

QUESTION PAPER

Name of the Examination: Winter 2023-24 Semester – CAT 1

Course Code: CSE 2007

Set number: 1

Duration: 90 Min

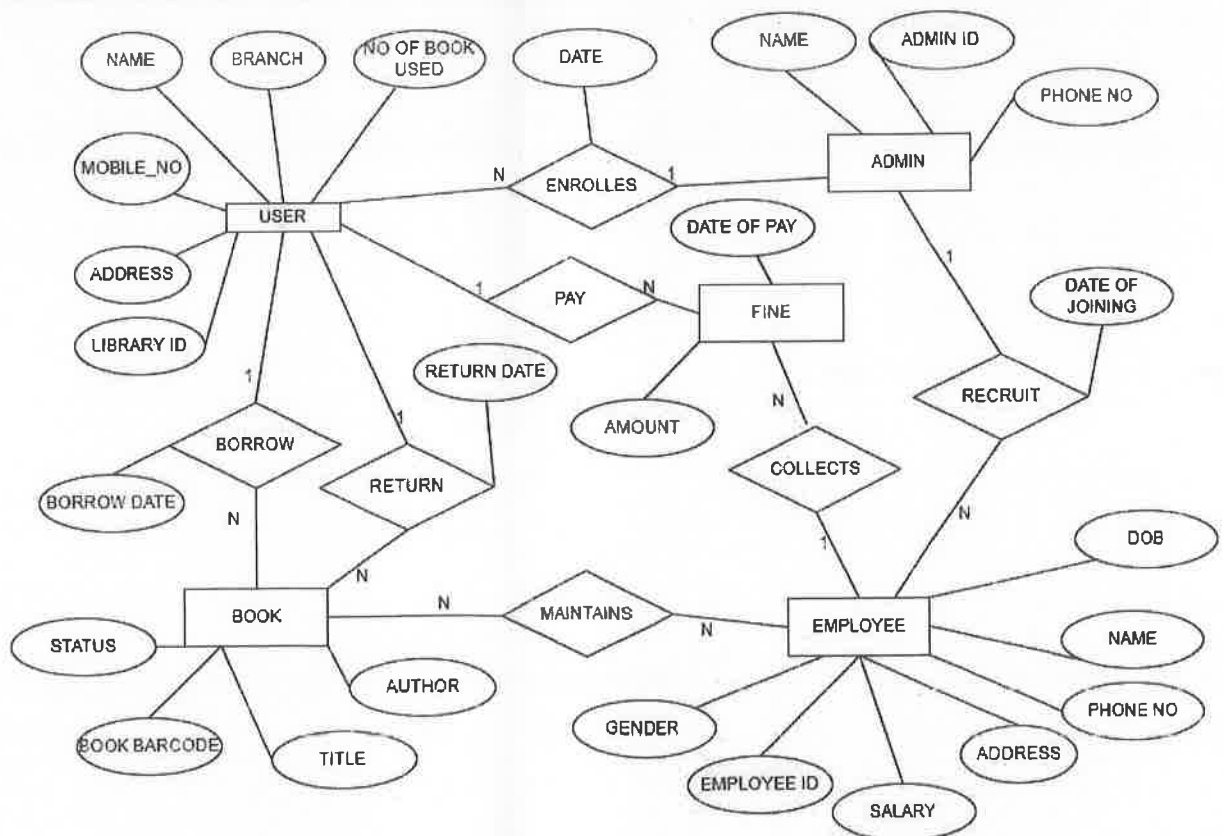
Course Title: Database Management System

Date of Exam: 05/02/2024 (AN) (A2)

Total Marks: 50.

Answer all the questions, all subparts should be in one place.

- Answer the following. (3*4=12M)
 - Compare the work of Database Administrators with Database Designers.
 - Find the difference between Distributed DBMS and Centralized DBMS.
 - What is data Independence? Explain with categorizations.
- VITAP University have CSE, ECE, MECHANICAL, SCIENCE and BUSINESS Departments. CSE is organizing a hackathon, ECE is organizing workshops, Science is organizing exhibitions and business is organizing business idea presentations for the students. Students are paying different amount of fees for these events. Organisers are awarding the best presenters. Faculties and students are working Behind these events and making them successful. A student can participate in a maximum of 3 events for a semester. Faculties can organize a maximum of 5 events in a semester. (13M)
 Find the entities, attributes and relations among entities and draw the relevant ER diagram.
- Construct the database schema for the below ER diagram. Mark the primary key for each relational table and also find the foreign keys. If we update any value in a table, how it will affect other tables? (13M)



4. Consider the given Database schema for answering the queries using relational algebra.

Relational schema:

(4*3=12M)

Movie (M_Name, Release_year, Language, Age_group, Producer, Director, Duration);

Actors (A_Name, DOB, Address, Working_language);

Movie_Theater (MT_Name, Established, Address, Owner, Ticket_price).

Acted_on (A_Name, M_name, Remuneration, character);

Release (M_name, MT_name, Number_of_show);

Queries:

- 1) List all the Hindi movies of 2023.
- 2) List the theaters, whose ticket price is >400 with their addresses.
- 3) List the Directors of moves, made for children.
- 4) Find the highly paid actor, for which movie he received the payment.

QP MAPPING

Q. No.	Module Number	CO Mapped	PO Mapped	PEO Mapped	PSO Mapped	Marks
Q1	1	CO1	PO1, PO4	1	1	12
Q2	1	CO2	PO1, PO2, PO3, PO4	1	1	13
Q3	2	CO2	PO1, PO2, PO3, PO4	1,2	1	13
Q4	2	CO2	PO1, PO2, PO3, PO4	1,2	1	12

QUESTION PAPER

Name of the Examination: CAT-1 (WINTER 2023-2024)

Course Code: CSE2007

Course Title: Database Management Systems

Slot: 2

Date of Exam: 06/02/2024 (AN) (B2)

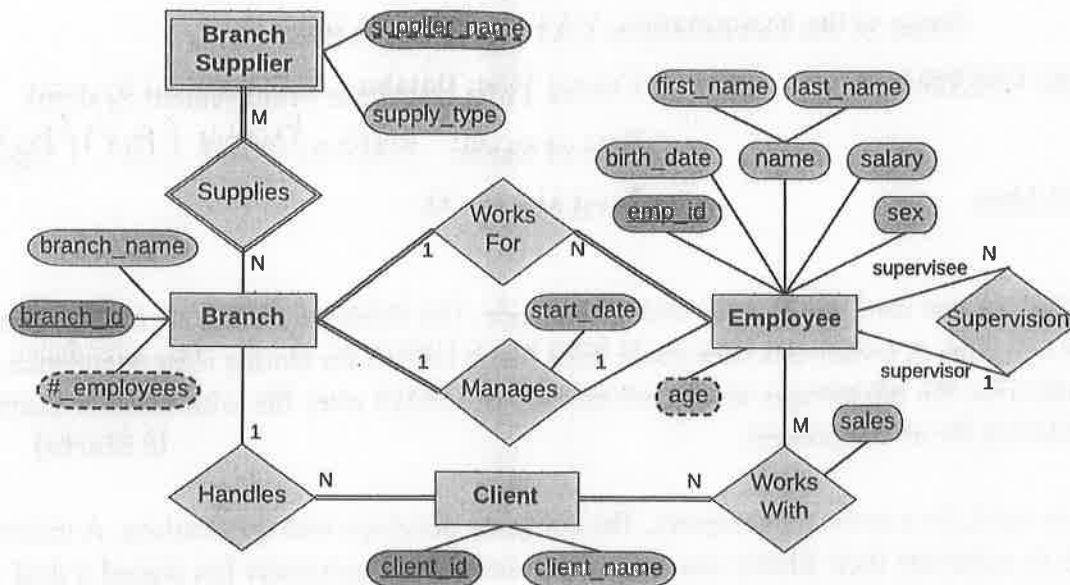
Duration: 90 Mins

Total Marks: 50

1. a) Suppose you used file to store class attendance. The fields are Serial_no, registration_no, name and date. A switch has been made from file to DBMS for storing class attendance. List and describe the advantages and disadvantages of DBMS over file with suitable examples considering the above context.
[6 Marks]

b) You work for a software company. The company develops web applications. A university wants to automate their library management system. That university has signed a deal with your company for developing the application for them. You are in the position of DBA. List and describe the roles that you have to play in the different phases of designing the database for your client.
[6 Marks]
2. Draw an ER diagram for the following scenario. Food delivery companies have customers. A customer is identified by customer_id. Customer has a name, several addresses, date of birth, age, mobile number, and profile photo. Customer may place multiple orders from restaurants. Every order is identified by an orderID. Orders have time, price, items, payment_mode and order_status. Every order belongs to one restaurant. One restaurant has multiple orders. A restaurant is identified by restaurant_id. Restaurant also have name, location, account number, and owner name. An order is assigned to a delivery guy. A delivery person is known by his ID number, name, and mobile phone numbers. The food delivery company has a few employees. Employees are recognized by employee ID. Employees likewise have their name, city and salary. For every employee the company also stores dependent information. The dependents are known by name and in relation to the employee. Every delivery guy and employee of the company has a bank account for salary credit. Bank accounts are identified by bank account number, type and IFSC code.
[13 Marks]
3. a. Given a relation R(A, B, C, D, E, F, G, H) where AB, BC and CD are the candidate keys. Find how many super keys are possible.
[3 Marks]

- b. Design the relational schema for the following ER diagram for a company database. [10 Marks]



4. Consider the relation employee(eid, name, salary, manager_id, designation, city) where eid is the primary key and manager_id is the foreign key referring to eid of the same relation. Write relational algebraic expressions for the following.

