



Shirpur Education Society's
R. C. PATEL INSTITUTE OF TECHNOLOGY, SHIRPUR

An Autonomous Institute

[Affiliated to Dr. Babasaheb Ambedkar Technological University, Lonere]

आर. सी. पटेल इन्स्टिट्यूट ऑफ टेक्नोलॉजी, शिरपुर
(स्वायत्त महाविद्यालय)



Programme: B.Tech in Computer Engineering **Year:** II/Semester III (**Exam Year:** 2024-2025)

Subject: Database Management System

Time: 09:00 am - 11:00 am (02:00 Hrs.)

Date: 09 Dec 2024

Max Marks: 60

END SEMESTER EXAMINATION ODD SEM-III (2024-2025) REGULAR

- Instructions:**
1. This question paper contains 3 pages
 2. Figure in right hand side indicates full marks
 3. Draw the neat labelled diagrams, wherever necessary.
 4. Assume suitable data wherever required, but justify it.

1.		15
	A. Draw an EER diagram for Hospital Management System by Specialization and Generalization features of EER. Include Entities like Patient, Doctor, Payment, Nurses, Rooms, etc. Add Appropriate Cardinalities and participation where ever required	10
	B. .	5
	i. Define functional dependency and explain its role in database normalization. Why is it important in achieving 2NF and 3NF?	5

----- OR -----

- ii. Discuss constraint on subclasses in enhanced ER model with suitable example. 5

2.		15
----	--	----

A. .		10
------	--	----

- i. Q.2 Employee (eid, ename, Address, city)
Works (eid, cid, salary)
Company (cid, cname, city)
- Construct the SQL queries for the following:

1. Modify database so that John now lives in Mumbai.
2. Display the information of all employees whose name ends with 'A'
3. Display the information of all the employees whose first name starts with 'R' in descending order of their salary.
4. Find the total number of employees who live in 'Nagpur'.
5. Display the information of all employees whose name contains at least 3 characters.

----- OR -----

- ii. Q.2 Employee (EID, Fname, Lname, Email, Phone, Salary, DeptID) 10
Departments (DeptID, DeptName, LocationID)
Location (LocationID, LocationName, City, Pincode)

Construct the SQL queries for the following:

1. Find Employees with Salary Greater Than the Average Salary
2. **Find Employees Who Work in Specific Departments (e.g., 'HR', 'Finance')**
3. **Get a List of Employees and Their Department Names**
4. Find Employees Whose Salary is Above the Average Salary in Their Department

B. Explain authorization in SQL. Write appropriate SQL queries to show authorization. 5

3. 15

A. . 10

i. 10

Q.3 Given two transactions, **Transaction A** and **Transaction B**, executing concurrently on the same bank account:

■ **Transaction A:**

1. Reads the balance from Account 101 (value = 1000).
2. Deducts 200 from the balance.
3. Writes the new balance (value = 800).

■ **Transaction B:**

1. Reads the balance from Account 101 (value = 1000).
 2. Adds 500 to the balance.
 3. Writes the new balance (value = 1500).
1. Simulate the execution of both transactions concurrently.
 2. Identify any potential concurrency issues (such as lost updates, dirty reads, or inconsistent results).
 3. Recommend a concurrency control technique (e.g., Two-Phase Locking, Timestamp Ordering) to prevent these issues and ensure that the transactions are executed correctly.

----- OR -----

ii. Q. 4 Consider a database system that uses a lock-based concurrency control protocol with shared (S) and exclusive (X) locks to manage concurrent transactions. Given the following sequence of operations involving two transactions, T1 and T2, operating on data items A and B: 10

■ **Transaction T1:**

1. **Read(A)** – Requires S(A)
2. **Write(A)** – Requires X(A)
3. **Read(B)** – Requires S(B)
4. **Write(B)** – Requires X(B)

■ **Transaction T2:**

1. **Read(B)** – Requires S(B)
2. **Write(B)** – Requires X(B)
3. **Read(A)** – Requires S(A)
4. **Write(A)** – Requires X(A)

Describe the sequence in which each transaction would acquire and release locks under the Two-Phase Locking (2PL) protocol.

