(ii) R1 Intersect R2

(iii) R2 Minus R1

(iv) R1 join R2 (Join attribute is Roll No.)

(v) R1 left outer join R2 (Join attribute is Roll No.)

(vi) R1 Cartesian Product R2

| R1: | |
|---|---|
| **Roll_No** | **Name** |
| 101 | Raman |
| 102 | Shyam |
| 103 | Gagan |
| 104 | Aarma |
| 105 | Riya |

| R2: | |
|---|---|
| **Roll_No** | **Name** |
| 105 | Riya |
| 103 | Gagan |
| 102 | Shyam |
| 106 | Saif |
| 107 | Rohan |



[This question paper contains 12 printed pages.]

**Your Roll No.....**

**Sr. No. of Question Paper : 6025** **E**

Unique Paper Code : 32345202

Name of the Paper : Database Management Systems

Name of the Course : **Generic Elective (Computer Science) For all Hons**

Year of Admission : 2019, 2020 & 2021

Semester : II

Duration : 3 Hours Maximum Marks : 75

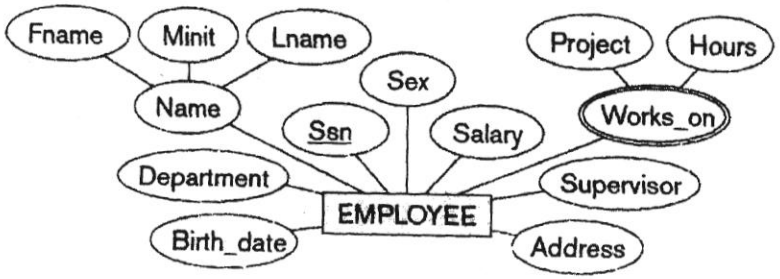


**Instructions for Candidates**

1. Write your Roll No. on the top immediately on receipt of this question paper.
2. **Section – A** is compulsory.
3. Attempt any **five** questions from **Section – B**.
4. Parts of a question should be attempted together.

## SECTION – A

1. (a) Identify Composite and Multivalued attributes in the following diagram – (2)



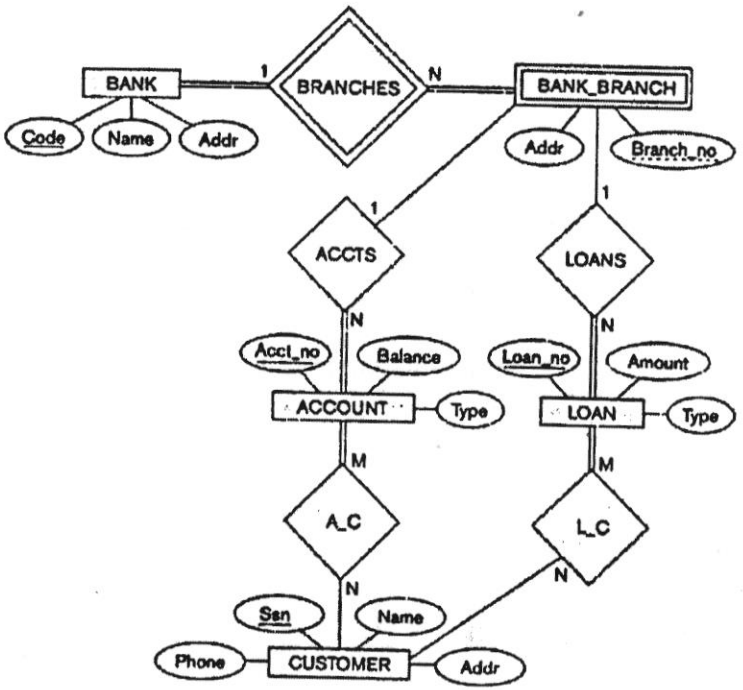

(b) Consider the set of FDs, F for a relation R(A,B,C,D,E):

F={A→B, AB→C, D→AC, D→E}

What will be the candidate key for R? Is this relation in 2NF, why? (3)

(c) What is Entity Integrity constraint in a relation? Explain, with example, why Primary key cannot be Null in an entity. (3)






8. (a) What is a Prime attribute? What undesirable dependencies are avoided when a 4 relation is in 3NF? Explain with example? (4)

(b) Show the results of the following operations on the two relation R1 and R2 6 given below : (6)

(i) R1 Union R2

(b) What is Data independence? What is the difference between logical data independence and physical data independence? Explain with example. (4)

7. (a) Define degree, participation constraint and cardinality ratio of a relation with example. (3)

(b) Consider the ER diagram given below for a BANK database. Each bank can have multiple branches, and each branch can have multiple accounts and loans.

(i) List the weak entity type, its partial key, and identifying relationship. (2)

(ii) List the names of all relationships, and specify the (min, max) constraint on each participation of an entity type in a relationship type. (5)



(d) Consider the following relations (the Primary keys are underlined) : (7)

WORKER(WORKER_ID number, FIRST_NAME char(20), LAST_NAME char(20), SALARY number, JOINING_DATE Date, DEPARTMENT char(10))

BONUS(WORKER_ID number, BONUS_DATE date, BONUS_AMOUNT number)

TITLE(WORKER_ID number, WORKER_TITLE char (10) AFFECTED_FROM date)

*Note:* WORKER_TITLE can be Manager, Assistant, Secretary etc.