[4X3 = 12 Marks]

- Display the name of the employees who is neither getting highest salary nor getting lowest salary
- Display the name of all the employees and his/her manager name
- Display the name of the employees who live in the same city as do their manager
- Display the designation, name of the employees and his/her salary where the employees have same designation but drawing different salary

QP MAPPING

Q. No.	Module Number	CO Mapped	PO Mapped	PEO Mapped	PSO Mapped	Marks
Q1	1	1	PO1, PO4			12
Q2	1	1	PO1, PO4			13
Q3	2	2	PO1, PO2, PO3, PO4			13
Q4	2	2	PO1, PO2, PO3, PO4			12



QUESTION PAPER

Name of the Examination: Winter 2023-24 Semester – CAT 1

Course Code: CSE2007

Course Title: Database Management Systems

Set number: 5

Date of Exam: 07/02/2024 (FN)

Duration: 90 Min.

Total Marks: 50 (4)

Instructions:

1. Assume data wherever necessary.
2. Any assumptions made should be clearly stated.

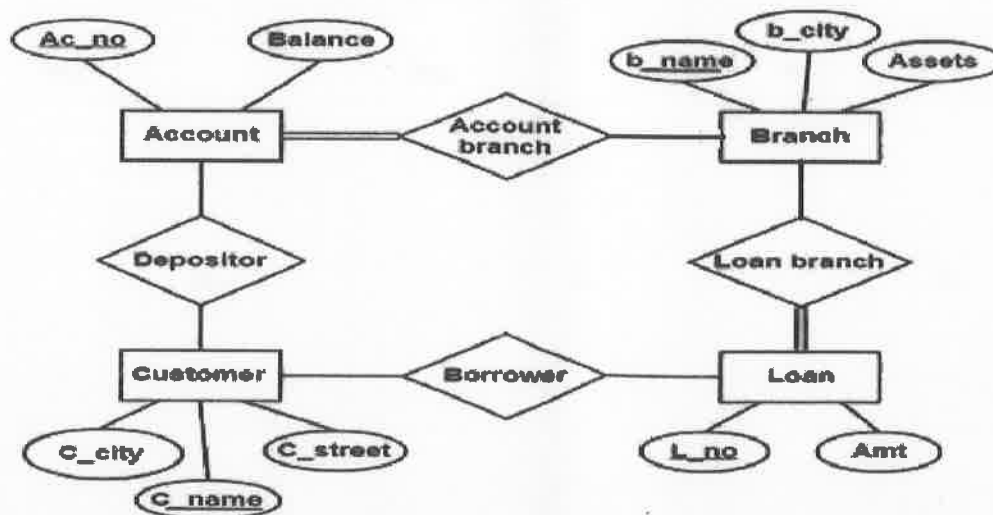
Q1. A company wants to centralize its database administration tasks, such as schema modifications and performance tuning while allowing different applications to have their application schemas. How does the three-schema architecture enable data independence to fulfil this requirement?

(12M)

Q2. Suppose you are given the following requirements for a simple database for the Vitopia Cricket League (VCL): the VCL has many teams, Each team has a name, a city, a coach, a captain, and a set of players, Each player belongs to only one team, Each player has a name, roles (such as Batsman, Bowler, Wicket keeper or All-rounder), rank, and a set of the man of the match awards, a team captain is also a player, a game is played between two teams (referred to as host_team and guest_team) and has a date (such as May 11th, 2023) and a score (115/2 in 20 overs, 117/5 in 15.5 overs). Construct a clean and concise ER diagram for the VCL database.

(13M)

Q3. Convert the given ER diagram into Relational schema and identify all the constraints. If you delete the branch how it is going to affect other relations in the schema.



(13M)

Q4. Consider the following relational schema

Employee (empno ,name, office, age)

Books (ISBN,title,authors,publisher)

Loan (empno, isbn, date) Write the following queries in relational algebra.

- Find the names of employees who have borrowed a book Published by McGraw-Hill.
- Find the names of employees who have borrowed all books Published by the McGraw-Hill only.
- Find the names of employees who have borrowed more than five different books.
- For each publisher, find the names of employees who have borrowed.

(12M)

QP MAPPING

Q. No.	Module Number	CO Mapped	PO Mapped	PEO Mapped	PSO Mapped	Marks
Q1	1	1	1,4	1	1	12
Q2	1	1	1,4	2	1	13
Q3	2	2	1,2,3,4	1	1	13
Q4	2	2	1,2,3,4	2	1	12



QUESTION PAPER

Name of the Examination: Winter 2023-24 Semester – CAT 1

Course Code: CSE2007

Course Title: Database Management Systems

Set number: 7

Date of Exam: 06/02/2024 (FN) (B1)

Duration: 90 Min

Total Marks: 50 M

Instructions:

1. Assume data wherever necessary.
2. Any assumptions made should be clearly stated.

Q1. A. Describe the process and mechanisms through which a client communicates with a server in the client/server architecture of a DBMS.

(6M)

B. Discuss the role of data abstraction in database design and development.

(6M)

Q2. The owners of a small computer repair shop would like to keep track of the repair jobs for computers they repair, the items used for each repair job, the labour costs for each repair job, the repairmen performing each repair job, and the total cost of each repair job. When customers bring their computers in to be repaired, they deposit the repair job and are given a date to return and uplift their computers. Repairmen then perform repairs on the customers' computers based on the repair job and detail the labour costs and the items used for each repair job. When customers return, they pay the total cost of the repair job less the deposit, collect a receipt for their payment, and uplift the repaired computer using this payment receipt. Construct an E-R diagram for the above scenario.

(13M)

Q3. A. Let **E** (Attributes: **e1, e2, e3**) and **D** (Attributes: **d1, d2, d3**) be two entities in an E/R diagram. **R1** and **R2** are two relationships between **E** and **D**, where **R1** is one - to-many and **R2** is many-to-many. **R1**(Attribute: **R1r**) and **R2**(Attribute: **R2r**). Calculate and show the minimum number of tables required to represent this situation in the relational model.

(8M)

B. Provide an example of a foreign key relationship between two tables in a database. Explain the rules for the foreign key and its function in establishing and maintaining relationships between the tables.

(5M)

- Q4.** Consider the following database schema and answer the questions in Relational algebra. **(12M)**

Sailors(sid: integer, sname: string, rating: integer, age: real)

Boats(bid: integer, bname: string, color: string)

Reserves (sid: integer, bid: integer, day: date)

- Find names of sailors who've reserved boat #155.
- Find names of sailors who've reserved a yellow boat.
- Retrieve the boat reserved details for sailors whose names start with the letter 'A'.
- Retrieve the Sailor's names(sname) who have reserved a boat on or after a specific date (e.g., January 1, 2024).

QP MAPPING

Q. No.	Module Number	CO Mapped	PO Mapped	PEO Mapped	PSO Mapped	Marks
Q1	1	1	1,4	1	1	12
Q2	1	1	1,4	2	1	13
Q3	2	2	1,2,3,4	1	1	13
Q4	2	2	1,2,3,4	2	1	12

QUESTION PAPER

Name of the Examination: Win 2023-24 Semester – CAT-1

Course Code: CSE2007

Course Title: Database Management Systems

Set number: 8

Date of Exam: 05/02/2024 (FN)(AI)

Duration: 90 Minutes

Total Marks: 50

Instructions:

1. Assume data wherever necessary. Any assumptions made should be clearly stated.
2. Answer all questions.

1. So far, the proprietors of a small computer repair shop manage their records on paper. Now they want to computerize their work. As a Data Base Vendor, explain them how a database is more advantageous than going for file systems with the help of DBMS characteristics and architecture. **(12M)**

2. Suppose you are given the following requirements for a simple database for the National Hockey League (NHL):

- The NHL has many teams where each team has a name, a city, a coach, a captain, and a set of players.
- Each player belongs to only one team, each player has a name, a position (such as left wing or goalie), a skill level, and a set of injury records, and a team captain is also a player.
- A game is played between two teams (referred to as host_team and guest_team) and has a date (such as May 11th, 1999) and a score (such as 4 to 2).