B. What is a deadlock in SQL? Name two common causes of deadlocks in SQL transactions.

5

4.

15

A. .

10

- i. Given the functional dependencies, $AB \rightarrow C$, $C \rightarrow D$, $C \rightarrow E$, $E \rightarrow F$, $F \rightarrow A$ for the relation $R(ABCDEF)$

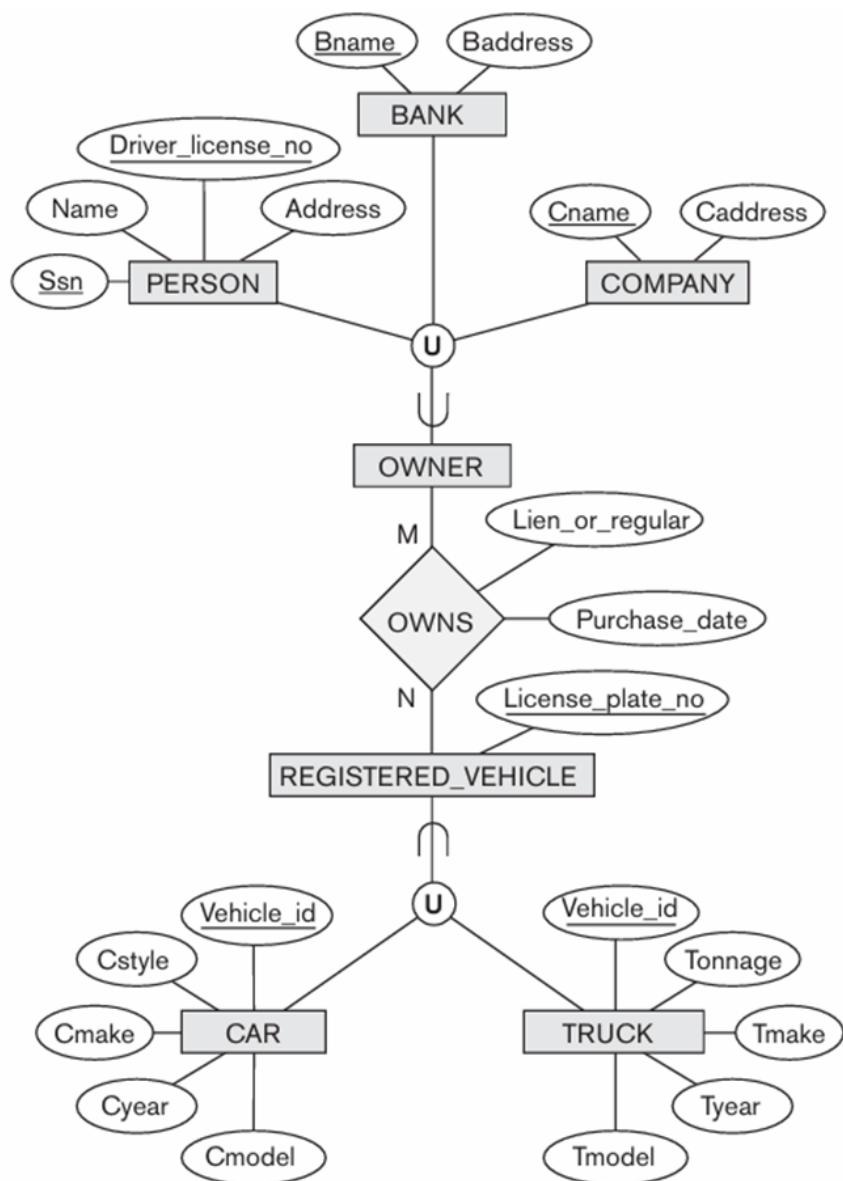
10

Check whether the relation is in BCNF or not. If not normalize it into BCNF.

----- OR -----

- ii. Convert the following EER into Relational Model

10



B. Differentiate between hashing and indexing in DBMS.

5