

# Pre-board Examination - 2024

**Subject: IT 220: Database Management System FM: 60**

**Semester: Time:3 hrs**

**SET A**

**Group A**

**Brief Answer Question [10\*1=10]**

1. What is data and database?
2. What is a 'generalization hierarchy' in database design?
3. What is the limitation of E-R Model? How can we overcome such limitation?
4. What is the result of applying the UNION operation in relational algebra?
5. What is a trigger in SQL?
6. What is the purpose of an index in a database?
7. What is the purpose of Boyce-Codd Normal Form (BCNF) in database design?
8. Why is it important to ensure that transactions are isolated from one another?
9. How does a backup differ from a recovery process?
10. Define a distributed database

**Group B**

**Short Answer Question [5\*3=15]**

1. What do you mean by database administrator? Explain different types of Database Administrator.
2. Identify common design issues that may arise when creating ER diagrams. How can these issues affect the overall database performance and integrity?
3. What is Relational Calculus? Explain the JOIN operation in RA with appropriate examples
4. Define Big Data. Explain NoSQL Databases.
5. What do you mean by key in SQL? Differentiate between candidate key and super key.

**Group C**

**Long Answer Question [3\*5=15]**

1. What do you mean by ACID? Explain ACID in detail with examples of each
2. Define set membership in the context of relational databases. How is it implemented in SQL, and what is its significance when querying data? Provide an example.
3. A healthcare provider uses shadow paging to manage patient records. During a software update, the system crashes, affecting ongoing updates to patient information.

How does shadow paging facilitate recovery from the crash? Also, describe the process of restoring the database to a stable state.

**Group D**

**Comprehensive Question [2\*10=20]**

a. What do you mean by unnormalized data? Explain the problems that may arise using unnormalized data. Also, explain how can we normalized the data up to 2NF with suitable examples

b. Design a database for an automobile company to provide to its dealers to assist them in maintaining customer records and dealer inventory and to assist sales staff in ordering cars. Each vehicle is identified by a vehicle identification number (VIN). Each individual vehicle is a particular model of a particular brand offered by the company (e.g., the XF is a model of the car brand Jaguar of Tata Motors). Each model can be offered with a variety of options, but an individual car may have only some (or none) of the available options. The database needs to store information about models, brands, and options, as well as information about individual dealers, customers, and cars. 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

* 1. Consider the relational database:

Project (pno, pname, no\_of\_staff)

Employee (eno, ename, deptno, basic\_salary, job\_status)

Working on (pno, eno, pjob)

Offering (branch, course)

For each of the queries below, give an expression in SQL.

i. Find the name of all employees who do not work in the department where "Dev" is working.

1. Compute total and average salary of professors , research fellow and office-assistants.
2. Find the names of those employees of the department with department number 3 and who get more salary than the highest paid employee of the department with deptno = 5
3. Find the employee numbers of those employees who are not working in any project
   1. What is a stored procedure in the context of a database? Explain the concept of stored procedures and their role in database management systems.



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**SET B**

**Group A**

**Brief Answer Question [10\*1=10]**

1. What is meant by 'schema' in a database system?
2. What is a high-level conceptual data model?
3. What is the limitation of E-R Model? How can we overcome such limitation?
4. Which set theory operation is used to find the common tuples in two relations?
5. How can you test for empty relations in SQL?
6. Which SQL command updates data in an existing row?
7. What is a multivalued dependency, and how does it relate to the Fourth Normal Form (4NF)?
8. What does "database backup" refer to?
9. What is the significance of the "checkpoint" in transaction processing?
10. What is Big Data, and how is it characterized?

**Group B**

**Short Answer Question [5\*3=15]**

1. What do you mean by data model? Classify the database according to the data model.
2. Discuss the importance of naming conventions in database design. What are some best practices for naming entities and attributes?
3. What is Relational Algebra? Explain DIVISION operation in RA with appropriate example
4. What are the advantages and limitation of Distributed Database?
5. What do you mean by constraints in SQL? Explain domain and referential integrity constraints.

**Group C**

**Long Answer Question [3\*5=15]**

1. Define Transaction. Explain the states of Transaction in detail
2. Why do we need view although we have table? Explain with example
3. A university database uses immediate update recovery for student enrollment transactions. A student updates their course selection, and the change is recorded immediately. A system crash occurs before the transaction is finalized.  
   What measures should the recovery system implement to maintain data consistency? How does the transaction log contribute to this recovery?

**Group D**

**Comprehensive Question [2\*10=20]**

a. What do you mean by Normalization? Explain 1NF, 2NF, 3NF and BCNF with examples of each

b. A company database needs to store information about employees (identified by ssn, with salary and phone as attributes); departments (identified by dno, 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. Draw an ER diagram that captures this information identifying the entity, attributes and the relationship between the entities.

* 1. Consider the relational database:

Student (name, roll\_number, address,main)

Admission (roll\_number, course, semester)

Faculty(course, faculty, semester)

Offering(branch, course)

For each of the queries below, give an expression in SQL.

1. The name of student admitted in a particular course in a given semester.
2. Students who have taken all course offered by the faculty “Sam”.
3. All the course taken by student ‘Aarav’.
4. Name all the faculty who had taught student ‘Aarav’.
   1. Enumerate the advantages of using stored procedures in database development. How do they improve performance, simplify complex operations, and enhance security?