Construct a clean and concise ER diagram for the NHL database. List your assumptions and clearly indicate the cardinality mappings as well as any role indicators in your ER diagram. **(13M)**

3. a) Consider the following schema. **(2+2+2+2= 8M)**

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

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

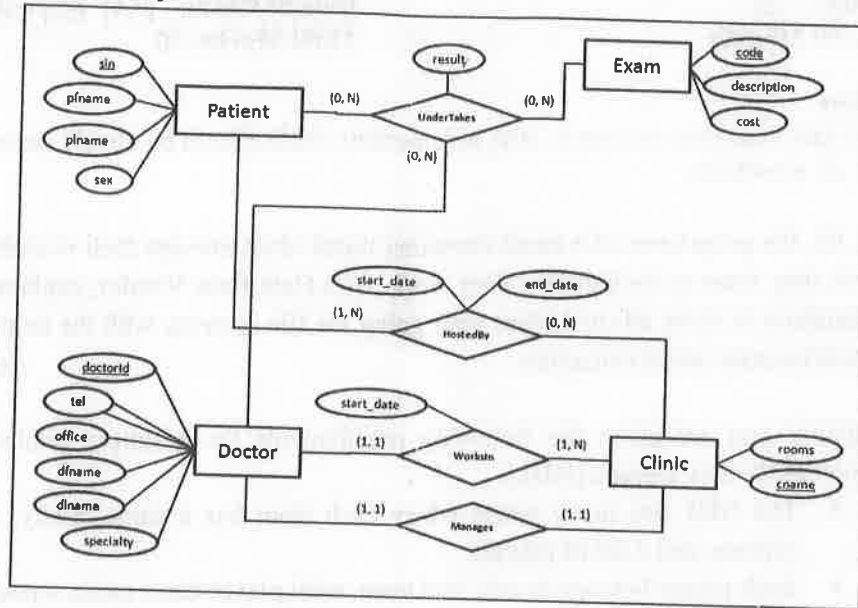
Catalog(sid: integer, pid: integer, cost: real)

Write the following queries in relational algebra:

- i) Find the pnames of parts for which there is some supplier.
- ii) For each part, find the sname of the supplier who charges the most for that part.
- iii) Find the sids of suppliers who supply only red parts.
- iv) Find the sids of suppliers who supply a red part and a green part.

- b) Explain Division operator in Relational Algebra with suitable example. **(5M)**

4. Consider the Following ER diagram and map it into relational model with proper constraints and justification.



(12M)

OP MAPPING

Q. No.	Module Number	CO Mapped	PO Mapped	PEO Mapped	PSO Mapped	Marks
Q1	1	1	1	1	1	12
Q2	1	1	1	1	1	13
Q3	2	2	1,2	1,2	1	12
Q4	2	2	1,2	1,2	1	13

QUESTION PAPER

Name of the Examination: WIN 2023-24 Semester – CAT-1

Course Code: CSE 2007

Course Title: Database Management Systems

Set number: 3

Date of Exam: 07/04/2024 (AN) (C2)

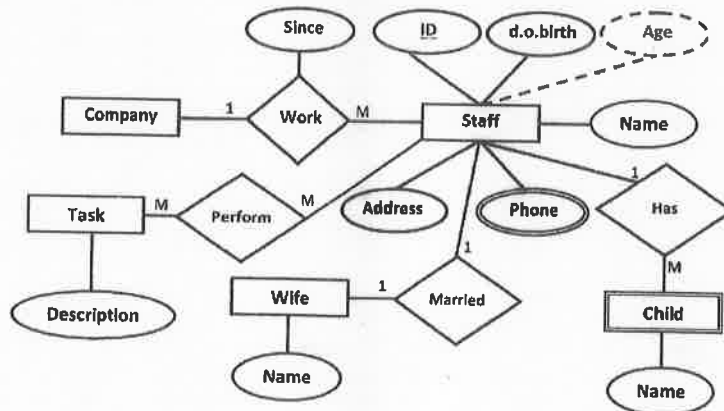
Duration: 90 mins

Total Marks: 50M

Instructions:

1. Assume data wherever necessary.
2. Any assumptions made should be clearly stated.
- 3.

- Q1.** Create an ER diagram for an online bookstore system that includes entities for books with attributes – book_id, book_name, book_genre, book_language, book_author customers with attributes – customer_id, customer_name, customer_location, customer_no and orders with attributes order_id, order_time, order_location. In the ER model represent the relationships such as purchasing and reviewing books between books, customer and order entities. **(13M)**
- Q2.** Explain the concept of data independence and how it is supported by the conceptual schema. Discuss the importance of the logical schema in facilitating database design and understanding the relationships between entities. **(12M)**
- Q3.** Explain the mapping in the relational schema from the below ER diagram and also represent all the constraints in the schema and Justify them.



- Q4.** Consider the following schema:

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

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

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

The key fields are underlined and domain of each field is listed after the field name

- a) Find the name of suppliers who supply some red parts
- b) Find the sids of suppliers who supply some red part and some green part
- c) Find the sids of suppliers who supply every part
- d) Find the sids of suppliers who supply every red or green part

QUESTION PAPER

Name of the Examination: CAT (WINTER 2022-2023)

Course Code: CSE2007

Course Title: Database Management Systems

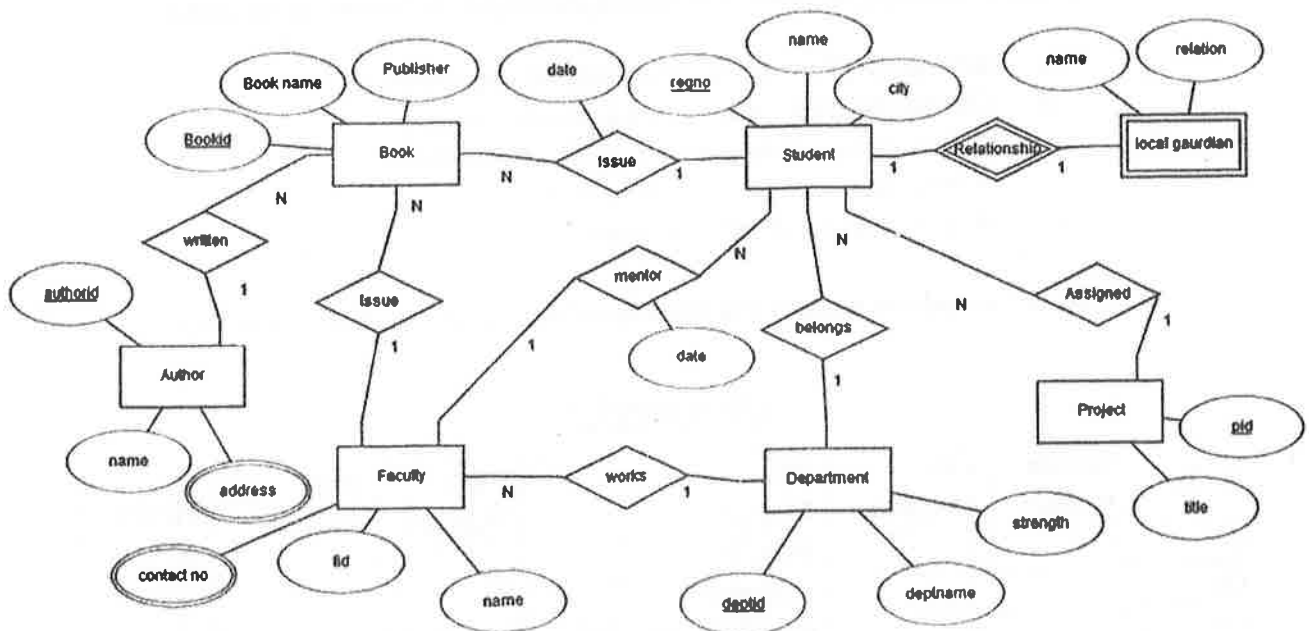
Seat: 1

Date of Exam: 20-02-2023 (FN) (GI)

Duration: 90 Mins

Total Marks: 50

1. The high school where you were studying is using MS Excel for managing their library. You have been asked for upgrading the existing system. Now you convince the school administration to choose DBMS. Explain the problems the librarian is currently facing and how the use of DBMS will help in solving those problems. Analyse data independence in the context of designing a database for the library with examples [10 Marks]
2. Draw an ER Diagram for the following scenario. Mark the suitable key attribute for each entity set. The bank is identified by IFSC, name and address. The Bank offers two types of service, one is account and the other is loan. Account is identified by account number, balance and type. Loan is identified by loan number, amount and type. Bank provides many loans and allows to open many accounts. A customer is identified by phone, pan card, name and address(house no, street, district and pin code). A customer may have both account as well as loan. A customer may have many accounts. An account may have many customers (joint account). The relation between loan and customer is the same as the relation between account and customer. Each account has a nominee. The bank is interested to store the details of the nominee (name and relation) until the account is not closed. [10 Marks]
3. Design the relational schema for the following ER diagram for a university database. [10 Marks]



4. Considering the below relations to find the output for each relational algebraic expression. [10 Marks]

R			
A	B	C	D
1	a	Z	3d
2	b	Z	3c
1	a	W	3d
2	a	W	3c

S		
E	F	A
M	45	1
N	47	2
P	48	2

R1	
ID	NAME
1	A
2	B
3	C
4	D
5	E

R2	
ID	NAME
1	A
2	B
3	C

R3	
ID	NAME
3	C
4	D

- a) The output of natural join between the relations R and S
b) Write the relational algebraic expression to find the ids from R1, which are not present in R2 and R3.
c) Write the relational algebraic expression to find the ids which are present in both R1 and R2, without using intersection.

d) The output of $\Pi_{A,B}(R) - \Pi_{A,B}(\sigma_{A \neq 'Z'} R)$

5. Consider two tables in a relational database with columns and rows as follows: [10 Marks]

Student		
Roll_no	Name	Dept_id
1	ABC	1
2	DEF	1
3	GHI	2
4	JKL	3

Department	
Dept_id	Dept_name
1	A
2	B
3	C

Roll_no is the primary key of the Student table, Dept_id is the primary key of the Department table and Student.Dept_id is a foreign key referring to Department.Dept_id. What will happen if we try to do following operation.

