Berlin, Germany"),

Values(5, "Random House", "Moscow, Russia");

Insert into Author

Values(1, "John Doe", "Male", "01/01/1970", "USA"),

Values(2, "Jane Smith", "Female", "02/02/1980", "Canada"),

Values(3, "Michael Johnson", "Male", "03/03/1990", "UK"),

Values(4, "Jennifer Williams", "Female", "04/04/2000", "France"),

Values(5, "David Brown", "Male", "05/05/2010", "Germany");

Insert into Book

Values(123456789, 1, 1, "01/01/2010", "The Great Gatsby"),

Values(987654321, 2, 2, "02/02/2020", "The Catcher in the Rye"),

Values(147258369, 3, 3, "03/03/2030", "To Kill a Mockingbird"),

Values(369258147, 4, 4, "04/04/2040", "The Lord of the Rings"),

Values(258147936, 5, 5, "05/05/2050", "The Hunger Games");

\*Question 2\*

Relational Model:

CUSTOMER (Cust\_ID (PK), Name, Gender, Contact\_No, Address, Cust\_Type)



ACCOUNT (Acct\_ID (PK), Cust\_ID (FK), Acct\_Type, Acct\_Balance)

TRANSACTION (Tran\_ID (PK), Acct\_ID (FK), Tran\_Date, Amount\_Withdrawn, Amount\_Deposited)

PRODUCT (Product\_ID (PK), Product\_Name, Product\_Desc, Product\_Category)

CUSTOMER\_PRODUCT (Cust\_ID (FK), Product\_ID (FK))

**\*Question 3\***

Possible candidate keys for this current state of relation R are:

{A}, {B}, {C}, {D}, {A, B}, {A, C}, {A, D}, {B, C}, {B, D}, {C, D}, {A, B, C}, {A, B, D}, {A, C, D}, {B, C, D}, {A, B, C, D}.

**\*Question 4\***

1. For INSERT operation:

a. INSERT INTO Product VALUES (null, 'Chicken Nuggets', 120, 100);  
Successfully carried out. No constraints violated.

Changes made: The Product table will contain a new record - (null, Chicken Nuggets, 120, 100).

b. INSERT INTO Production VALUES (1, '1-2001', 300, '01-Feb-2021', '01-Feb-2022');  
Successfully carried out. No constraints violated.

Changes made: The Production table will contain a new record - (1, 1-2001, 300, 01-Feb-2021, 01-Feb-2022).

c. INSERT INTO Production VALUES (1, null, 300, '01-Feb-2021', '01-Feb-2022');  
Not successfully carried out. Violates the NOT NULL constraint on the BatchNo field.

d. INSERT INTO Customer VALUES (1, 'Packages', 'DHA', '042-31234567');



Not successfully carried out. Violates the PRIMARY KEY constraint on the CustomerID field.

e. INSERT INTO Order VALUES (5, 10, 1, '09-Feb-2021');

Not successfully carried out. Violates the FOREIGN KEY constraint on the CustomerID field.

2. For DELETE operation - Assume that foreign key with CASCADE option is implemented.

a. DELETE FROM Product WHERE ProductID=2;

Successfully carried out. No constraints violated.

Changes made: The Product table will no longer contain record with ProductID=2.

The Production table will no longer contain any record with ProductID=2. The

Order table will no longer contain any record with ProductID=2.

b. DELETE FROM Customer WHERE CustomerID=1;

Successfully carried out. No constraints violated.

Changes made: The Customer table will no longer contain record with

CustomerID=1. The Order table will no longer contain any record with

CustomerID=1.

c. DELETE FROM Production WHERE BatchID='1-1002';

Successfully carried out. No constraints violated.

Changes made: The Production table will no longer contain record with BatchID=1-1002.

d. DELETE FROM Order WHERE CustomerID=1 OR ProductID=1;

Successfully carried out. No constraints violated.

Changes made: The Order table will no longer contain any record with

CustomerID=1 or ProductID=1.

e. DELETE FROM Order WHERE OrderNo=4;



Not successfully carried out. Violates the PRIMARY KEY constraint on the OrderNo field.

3. For DELETE operation - Assume that foreign key with SET NULL option is implemented.

a. DELETE FROM Product WHERE ProductID=2;  
Successfully carried out. No constraints violated.

Changes made: The Product table will no longer contain record with ProductID=2. The Production table will no longer contain any record with ProductID=2. The Order table will no longer contain any record with ProductID=2 and the foreign key ProductID will be set to NULL.

b. DELETE FROM Customer WHERE CustomerID=1;  
Successfully carried out. No constraints violated.

Changes made: The Customer table will no longer contain record with CustomerID=1. The Order table will no longer contain any record with CustomerID=1 and the foreign key CustomerID will be set to NULL.

c. DELETE FROM Production WHERE BatchID='1-1002';  
Successfully carried out. No constraints violated.

Changes made: The Production table will no longer contain record with BatchID=1-1002.

d. DELETE FROM Order WHERE CustomerID=1 OR ProductID=1;  
Successfully carried out. No constraints violated.

Changes made: The Order table will no longer contain any record with CustomerID=1 or ProductID=1 and the foreign keys CustomerID and ProductID will be set to NULL.

e. DELETE FROM Order WHERE OrderNo=4;

Not successfully carried out. Violates the PRIMARY KEY constraint on the OrderNo field.



4. For DELETE operation - Assume that foreign key with NO ACTION option is implemented.

a. DELETE FROM Product WHERE ProductID=2,  
Successfully carried out. No constraints violated.

