National University of Computer and Emerging Sciences, Lahore Campus

Course:	**Database Systems**	**Course Code:**	**CS219**
Program:	**BS (Computer Science)**	**Semester:**	**Spring 2021**
Out Date:	**24-Mar-2021**	**Total Marks:**	
Due Date:	**Tue 30-Mar-2021**	**Weight:**	
Section	**BCS-4A & BCS-4B**	**Page(s):**	**3**
Assignment:	**1 (Relational Model)**		

Instructions:

- This assignment is an individual assignment.
- Clearly mention any assumption you have made.
- Please upload your solution in PDF format with your 8 digit Roll No (19L-1234) as file name.

TOPIC: Relational Data Model

Q1. Consider the database of a book store, to keep the information of books

Publisher (PublisherID, PublisherName, Address)
Aurthor (AurthorID, AurtorName, Gender, BirthDate, Country)
Book (ISBN, AurthorID, PublisherID, PublishDate, BookTitle)

Identify the domain of each attribute, primary keys, and foreign keys for all the relations. Also populate each relation with at least 5 sample tuples so that none of the constraints is violated.

Q2. The following database holds information about a bank. Read all the statements carefully and draw a relational model for this. Identify the primary keys, foreign keys, and other constraints mentioned below:

1. Each bank customer has a valid customer id, name, gender, contact no and address.
2. There could be different types of customers like corporate, business or priority customers.
3. Bank is currently offering 2 types of account to its valuable customers (current and saving accounts) and plan to increase account types in future.
4. Each account has a customer id, unique account id, account type and current balance.
5. Transactions are also logged in the database with the unique transaction id, account id, transaction date and amount withdrawn or amount deposited.
6. Each customer can have only one account.
7. Bank also offers other products like personal loans and car loans.
8. Each product has a unique product id, product name and product description.
9. Each product has a certain product category. For example, loan category could be mortgage loan or personal loan.

Q3. Consider the following current state of the R relation. Specify all possible candidate keys (i.e. minimal super keys) for this current state of relation. You may assume that no future instances of this relation will violate the keys that can be inferred to hold in the current state.

R

A	B	C	D
a4	b1	c2	d1
a2	b2	c1	d1
a2	b2	c4	d2
a1	b4	c3	d1

Q4. Consider the following database. In this schema primary keys (PKs) are underline and *Production.productID, Order.productID, Order.customerID* are foreign keys (FKs).

Product

ProductID	ProductName	PricePerUnit	QuantityInStore
1	Chicken Cutlets	250	600
2	Chicken Tenders	300	500
3	Potato Fries	150	800

Production

ProductID	BatchNo	UnitsProduced	DateOfProduction	ExpiryDate
1	1-1001	1000	01-Feb-2021	01-Feb-2022
1	1-1002	6000	06-Feb-2021	06-Feb-2022
3	1-1002	1000	06-Jan-2021	06-Jan-2022
2	1-1026	2000	06-Jan-2021	06-Jan-2022

Customer

CustomerID	CustomerName	Address	ContactNo
1	Metro	Model Town	042-31234567
2	Jalal Sons	Gulberg	042-31234568
3	Rainbow	Bahria Town	042-31234569

Order

OrderNo	*CustomerID*	*ProductID*	OrderDate
1	1	3	01-Feb-2021
2	2	1	08-Feb-2021
3	1	1	01-Feb-2021

Apply following operations on the above database. State if the operation would be carried out successfully or not. In case of successful operation indicate the changes that will be made to the above database. Also state all the integrity constraints violated by each operation, if any. Please note that **all operations are independent**.

1. For INSERT Operation:

a. INSERT INTO Product VALUES (null, 'Chicken Nuggets', 120, 100);
b. INSERT INTO Production VALUES (1,'1-2001', 300, '01-Feb-2021', '01-Feb-2022');
c. INSERT INTO Production VALUES (1, null, 300, '01-Feb-2021', '01-Feb-2022');
d. INSERT INTO Customer VALUES (1,'Packages', 'DHA', '042-31234567');
e. INSERT INTO Order VALUES (5, 10, 1, '09-Feb-2021');

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

a. DELETE FROM Product WHERE ProductID=2;
b. DELETE FROM Customer WHERE CustomerID=1;
c. DELETE FROM Production WHERE BatchID='1-1002';
d. DELETE FROM Order WHERE CustomerID=1 OR ProductID=1;
e. DELETE FROM Order WHERE OrderNo=4;

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

a. DELETE FROM Product WHERE ProductID=2;
b. DELETE FROM Customer WHERE CustomerID=1;

c. DELETE FROM Production WHERE BatchID='1-1002';
d. DELETE FROM Order WHERE CustomerID=1 OR ProductID=1;
e. DELETE FROM Order WHERE OrderNo=4;

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

a. DELETE FROM Product WHERE ProductID=2;
b. DELETE FROM Customer WHERE CustomerID=1;
c. DELETE FROM Production WHERE BatchID='1-1002';
d. DELETE FROM Order WHERE CustomerID=1 OR ProductID=1;
e. DELETE FROM Order WHERE OrderNo=4;

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

a. UPDATE Order SET CustomerID=10 WHERE CustomerId=2;
b. UPDATE Product SET ProductID=21 WHERE ProductID=3;
c. UPDATE Order SET OrderDate= null WHERE ProductID=1;
d. UPDATE Production SET CustomerID=1 WHERE BatchID='1-1002';
e. UPDATE Production SET BatchNo= null WHERE UnitsProduced=6000;

6. For UPDATE Operation - Assume that foreign key with SET NULL option is implemented.

a. UPDATE Order SET CustomerID=10 WHERE CustomerId=2;
b. UPDATE Product SET ProductID=21 WHERE ProductID=3;
c. UPDATE Order SET OrderDate= null WHERE ProductID=1;
d. UPDATE Production SET CustomerID=1 WHERE BatchID='1-1002';
e. UPDATE Production SET BatchNo= null WHERE UnitsProduced=6000;

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

a. UPDATE Order SET CustomerID=10 WHERE CustomerId=2;
b. UPDATE Product SET ProductID=21 WHERE ProductID=3;
c. UPDATE Order SET OrderDate= null WHERE ProductID=1;
d. UPDATE Production SET CustomerID=1 WHERE BatchID='1-1002';
e. UPDATE Production SET BatchNo= null WHERE UnitsProduced=6000;