- Change the Dept_id to 3 of student having roll no 1.
- Change the Dept_id to 4 for the department A.
- A new students information (5,LMN,3) is added.
- A new department is introduced (8,Z).
- A new student (6,PQR,7) is added.

Write the updated Student and Department table after the above operations.

QP MAPPING

Q. No.	Module Number	CO Mapped	PO Mapped	PEO Mapped	PSO Mapped	Marks
Q1	1	1	PO1, PO4			10
Q2	1	1	PO1, PO4			10
Q3	2	2	PO1, PO2, PO3, PO4			10
Q4	2	2	PO1, PO2, PO3, PO4			10
Q5	2	2	PO1, PO2, PO3, PO4			10



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QUESTION PAPER

Name of the Examination: WINTER 2022-2023 – CAT-1

Course Code: CSE 2007

Course Title: Database Management Systems

Set number: 2

Date of Exam: 16-2-2023 (AN) (D2)

Duration: 90 min

Total Marks: 50

Instructions:

1. Assume data wherever necessary.
2. Any assumptions made should be clearly stated.

Q1. Suppose you are given the following requirements for a simple music database: **10M**

- The collection consists of albums.
- An album is made by exactly one artist.
- An artist makes one or more albums.
- An album contains one or more tracks
- Artists, albums, and tracks each have a name.
- Each track is on exactly one album.
- Each track has a time length, measured in seconds.
- When a track is played, the date and time the playback began (to the nearest second) should be recorded; this is used for reporting when a track was last played, as well as the number of times music by an artist, from an album, or a track has been played.

Analyze the above scenario and answer the following:

- a. Design an Entity Relationship Diagram. **7M**
- b. Identify primary, Foreign keys for the above ER Diagram and define Entity types **3M**

Q2 a. Consider the following relations A, B and C and find number of tuples the result of the following relational algebra expression contain.

$$(A \cup B) \bowtie_{A.Id > 40 \vee C.Id < 15} C$$

4M

Table A

Id	Name	Age
15	Shreya	24
25	Hari	40
99	Rohit	11

Table B

Id	Name	Age
12	Arun	60
15	Shreya	24
98	Rohit	20
99	Rohit	11

Table C

Id	Phone	Area
10	2200	02
99	2100	01

- b. Explain Three schema architecture. **3M**
- c. Explain Structural Constraints in DBMS. **3M**

Q3. The following relations keep track of COMPANY information:

10M

Employee(Fname,Minit,Lname,SSN,Bdate,Address,Salary,Sex,Super_ssn,Dno)

Department (Dname, Dnumber, Mgr_ssn, Mgr_start_date)

Dept_Locations (Dnumber, Dlocation)

Works_on (Essn, Pno, Hours)

Project (Pname, Pnumber, Plocation, Dnum)

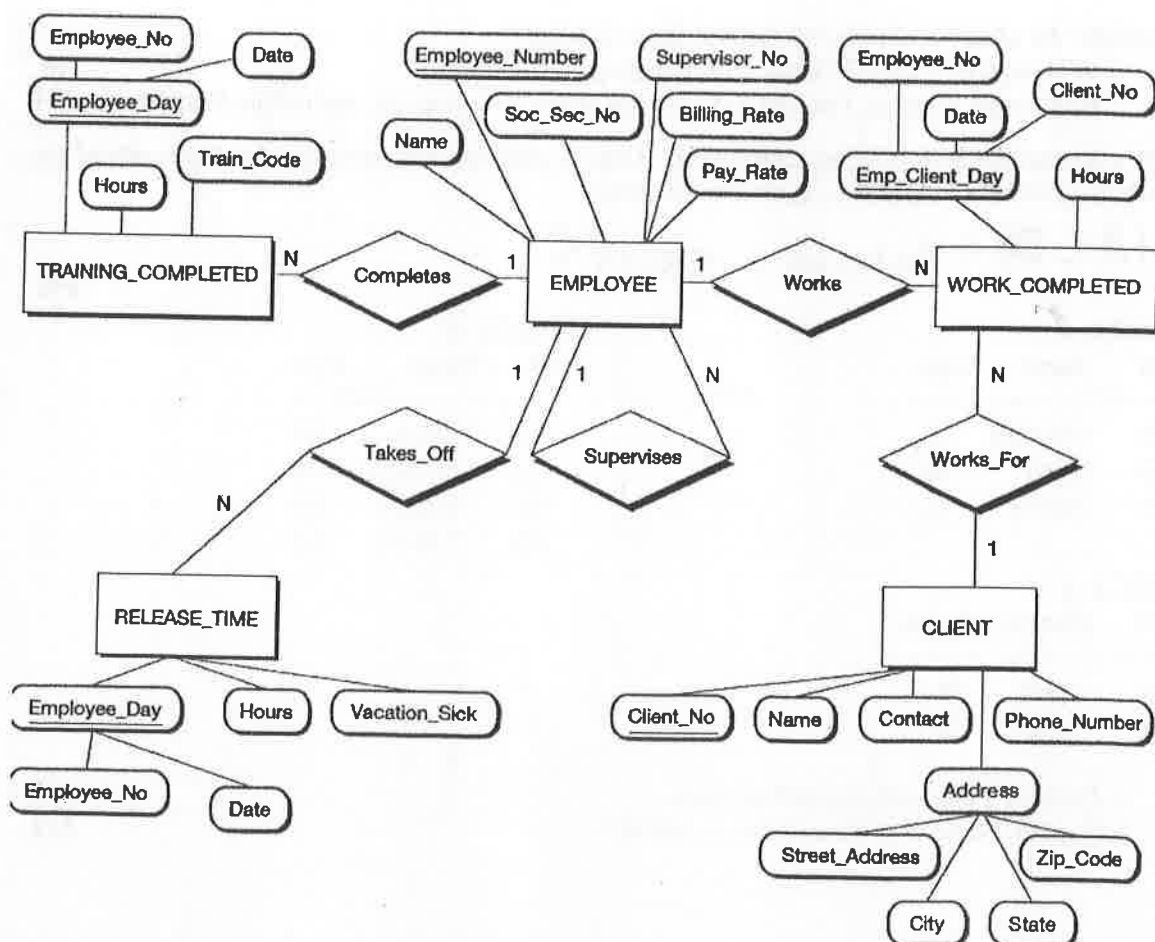
Dependent (Essn, Dependent_name, Sex, Bdate, Relationship)

Answer the given questions using Relational Algebra

- Retrieve the name and address of all employees who work for the 'Research' department.
- For every project located in 'Stafford', list the project number, the controlling department number, and the department manager's last name, address, and birth date.
- Find the names of employees who work on *all* the projects controlled by department number 5.
- List the names of managers who have at least one dependent.
- Retrieve number of employees and their average salary in each department.

Q4. a. Convert the given ER diagram into Relational mapping.

7M



b. Define Attribute and explain various attributes in DBMS.

3M

Q5. a. Explain different constraints on relational data model.

5M

b. Summarize the advantages of DBMS over file Processing systems

5M

QP MAPPING

Q. No.	Module Number	CO Mapped	PO Mapped	PEO Mapped	PSO Mapped	Marks
Q1	1	1	1,4			10
Q2	2	1,2	1,2,3,4			10
Q3	2	2	1,2,3,4			10
Q4	2	1,2	1,2,3,4			10
Q5	1,2	1,2	1,2,3,4			10

QUESTION PAPER

Name of the Examination: WINTER 2022-2023 – CAT-1

Course Code: CSE2007

Course Title: Database Management Systems

Set number: 5

Date of Exam: 16-2-2023 (FN)

Duration: 90 Mins

Total Marks: 50

(D1)

- Q1. A DBMS is having more advantages than file system? Justify your answer? 5 M**
B. List out the responsibilities of the DBA and the database designers? 5M

Q2. The “redbus.in” website is maintaining relational database, there are some responsibilities like

- Providing backup and recovery services.
- Providing multiple interfaces to different classes of users.
- Representing complex relationships among data.

10 M

If the responsibilities were not discharged correctly, then explain what are the problems that would arise?

- Q3. A software company wants to track project details for the following tables**
Employee(Empid , Empname, Address, Doj, Salary)
Project (Projectno, Duration, Projectname).
Workson(Empid,Projno,experiance).

10 M

Design an ER diagram by considering the above database schema?

