

### QUESTION PAPER

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

**Course Code: CSE 2007**

**Set number: 1**

**Duration: 90 Min**

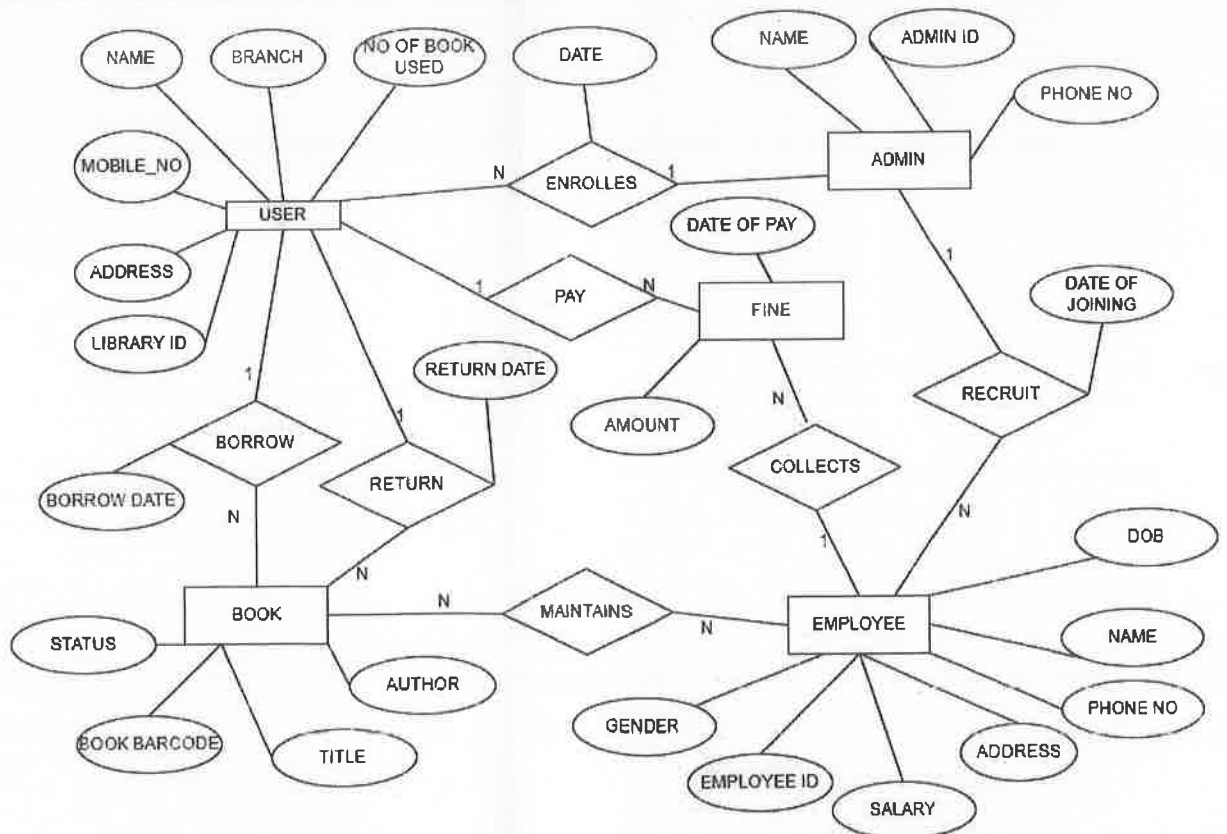
**Course Title: Database Management System**