(i) Write an SQL query to fetch unique values of DEPARTMENT.

(ii) Write an SQL query to print details of the Workers whose FIRST_NAME ends with 'a'.

(iii) Write an SQL query to print the details of worker who has received maximum amount of bonus.

P.T.O.

(iv) Write an SQL query to print details of the 'Manager' Workers with SALARY in the range of Rs. 100000 and Rs. 500000.

(e) In the following relations identity all the Candidate Keys : (2)

**Suppliers**(*sid*: integer, *sname:* string, *address:* string, *panNumber:* string)

**Parts**(*pid:* integer, *pname:* string, *color:* string)

**Catalog**(*sid*: integer, *pid:* integer, *cost:* real)

*Note*: **Supplier**(identifxed by *sid)* can supply multiple **Parts**(identified by *pid).*

The information about what **Parts** can be supplied by a Supplier is kept in **Catalog**.

(f) What all anomalies can be caused if a table is dropped from database? (2)

(g) What is the difference between a Database Schema and a Database State? (2)



6. (a) Consider the following relation– (6)

**STUDENT**

| Attributes | Datatype | Constraint |
|---|---|---|
| *Roll_no* | Number | Primary Key |
| *Name* | String of maximum 20 characters | Not Null |
| *Address* | String of maximum 30 characters | |
| *Phone* | Integer | Not Null |
| *CourseId* | String of maximum 10 characters | |

Give SQL queries for the following :

(i) Create the table for the above relation.

(ii) Alter the size of the *Address* to 50 characters.

(iii) Remove *Phone* attribute from the table.

(iv) Make *Courseld* as foreign key in the relation. (Assume that another relation **COURSE**, with primary key as *CID*, already exists)

(iii) Select the department name assigned to the employee whose employee id is 103.

(iv) Select the name of the employee who is working in the department with 'Abhishek' as manager.

(v) How many employees take salary more than 5000.

4. (a) Construct an E-R diagram for a car insurance company whose customers own one or more cars each. Each car has associated with it zero to any number of recorded accidents. Two cars will participate in one accident and we store damage amount for each accident. Specify key attributes and all constraints on the relationships. (5)

(b) Consider the universal relation $R = \{A, B, C, D, E, F, G, H, I, J\}$ and the set of functional dependencies $F = \{\{A, B\} \rightarrow \{C\}, \{A\} \rightarrow \{D,E\}, \{B\} \rightarrow \{F\}, \{F\} \rightarrow \{G, H\}, \{D\} \rightarrow \{I,J\}\}$. What is the key for F? Decompose $R$ into 2NF and then 3NF relations. (5)



(h) Consider the following relations : (4)

**Library_Books**

| AccNo | Title | Author | Dept | PurDate | Price |
|---|---|---|---|---|---|
| A101 | Python Programming | Lafore | CS | 3/3/2020 | 750 |
| A102 | R Programming | Navathe | Maths | 4/7/2021 | 450 |
| A103 | Statistics | Rosen | Economics | 6/2/2020 | 475 |
| A104 | Algebra | Navathe | Maths | 6/9/2019 | 600 |
| A105 | Probability | Diesel | Maths | 9/5/2022 | 700 |

**Issued_Books**

| AccNo | Borrower |
|---|---|
| A102 | Ritwik |
| A105 | Rhea |
| A104 | Arena |
| A105 | Timothy |
| A103 | John |

Give output of the following queries :

(i) Select AccNo, Title, Author, Dept

from Library_Books

where Dept = "Maths" and Author = "Navathe";

(ii) Update Library_Books

set Dept = "CS"

where Title = "R Programming";

(iii) Select * from Library_Books

where Price>500 or PurDate between '7/5/2019' and '4/8/2021';

(iv) Select AccNo, Title, Dept

from Library_Books

where Dept = "CS";

**Section – B**

2. (a) What are the responsibilities of a Database Administrator and Database Designer? (4)

(b) Consider the following relations for a database that keeps track of business trips 6 of salespersons in a sales office: (6)

*SALESPERSON(Ssn, Name, Start_year, Dept_no)*

*TRIP(Trip_id, Ssn, From_city, To_city, Departure_date, Return_date)*

*EXPENSE(Trip_id, Account#, Amount)*



One trip can be charged to one or more accounts. Construct diagram for this Database Schema, specifying the entity integrity constraints and referential integrity constraints for this schema. Please state any assumptions you make.

3. Consider the following relational database : (10)

EMPLOYEE (emp_id, emp_name, dept_id, contact_no, email_id)

DEPARTMENT (dept_id, dept_name, dept_off, mgr_id)

Give SQL queries for the following :

(i) Select the detail of the employee whose name contains double a.

(ii) Select the details of the employee who work either for department HR or Admin.