- Q4. Draw ER diagram for a BANK database with customer, admin and different types of accounts. Mention the different cardinalities and keys. 10 M**

- Q5. Write the Relational algebra for all the listed queries on the tables given below.10 M**

Student

S_name	S_number	Study Year	Major
Smith	7	2	CS
Brown	8	1	CS
Ramesh	10	2	EC
Susan	3	1	EC
Amy	5	1	ME

Course

C_name	C_no	Credit	Department	Prerequisite	Teacher
Data structure	CSE1002	4	CS	CSE1001	100
Java Programing	CSE1001	3	CS	MAT1001	130
Database	CSE2007	4	CS	CSE1002	107
Math	MAT1001	3	Math	Null	121
Digital logic	ECE2001	4	EC	MAT1001	102

Faculty

F_name	F_ID	Department	Position	Salary
Join	100	CS	Professor	60000
Ricardo	102	EC	Assistant	40000
Francis	130	CS	Assistant	42000
Jimmy	121	MAT	Assistant	41000
Ernest	117	EC	Associate	52000
Barbara	107	CS	Associate	53000

Registration

Student	Course1	Course2
3	CSE1001	ECE2001
5	CSE1002	
7	CSE2007	
8	MAT1001	

- Show the details of all 1 st year students.
- Find out the faculty names whose position is professor.
- Find out the faculty names whose salary is greater than 50000.
- Find out the prerequisite of CSE1001
- Find out the number of credits of database

10 M

QP Mapping

Q. No.	Module Number	CO Mapped	PO Mapped	PEO Mapped	PSO Mapped	Marks
Q1	1	1	1			10
Q2	1	1	1			10
Q3	1,2	1	2			10
Q4	1,2	2	2			10
Q5	2	2	2			10



QUESTION PAPER

Name of the Examination: WINTER 2022-2023 – CAT-1

Course Code: CSE2007

Course Title: Database Management Systems

Set number: 6

Date of Exam: 17-2-2023 (AN) (E2)

Duration: 90 Minutes

Total Marks: 50

Instructions:

1. Assume data wherever necessary.
2. Any assumptions made should be clearly stated.

Q1. Differentiate between the followings: (2+4+4 Marks)

- a. Database schema vs. Database state
- b. Physical data independence vs. Logical data independence
- c. User view vs. Conceptual view

Q2. Suppose that a newly established hospital has hired you for setting up a database for them. Describe the steps that you would follow for creating/initializing the database. (10 Marks)

Q3. a. Consider a relational schema $R = \{a_1, a_2, a_3, \dots, a_n\}$ wherein $\{a_1\}$ and $\{a_2, a_3\}$ are two candidate keys. Then, calculate the maximum number of super keys possible. (5 Marks)

b. Considering the relational model, give an example to define the following constraints: (5 Marks)

- i. Primary key constraint
- ii. Not null constraint
- iii. Unique constraint
- iv. Check constraint
- v. Default constraint

Q4. Represent the below given requirement analyses using the E-R model: (5+5 Marks)

a. A painter can paint many paintings. Each painting is painted by one painter. A gallery can have many paintings. A painting must be exhibited by a gallery.

b. A furniture company has several salespersons. The identity for a salesperson is SALESPERSON_ID. Other attributes include SALESPERSON_NAME, SALESPERSON_PHONE, and SALESPERSON_FAX. A salesperson serves exactly one sales territory. Each sales territory is served by one or more salespersons.

Q5. Consider the following database schema and express the below given queries using relational algebra: (2.5 * 4 marks)

Supplier (sid, sname, address)

Parts (pid, pname, color)

Catalog (sid, pid, cost)

- i. Delete the details of the suppliers who supply no parts.
- ii. Display the names of the suppliers who supply all parts.
- iii. Display the names of the suppliers who supply no green parts.
- iv. Display the details of the suppliers who live in the same address as that of "Rohith".

QP MAPPING

Q. No.	Module Number	CO Mapped	PO Mapped	PEO Mapped	PSO Mapped	Marks
Q1	1	1	1,4	1,4	1,2	10
Q2	1	1	1,4	1,4	1,2	10
Q3	2	2	1,2,3,4	1,2,3,4	1,2	10
Q4	1	1	1,4	1,4	1,2	10
Q5	2	2	1,2,3,4	1,2,3,4	1,2	10

QUESTION PAPER

Name of the Examination: WINTER 2022-2023 – CAT-1

Course Code: CSE2007

Course Title: Database Management Systems

Set number: 7

Date of Exam: 15-02-2023 (FN) (C1)

Duration: 2 hours

Total Marks: 50 M

Instructions:

1. Use proper ER notations and naming conventions to construct the ER diagram.
2. Draw neat diagrams with proper labeling.
3. Use correct Relational Algebra (RA) notations to write RA queries.

Q1. a. Sketch and give comprehensive explanation on the necessity of mapping one level of schema to another with reference to three level schema architecture. (5 M)

b. Justify the significance of Client/Server DBMS over Centralized DBMS. (5 M)

Q2. Illustrate the interaction and background execution of different user's query with DBMS Environment using a neat diagram. (10 M)

Q3. a. Scenario 1: Passenger books air ticket to travel to different places. A Passenger can book one or more tickets. No passenger can travel without a ticket and needs minimum 1 ticket to travel.

Question: Construct ER diagram, Identify the structural constraints of Scenario 1 and explain it. (5 M)

b. Explain Referential Integrity Constraint using Scenario 1. (3 M)

c. Discuss the circumstances where NULL values can be used and their meaning with an example for each. (2 M)

Q4. a. Construct an ER diagram for the Scenario 2 and identify the keys, degree and cardinality of relationships. (5 M)

b. Convert the ER diagram into Relational Schema, Identify primary keys and foreign keys. Show the relationships between different Schema constructs by connecting them. (5 M)

Scenario 2: Telangana State Transport allows a Person to register maximum of two Vehicles. A Person is uniquely Identified with Aadhar number. The Transport office also stores name, date of birth, address, mobile number, driving license number, email id of the Person. The Person's address is stored as door number, street name, city, state and pin code. A Person can have more than one mobile number.

A Vehicle is identified by registration number or by chassis number. A Vehicle can be a two-wheeler or four-wheeler. Color, model and cost of the vehicle are also recorded. Vehicle can be registered in Shamshabad or Cyberabad.

A Vehicle has to be insured with any of Insurance companies. A Vehicle has to be insured compulsorily. Mostly it would be like one vehicle will have utmost one insurance only. Insurance details include insurance number, valid_from, valid_to dates, type of insurance like full or partial insurance, company and assured amount.

Q5. Convert the following queries Into RA queries using Scenario 2 with proper notations. (5x2M=10M)

- Get all the vehicles registered in Shamshabad and Cyberabad. Retrieve them separately to ensure correctness and give them as a single list.
- Get all the vehicle details whose insurance has expired.
- Get the name, address of the person whose vehicle's registration number is TS07JK9991.
- List all the insurance companies who have given insurance to vehicles registered in Shamshabad.
- Get all the four wheelers and their owner details.

QP MAPPING

Q. No.	Module Number	CO Mapped	PO Mapped	PEO Mapped	PSO Mapped	Marks
Q1	1	1	PO1, PO4	-	-	10
Q2	1	1	PO1, PO4	-	-	10
Q3	1	1	PO1, PO4	-	-	10
Q4	2	2	PO1,PO2,PO3 ,PO4	-	-	10
Q5	2	2	PO1,PO2,PO3 ,PO4	-	-	10

QUESTION PAPER

Name of the Examination: WINTER 2022-2023-CAT-1

Course Code: CSE2007

Course Title: DBMS

Set number: 8

Date of Exam: 17-02-2023 (FN)

Duration: 90 Minutes

Total Marks: 50 (EI)

Instructions:

1. Assume data wherever necessary.
 2. Any assumptions made should be clearly stated.
- Q1.** a. What are the main benefits of using a DBMS to manage data in applications involving extensive data access? **(5 Marks)**
b. Explain the different roles of database administrators, application programmers, and end users of a database. Who needs to know the most about database systems? **(5 Marks)**
- Q2.** A company database needs to store information about employees (identified by ssn, with salary and phone as attributes), departments (identified by dna, with dname and budget as attributes), and children of employees (with name and age as attributes). Employees work in departments; each department is managed by an employee; a child must be identified uniquely by name when the parent (who is an employee; assume that only one parent works for the company) is known. We are not interested in information about a child once the parent leaves the company.
Analyze the above scenario and answer the following,
a. Design an Entity Relationship Diagram. **(5 Marks)**
b. Convert the ER Diagram into Relational model **(5 Marks)**
- Q3.** a. Consider the following relations for a database that keeps track of student enrolment in courses and the books adopted for each course: **(5 Marks)**
STUDENT (SSN, Name, Major, Bdate)
COURSE (CourseNo, Quarter, Grade)
ENROLL (SSN, CourseNO, Quarter, Grade)
BOOK_ADOPTION (CourseNo, Quarter, Book_ISBN)
TEXT (Book_ISBN, Book_Title, Publisher, Author)
Specify the foreign keys for this schema, stating any assumptions you make.
b. Describe the three-schema architecture. Why do we need mappings between schema levels? How do different schema definition languages support this architecture? **(5 Marks)**
- Q3.** Give the relevance of SQL Integrity Constraints while designing a Relational Model. Discuss various Integrity Constraints with examples. **(10 Marks)**

Q4. Consider the following relational schema.

(5*2= 10 Marks)

An employee can work in more than one department; the pct time field of the Works relation shows the percentage of time that a given employee works in a given department.