**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**

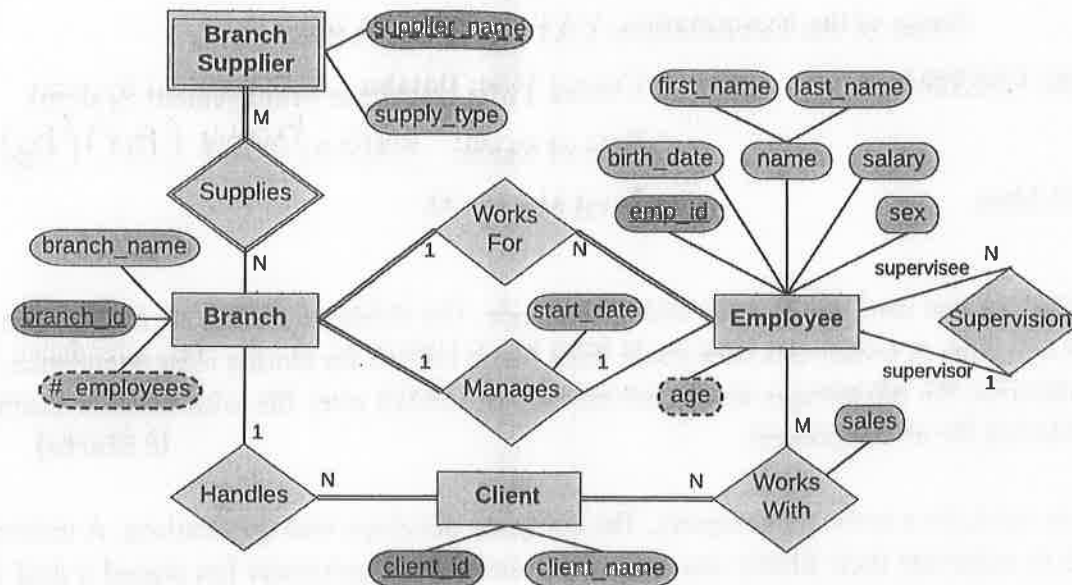
**Date of Exam: 06/02/2024 (AN) (B2)**

**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.

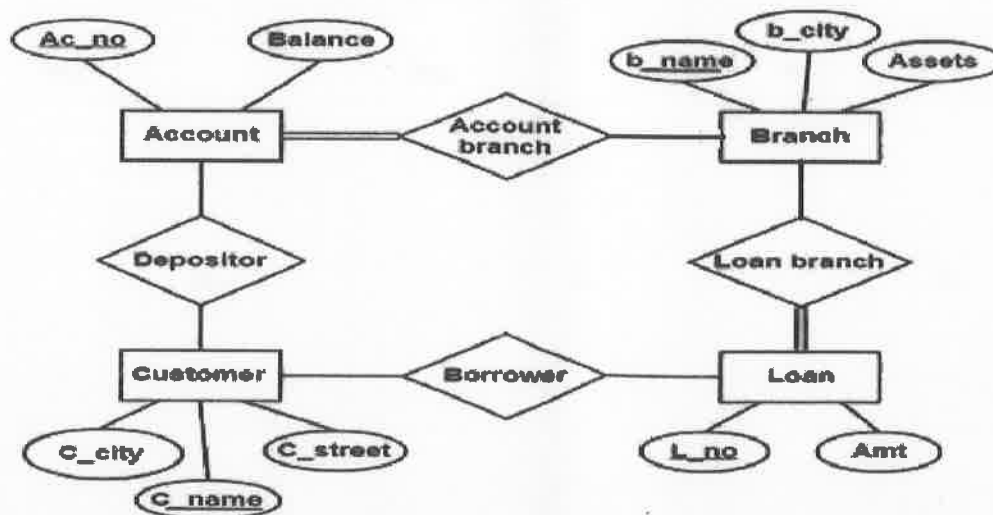
**Q1.** A company wants to centralize its database administration tasks, such as schema modifications and performance tuning while allowing different applications to have their application schemas. How does the three-schema architecture enable data independence to fulfil this requirement?

**(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)

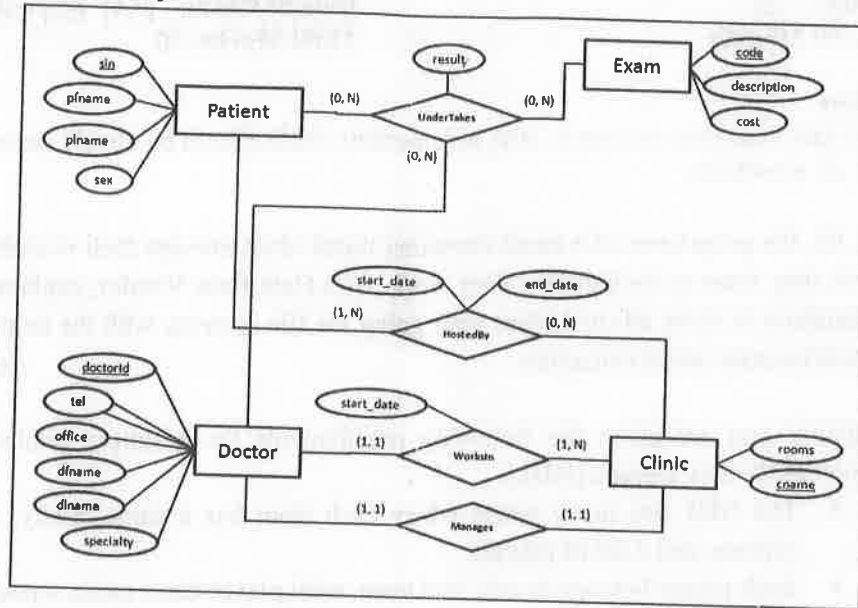
Catalog(sid: integer, pid: integer, cost: real)

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)**

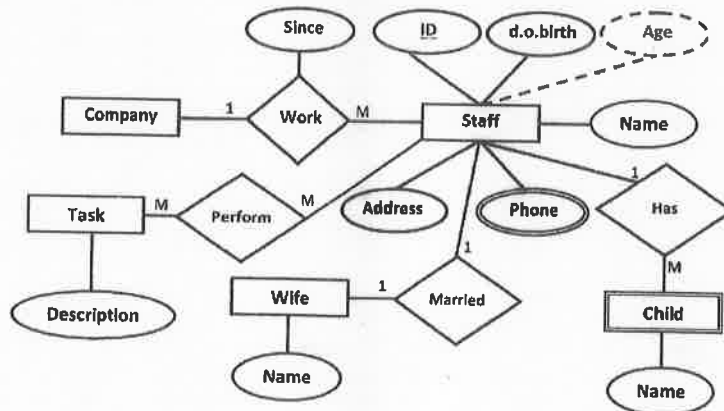
**Duration: 90 mins**

**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

