

# CS 261: Database Management Systems

## Assignment-1

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### Please read the following:

1. Write your name and roll number on the first page of your answer script.
2. Answer all the questions
3. The deadline to submit scanned copies of your answer scripts is on or before 21/02/2021 11:59 PM. Make sure that you add all the scanned copies in order.
4. Answer scripts submitted after the deadline will not be considered and any reason will not be entertained.
5. Do not copy from others and do not discuss with others.
6. Do not waste your time digging the internet for solutions.
7. Good luck!

### Question 1

Consider the following two relations  $R(A, B, C, D)$  and  $S(E, F, G, H)$  and the given instances. Write the resultant relation of the following expressions:

1.  $\pi_{E,H}(\sigma_{(G=78) \vee (F=71)}(S)) - \pi_{B,C}(\sigma_{(A=49) \vee (A=19)}(R))$ .
2.  $S \bowtie_{F \leq A} R$

A	B	C	D
19	60	28	75
21	71	78	15
13	45	77	70
49	54	18	60
51	88	78	63

E	F	G	H
69	70	98	75
21	71	48	35
13	55	67	70
49	53	19	40
35	78	78	63
21	71	78	15
13	45	77	70

## Question 2

Consider the bank database discussed in class with the same assumptions.

**Branch**(Name, Assets, City)

**Customer**(ID, Customer\_Name, Street, City)

**Loan**(Loan\_Number, Branch\_name, Amount)

**Borrower**(BC\_ID, BL\_Number)

**Account**(Account\_Number, AB\_name, Balance)

**Depositor**(DC\_ID, A\_number)

Write a relational algebraic expression(s) to find the IDs of customers who has the second lowest loan amount.

## Question 3

Consider the following relational schema for universities and its affiliated colleges.

**University**(ID, Name, Address, Website)

**Affiliation**(University\_ID, College\_name, City, College\_Address, Principal)

Write a TRC expression for the query to *find the ID and Names of all universities with an affiliated college located in every city in which "Delhi University" has an affiliated college.*

## Question 4

For this question, consider our running example of COMPANY database<sup>1</sup> and write a DRC expression for the query: *find the SSNs of employees who belong to "Research" department together with the project numbers of the projects which they work on.*

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<sup>1</sup>Page no. 162, Fundamentals of Database Systems book, 7th edition