Emp(eid: integer, ename: string, age: integer, salary: real)

Works(eid: integer, did: integer, pct time: integer)

Dept(did: integer, dname: string, budget: real, managerid: integer)

Answer the following queries using SQL:

- Print the names and ages of each employee who works in both the Hardware department and the Software department.
- Print the name of each employee whose salary exceeds the budget of all of the departments that he or she works in.
- Find the eids of employees who make the highest salary.
- Identify the employee names whose salary is more than \$100,000.
- Define a table constraint on Emp that will ensure that every employee makes at least \$10,000.

Q5. Consider the following schema:

(5*2 =10 Marks)

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

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

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

Answer the following query using Relational Algebra:

- Find the names of suppliers who supply some red part.
- Find the sids of suppliers who supply some red or green part.
- Find the sids of suppliers who supply some red part or are at 221 Packer Street.
- Find the sids of suppliers who supply some red part and some green part.
- Find the sids of suppliers who supply every red part or supply every green part.

QP MAPPING

Q. No.	Module Number	COMapped	PO Mapped	PEO Mapped	PSO Mapped	Marks
Q1	1	CO1	PO1,PO4			10
Q2	1	CO1	PO1,PO4			10
Q3	2	CO1	PO1, PO2			10
Q4	2	CO1	PO2, PO3			10
Q5	2	CO1	PO3, PO4			10



QUESTION PAPER

Name of the Examination: WINTER 2022-2023 – CAT-1

Course Code: CSE 2007

Set number: 3

Duration: 90 min

Course Title: Database Management Systems

Date of Exam: 20-02-2023 (AN) (G2)

Total Marks: 50

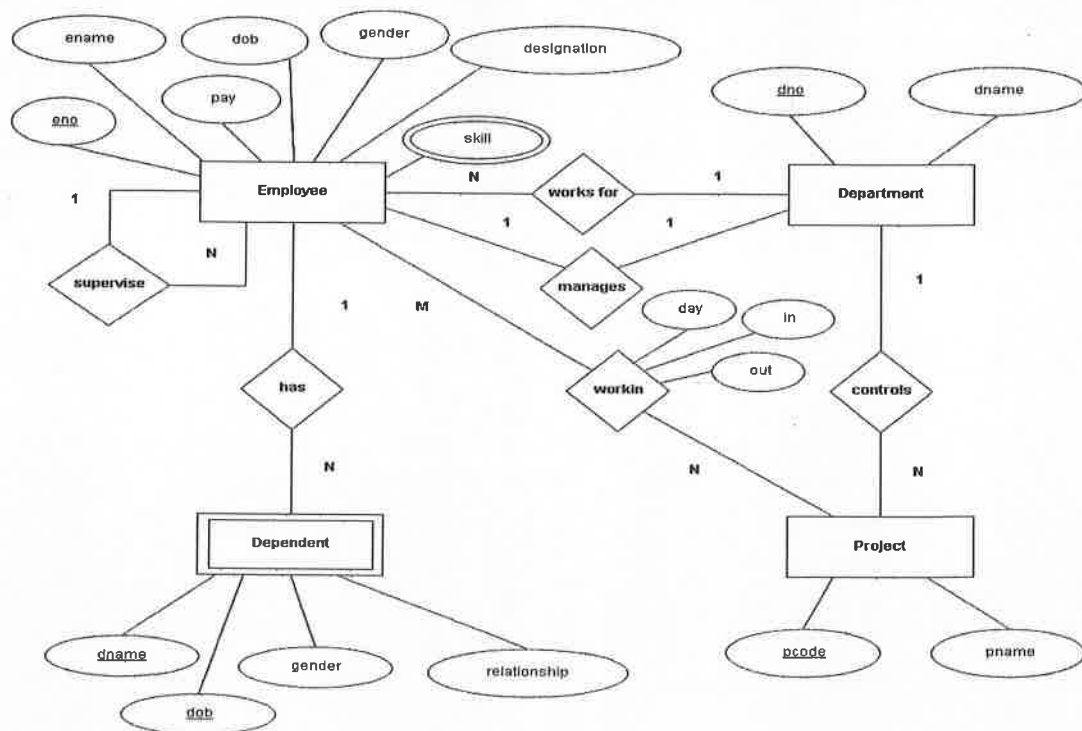
Q1. Describe the usefulness of ER diagram in database management system. Draw an ER diagram for the given scenario:

Suppose that you are designing a schema to record information about reality shows on TV. Your database needs to record the following information. For each reality show, its name, genre, basic_info and participant's name. Any reality show has at least two or more participants. For each producer, the company name, company country. A show is produced by exactly one producer. And one producer produces exactly one show. For each television, its name, start year, head office. A television may broadcast multiple shows. Each show is broadcasted by exactly one television. For each user, his/her username, password, and age. A user may rate multiple shows, and a show may be rated by multiple users. Each rating has a score of 0 to 10. **(10 Marks)**

Q2. How we can achieve data independence through data abstraction describe with suitable diagram. **(10 Marks)**

Q3. Describe the characteristics of database approaches that helps a database designer in order for it to be considered as an interactive database? Also, describe how the integrity of the data should maintain in a DBMS. **(10 Marks)**

Q4. Convert the given ER diagram into relational model structure. Also calculate the number of entities, attributes and total number of relationships exists. **(10 Marks)**



Q5. Consider the following relational database schema consisting of the four relation schemas:

(10 Marks)

passenger (pid, pname, pgender, pcity)

agency (aid, aname, acity)

flight (fid, fdate, time, src, dest)

booking (pid, aid, fid, fdate)

Answer the following questions using relational algebra queries;

Note: Take the input for the table based on the question given.

(i). Get the complete details of all flights to New Delhi.

(ii). Get the details about all flights from Chennai to New Delhi.

(iii). Find the passenger names for passengers who have bookings on at least one flight.

(iv). Get the details of flights that are scheduled on both dates 01/12/2020 and 02/12/2020 at 16:00 hours.

QP Mapping

Q. No.	Module Number	CO Mapped	PO Mapped	PEO Mapped	PSO Mapped	Marks
Q1	1	1	1,2,3			10
Q2	1	1	1,2,3			10
Q3	2	2	1,2,3			10
Q4	2	2	1,2,3			10
Q5	2	2	1,2,3			10

QUESTION PAPER

Name of the Examination: WINTER 2022-2023 – CAT-1

Course Code: CSE2007

Course Title: Database Management Systems

Set number: 10

Date of Exam: 14-02-2023 (FN)

Duration: 90 Minutes

Total Marks: 50

(B1)

Instructions:

1. Assume data wherever necessary.
2. Any assumptions made should be clearly stated.

Q1. a) What is a Database model? List out various database models and explain any two of them.
b) Explain the difference between external, logical and physical level schemas. How are these different schema layers related to the concepts of logical and physical data independence?

(5M+5M)

Q2. With a neat diagram, explain the structure of Database Management System. (10M)

Q3. Design a database for an airline. Airlines ticket booking is an application of database management system which is used for booking and schedule information. Airline ticket booking is to provide help for the user to book their flight tickets without visiting booking counter or to any other booking vendors. This system provides options for viewing different flights available with different timings for a particular date and provides customers with the facility to book a ticket, modify or cancel a particular reservation. It can also manage all the information about customer, booking enquiry, reservation. Users can view the status and schedule of a flight directly, from the online. It also provides time to time current information related to airlines schedules. It tracks all the details about the airlines booking, ticket booking and routing of future flights. Your design should include an E-R diagram, a set of relational schemas, and a list of constraints, including primary-key and foreign-key constraints. (10M)

Q4. a) Refer to the relation schemas given below and answer the questions asked after schema description. Suppliers (S.No., Sname, City) Parts (P.No., Pname, Colour, City) Projects (ProjectNo., ProjectName, City) Sup-Par-Proj (S.No., P.No., ProjectNo., Quantity)

- i) What are the entity integrity constraints in the relations?
- ii) What are the referential integrity constraints in the relations?

b) Define the concept of aggregation. Give two examples of where this concept is useful. (6M+4M)

Q5. a) Consider the relational schema: Employee (empno, name, office, age)

Books (isbn, title, authors, publisher), Loan (empno, isbn, date)

Write the following queries in relational algebra.

- i. Find the names of employees who have borrowed a book Published by McGraw-Hill.
- ii. Find the names of employees who have borrowed all books Published by McGraw-Hill.