Changes made: The Product table will no longer contain record with ProductID=2.  
The Production table will no longer contain any record with ProductID=2. The  
Order table will no longer contain any record with ProductID=2.

b. DELETE FROM Customer WHERE CustomerID=1,  
Successfully carried out. No constraints violated.

Changes made: The Customer table will no longer contain record with  
CustomerID=1. The Order table will no longer contain any record with  
CustomerID=1.

c. DELETE FROM Production WHERE BatchID='1-1002';  
Successfully carried out. No constraints violated.

Changes made: The Production table will no longer contain record with BatchID=1-  
1002.

d. DELETE FROM Order WHERE CustomerID=1 OR ProductID=1,  
Not successfully carried out. Violates the FOREIGN KEY constraint on the  
CustomerID and ProductID fields.

e. DELETE FROM Order WHERE OrderNo=4;  
Not successfully carried out. Violates the PRIMARY KEY constraint on the  
OrderNo field.

5. For UPDATE operation - Assume that foreign key with CASCADE option is implemented.

a. UPDATE Order SET CustomerID=10 WHERE CustomerID=2,  
Successfully carried out. No constraints violated.

Changes made: The CustomerID field on all records in the Order table with



customerID=2 will be changed to 10.

b. UPDATE Product SET ProductID=21 WHERE ProductID=3;

Not successfully carried out. Violates the PRIMARY KEY constraint on the ProductID field.

c. UPDATE Order SET OrderDate= null WHERE ProductID=1;

Successfully carried out. No constraints violated.

Changes made: The OrderDate field on all records in the Order table with ProductID=1 will be set to NULL.

d. UPDATE Production SET customerID=1 WHERE BatchID='1-1002';

Not successfully carried out. Violates the FOREIGN KEY constraint on the customerID field.

e. UPDATE Production SET BatchNo= null WHERE UnitsProduced=6000;

Successfully carried out. No constraints violated.

Changes made: The BatchNo field on all records in the Production table with UnitsProduced=6000 will be set to NULL.

b. For UPDATE operation - Assume that foreign key with SET NULL option is implemented.

a. UPDATE Order SET customerID=10 WHERE customerID=2;

Successfully carried out. No constraints violated.

Changes made: The customerID field on all records in the Order table with customerID=2 will be changed to 10 and the foreign key customerID will be set to NULL.

b. UPDATE Product SET ProductID=21 WHERE ProductID=3;

Not successfully carried out. Violates the PRIMARY KEY constraint on the ProductID field.



c. UPDATE Order SET OrderDate= null WHERE ProductID=1;  
Successfully carried out. No constraints violated.

Changes made: The OrderDate field on all records in the Order table with ProductID=1 will be set to NULL and the foreign key ProductID will be set to NULL.

d. UPDATE Production SET CustomerID=1 WHERE BatchID=1-1002;  
Not successfully carried out. Violates the FOREIGN KEY constraint on the CustomerID field.

e. UPDATE Production SET BatchNo= null WHERE UnitsProduced=6000;  
Successfully carried out. No constraints violated.  
Changes made: The BatchNo field on all records in the Production table with UnitsProduced=6000 will be set to NULL.

7. For UPDATE operation - Assume that foreign key with NO ACTION option is implemented.

a. UPDATE Order SET CustomerID=10 WHERE CustomerID=2;  
Successfully carried out. No constraints violated.  
Changes made: The CustomerID field on all records in the Order table with CustomerID=2 will be changed to 10.

b. UPDATE Product SET ProductID=21 WHERE ProductID=3;  
Not successfully carried out. Violates the PRIMARY KEY constraint on the ProductID field.

c. UPDATE Order SET OrderDate= null WHERE ProductID=1;  
Successfully carried out. No constraints violated.  
Changes made: The OrderDate field on all records in the Order table with ProductID=1 will be set to NULL.

d. UPDATE Production SET CustomerID=1 WHERE BatchID=1-1002;



Not successfully carried out. Violates the FOREIGN KEY constraint on the customerID field.

e. UPDATE Production SET BatchNo= null WHERE UnitsProduced=6000;  
Successfully carried out. No constraints violated.

Changes made: The BatchNo field.

### \*Question 5\*

Date Formats:

- YYYY-MM-DD (ISO 8601, e.g. 2020-02-11)
- DD/MM/YYYY (e.g. 11/02/2020)
- DD-MON-YYYY (e.g. 11-FEB-2020)
- MON DD, YYYY (e.g. FEB 11, 2020)

Time Formats:

- HH:MM:SS (e.g. 12:30:15)
- HH:MM:SS AM/PM (e.g. 12:30:15 PM)

Date and Time Functions:

- CURRENT\_DATE - Returns the current date
- CURRENT\_TIME - Returns the current time
- CURRENT\_TIMESTAMP - Returns the current date and time
- EXTRACT - Extracts specific parts of a date
- DATE\_ADD - Adds an interval to a date

### \*Question 6\*

-> A composite primary key is a combination of two or more columns in a table used to uniquely identify each row in a table. For example, a table might have two columns, "Name" and "Date of Birth". Together, those two columns can be used to



create a unique identifier for any row in the table.

->A composite foreign key is a combination of two or more columns in a table used to reference a primary key in another table. For example, a table of orders might have columns for "Product ID" and "Supplier ID". Together, these two columns can be used to reference the primary key of a "Suppliers" table, which might have its own primary key composed of the "Supplier ID" and "Country of Origin".