National University of Computer and Emerging Sciences, Lahore Campus

Course:	Database Systems		Course Code:	CS2005
Program:	BS(Software Engineering)		Semester:	Spring 2022
Duration:	15 Minutes		Total Marks:	10
Paper Date:	16-Mar-2021		Weight	-
Section:	BSE-4A		Page(s):	1
Exam:	Quiz-1		Roll No:	

Question 1: Consider the following relational database of a bank. The underlined attributes are primary keys. The attribute 'Holder_ID' in Accounts is a foreign key (from AccountHolders table) and the attribute 'Accoun_ID' in Transactions is a foreign key (from Account table).

Accounts

ID	Holder_ID	Account_Type	Balance
10	1	Current	1000
20	2	Saving	2000
30	1	Saving	3000
40	2	Student	3000

AccountHolders

ID	Name
1	John
2	Jane
3	Alex

Transactions

Trans_ID	Account_ID	Tran_Type	Amount	Date
100	10	Deposit	3000	9/2/2018
101	20	Withdraw	100	9/2/2018
102	40	Deposit	500	8/10/2018
103	40	Deposit	5000	8/4/2017

Write relational algebra for the following statement.
Give the name of all account holders who have done at least two transactions.

$R1 \leftarrow$ Accounts $\bowtie$ Transactions

$R1 \leftarrow$ Accounts $\bowtie$ AccountHolders

Accounts.Holder_ID = AccountHolders.ID

$R2 \leftarrow$ (R2) $\bowtie$ Transactions

R2.ID = Account_ID

$R3 \leftarrow \pi_{name}$ (Transactions $-$ R2)

Employee

ID	Name	Department ID
1	Olivia	1
2	John	3
3	Isla	2
4	Sam	NULL

Department

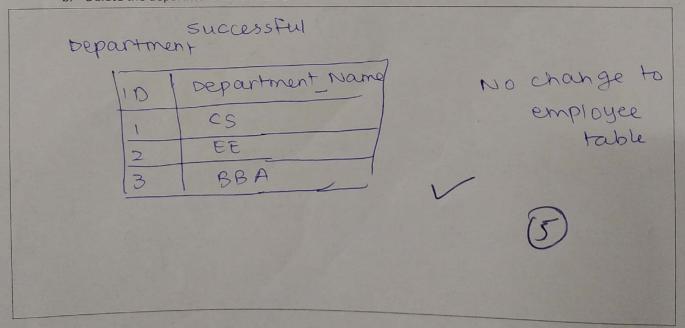| ID	Department_ Name
1	CS
2	EE
3	BBA
4	Physics

Question 1. Perform the following operations on the above given database, and show the new state of Database if the operation is successful. If the operation is not successful, then explain the reason. (Assume that all operations are independent of each other). Assume that Foreign key with **Cascading** option is implemented

a. Change the id of Department 'CS' to 5 in department table.

Successful

ID	Department_Name
5	CS
2	EE
3	BBA
4	Physics

Employee

ID	Name	Department
1	Olivia	5
2	John	3
3	Isla	2
4	Sam	NULL

✓

b. Delete the department which has ID=4.

Successful

Department

ID	Department_Name
1	CS
2	EE
3	BBA

No change to employee table

✓

⑤