- b) Given two relations R1 and R2, where R1 contains N1 tuples and R2 contains N2 tuples, and $N2 > N1 > 0$, give the maximum and minimum possible sizes (in tuples) for the result relation produced by each of the following relational algebra expressions. In each case, state any assumptions about the schemas for R1 and R2 that are needed to make the expression meaningful. (a) $R1 \times R2$ (b) $\sigma_{a=5}(R1)$ (c) $\pi_a(R1)$ (d) $R1/R2$ (5M+5M)

QP MAPPING

Q. No.	Module Number	CO Mapped	PO Mapped	PEO Mapped	PSO Mapped	Marks
Q1	1	1	1	2	1	10
Q2	1	1	1	2	1	10
Q3	1	1	1	2	1	10
Q4	2	2	4	-	1	10
Q5	2	2	4	-	1	10

QUESTION PAPER

Name of the Examination: WINTER 2022-2023 – CAT-1

Course Code: CSE2007

Set number: 11

Duration: 90 Mins

Course Title: DBMS

Date of Exam: 13-02-2023

Total Marks: 50 (FN) (AI)

Instructions:

1. Assume data wherever necessary.
2. Any assumptions made should be clearly stated.

- Q1. a) With a neat diagram explain three schema architecture. (5M)
- b) Explain the Constraints on Relational database model. (5M)

- Q2. a) Write a SQL statement to create a table named jobs including columns job_id, job_title, min_salary, max_salary and check whether the max_salary amount exceeding the upper limit 25000. (3M)

- b) For the following relation schema: (3M)

Employee (employee-name, street, city)

Works (employee-name, company-name, salary)

Company (company-name, city)

Manages (employee-name, manager-name)

Write Query to find the names of all employees in the database who live in the same cities as the companies for which they work.

- c) Draw an ER diagram for the given scenario. (4M)

Suppose that you are designing a schema to record information about reality shows on TV. Your database needs to record the following information:

- For each reality show, its name, genre, basic_info and participants name. Any reality show has at least two or more participants.

- For each producer, the company name, company country. A show is produced by exactly one producer. And one producer produces exactly one show.

- Q3. Compare primary key, candidate key, super key, alternate key and minimal super key. From the below table identify primary key candidate key, super key, alternate key and minimal super key and justify. (10M)

TABLE_1--STUDENT

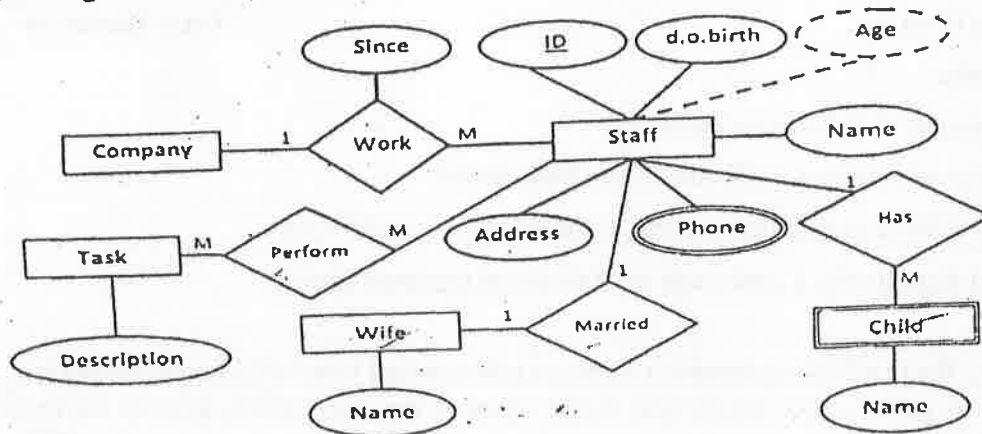
STUD_NO	STUD_NAME	STUD_PHONE	STUD_STATE	STUD_COUNTRY	STUD_AGE
1	RAM	9716271721	HARYANA	INDIA	20
2	RAM	9898291281	PUNJAB	INDIA	19
3	SUJIT	7898291981	RAJESTHAN	INDIA	18
4	SURESH		PUNJAB	INDIA	21

TABLE-2---STUDENT COURSE

STUD_NO	COURSE_NO	COURSE_NAME
1	C1	DBMS
2	C2	COMPUTER NETWORKS
1	C2	COMPUTER NETWORKS

(10M)

Q4. Convert the given ER diagram below to relational schema.



Q5. Write a query using the below relation tables to show different DBMS relational algebra. (10M)

Player relation

Player Id	Team Id	Country	Age	Runs	Wickets
1001	101	India	25	10000	300
1004	101	India	28	20000	200
1006	101	India	22	15000	150
1008	101	India	21	12000	400
1005	101	India	22	15000	150
1008	101	India	22	15000	150
1009	103	England	24	6000	90
1010	104	Australia	35	1300	0
1011	104	Australia	29	3530	10
1012	105	Pakistan	28	1421	168
1014	105	Pakistan	21	3599	205

- Find all tuples from player relation for which country is India.
- Select all the tuples for which runs are greater than or equal to 15000.
- List all the countries in Player relation.
- Select all the players whose runs are greater than or equal to 6000 and age is less than 25.
- List all the team ids and countries in Player Relation.

QP MAPPING

Q. No.	Module Number	CO Mapped	PO Mapped	PEO Mapped	PSO Mapped	Marks
Q1	1	1	1	2	1	10
Q2	1	1	1	2	1	10
Q3	1	1	1	2	1	10
Q4	2	2	4	-	1	10
Q5	1	2	4	-	1	10

QUESTION PAPER

Name of the Examination: WINTER 2022-2023 – CAT-1

Course Code: CSE2007

Course Title: DATABASE MANAGEMENT SYSTEMS

Set number: 12,

Date of Exam: 13-02-2023 (AN)

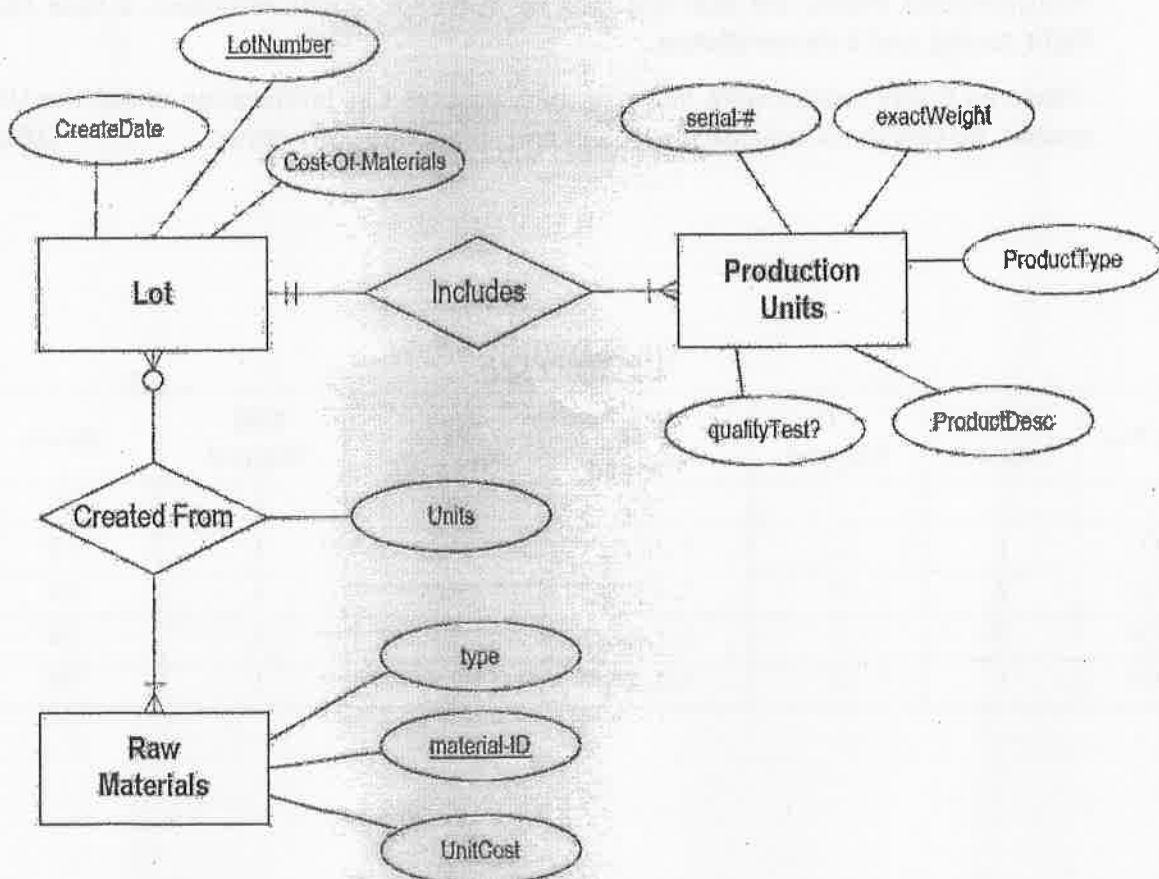
Duration: 90 Min

Total Marks: 50 (A2)

Instructions:

1. Assume data wherever necessary.
2. Any assumptions made should be clearly stated.

- Q1. (a) Describe the overall three schema architecture of database system with neat diagram (6M)**
(b) Differentiate File systems from DBMS. (4M)
- Q2. (a) What is an attribute? Describe various attributes that are represented in ER Diagram with examples. (5M)**
(b) Explain about the Structural constraints with suitable Examples. (5M)
- Q3. (a) Reduce the following ER diagram to relational database schema (6M)**



- (b) Explain in detail about referential integrity constraints and domain constraints with example. (4M)**

Q4. Consider the following relational database schema consisting of the four relation schemas:

passenger (pid, pname, pgender, pcity)

(10M)

agency (aid, aname, acity)

flight (fid, fdate, time, src, dest)

booking (pid, aid, fid, fdate)

Answer the following questions using relational algebra queries:

- (a) Get the details about all flights from Chennai to New Delhi.
- (b) Find the passenger names for passengers who have bookings on at least one flight.
- (c) Find the passenger names for those who do not have any bookings in any flights.
- (d) Get the details of flights that are scheduled on both dates 01/12/2020 and 02/12/2020 at 16:00 hours.
- (e) Find the details of all male passengers who are associated with Jet agency.

Q5. UPS prides itself on having up-to-date information on the processing and current location of each shipped item. To do this, UPS relies on a company-wide information system. Shipped items are the heart of the UPS product tracking information system. Shipped items can be characterized by item number (unique), weight, dimensions, insurance amount, destination, and final delivery date. Shipped items are received into the UPS system at a single retail center. Retail centers are characterized by their type, uniqueID, and address. Shipped items make their way to their destination via one or more standard UPS transportation events (i.e., flights, truck deliveries). These transportation events are characterized by a unique scheduleNumber, a type (e.g, flight, truck), and a deliveryRoute.

Create an Entity Relationship diagram that captures this information about the UPS system. Be certain to indicate identifiers and cardinality constraints. (10M)

OP MAPPING

Q. No.	Module Number	CO Mapped	PO Mapped	PEO Mapped	PSO Mapped	Marks
Q1	1	1	1,2	1	1	10
Q2	1	1,2	1,2,3,4	2	1	10
Q3	2	2	1,2,3,4	2	1	10
Q4	2	2	1,2,3,4	2	1	10
Q5	1	2	1,2,3,4	2	1	10

QUESTION PAPER

Name of the Examination: WIN 2022-2023 – CAT 1

Course Code: CSE2007

Set number: 14

Duration: 90 min

Course Title: Database Management Systems

Date of Exam: 14-2-2023 (AN) (B2)

Total Marks: 50

Answers of all parts of a question should be written together

Answer all five questions.

1. (a) Suppose, the Academic section of VIT-AP UNIVERSITY maintain the information about students, courses, and grades and the HR section maintain the information about staff, teachers and administration works. Now, you are asked to design a model to maintain the all the information of our university using either file processing system or database management system. Differentiate both the systems respect to given scenario.
- (b) What are the different users of DBMS. Discuss their role in the DBMS. **6+4=10M**
2. (a) What are the different levels of abstraction? What do you mean by strong entity and weak entity type?
- (b)

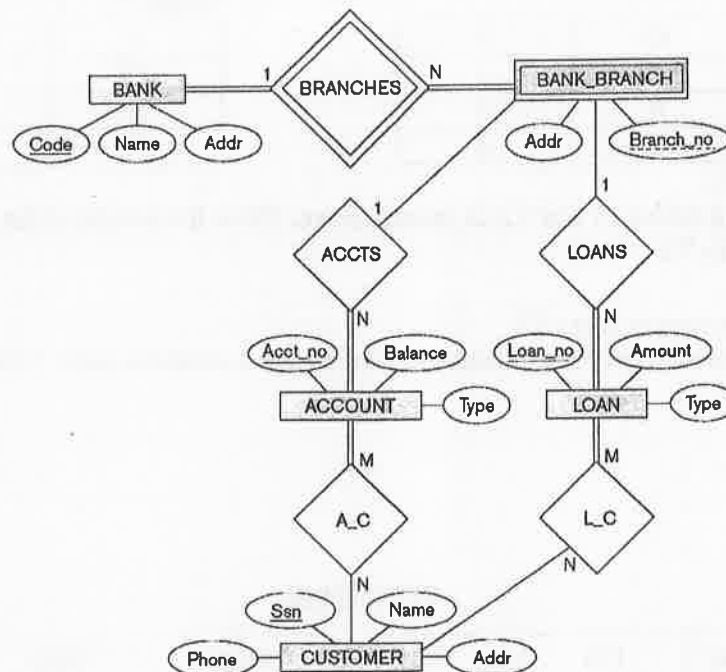


Figure 1

Consider the ER diagram shown in the Figure 1 for part of a BANK database.

Answer the following questions

- i. List the strong (nonweak) entity types with their candidate key in the ER diagram.
- ii. Is there a weak entity type? If so, give its name, partial key, and identifying relationship.
- iii. Identify the cardinality of relationship type between CUSTOMER and LOAN entity.

5+3=8M

3. (a) Convert the ER diagram shown in Figure 1 into a relational database schema. Be certain to indicate primary keys and referential integrity constraints
 (b) What is super key, candidate key, primary key and foreign key. What is referencing and referenced table in relational database design? 7+5=12M
4. (a) LIVES (person-name, street, city)
 WORKS (person-name, company-name, salary)
 LOCATED-IN (company-name, city)
 MANAGES(person-name, manager-name)

For the above schema (the primary key for each relation is denoted by the underlined attribute), provide relational algebra expressions for the following queries:

- Find the name of all employees (i.e., persons) who work for the City Bank company.
- Find the name, street and city of all employees who work for HSBC Bank and earn more than Rs. 10,000
- Find all persons who do not work for SBI Bank
- Find all the manager's name in SBI Bank
- Count the number of employees in City Bank

10M

5. (a) Table T1

P	Q	R
10	a	5
15	b	8
25	a	6

Table T2

A	B	C
10	b	6
25	c	3
10	b	5

Consider the two tables T1 and T2 as shown above. Show the results of the following operations:

- $T1 \bowtie_{T1.P=T2.A} T2$
 - $T1 \cup T2$
 - $T1 \bowtie_{T1.P=T2.A \text{ AND } T1.R=T2.C} T2$
- (b) What is the difference between a database schema and a database state. Discuss with Example 6+4=10M

QP MAPPING

Q. No.	Module Number	CO Mapped	PO Mapped	PEO Mapped	PSO Mapped	Marks
Q1	1	1	PO1, PO4			10
Q2	2	1	PO1, PO4			8
Q3	2	2	PO1, PO2, PO3, PO4			12
Q4	3	2	PO1, PO2, PO3, PO4			10
Q5 (a)	2	2	PO1, PO2, PO3, PO4			6
Q5 (b)	1	1	PO1, PO4			4

QUESTION PAPER

Name of the Examination: Fast Track Fall 2023-24 Semester – CAT

Course Code: CSE2007

Course Title: Database Management Systems

Set number: /

Date of Exam: 07/07/2023 (AN)

Duration: 90Mins

Total Marks: 50

(E₂)

Instructions:

1. Assume data wherever necessary.
2. Any assumptions made should be clearly stated.

- Q1.** Assume that you want to design an information system for online shopping what kind of approach you would prefer either file system approach or database system approach? justify your answer? **(10M)**
- Q2.** i) Construct an E-R diagram for a hospital with a set of patients and a set of medical doctors. Associate with each patient a log of the various tests and examinations conducted. **(5M)**
ii) Construct appropriate tables for the above ER Diagram using SQL: **(5M)**
- Q3.** Consider the MOVIE DATABASE **(10M)**

Movies				Actors	
title	director	myear	rating	actor	ayear
Fargo	Coen	1996	8.2	Cage	1964
Raising Arizona	Coen	1987	7.6	Hanks	1956
Spiderman	Raimi	2002	7.4	Maguire	1975
Wonder Boys	Hanson	2000	7.6	McDormand	1957

Actors		Directors	
actor	title	director	dyear
Cage	Raising Arizona	Coen	1954
Maguire	Spiderman	Hanson	1945
Maguire	Wonder Boys	Raimi	1959
McDormand	Fargo		
McDormand	Raising Arizona		
McDormand	Wonder Boys		

Write following relational algebra queries for a given set of relations.

1. Find movies made after 1997
2. Find movies made by Hanson after 1997
3. Find all movies and their ratings
4. Find all actors and directors
5. Find Coen's movies with McDormand

- Q4. a) Suppose a relational schema $R(P, Q, R, S)$, and set of functional dependency as following $F : \{ P \rightarrow QR, Q \rightarrow R, P \rightarrow Q, PQ \rightarrow R \}$ Find the canonical cover F_c (Minimal set of functional dependency). (5M)
- b) Consider a relational schema $R(W, X, Y, Z)$ having two FD sets $FD_1 = \{W \rightarrow X, X \rightarrow Y, W \rightarrow Y\}$ and $FD_2 = \{W \rightarrow X, X \rightarrow Y, W \rightarrow Z\}$ check whether two FD sets are equivalent or not. (5M)
- Q5. Consider two a relation $R(A, B, C, D, E, F, G, H, I, J)$ and set of functional dependencies $F = \{AB \rightarrow C, A \rightarrow DE, B \rightarrow F, F \rightarrow GH, D \rightarrow IJ\}$. What is the key for R ? Identify the relation in which normal form? (10M)

QP MAPPING

Q. No.	Module Number	CO Mapped	PO Mapped	PEO Mapped	PSO Mapped	Marks
Q1	1	1	1,4	2	1	10
Q2	1,2	1,2	1,2,3,4	2	1	10
Q3	2	2	1,2,3,4	2	1	10
Q4	3	3	1,2,3,4	2	1	10
Q5	3	3	1,2,3,4	2	1	10