**Exam Structure and Format**

* All exams are 2 hours long
* All questions must be answered (no choices)
* Calculators are not permitted
* The exam typically contains 3-4 main questions, each with multiple parts

**Recurring Topics and Question Types**

**1. Entity-Relationship (E-R) Modeling**

This appears in every exam, typically as the first question:

* Drawing E-R diagrams based on textual descriptions
* Converting E-R diagrams to relational table schemas
* Identifying appropriate constraints (primary keys, foreign keys)
* Handling specialization/generalization relationships
* Modeling complex relationships (many-to-many, recursive relationships)

**2. SQL and Relational Algebra**

These consistently appear in all exams:

* SQL table creation with appropriate constraints
* SQL queries for data retrieval (SELECT statements with various conditions)
* Data manipulation (INSERT, UPDATE, DELETE)
* Aggregate functions and GROUP BY
* Relational algebra expressions (projection, selection, joins, division)
* Understanding and interpreting SQL queries

**3. Normalization and Functional Dependencies**

This is a core theoretical component in every exam:

* Identifying candidate keys from functional dependencies
* Normalization to BCNF (Boyce-Codd Normal Form) or 3NF
* Testing if schemas are in 3NF or BCNF
* Analyzing lossless join decompositions
* Dependency preservation in decompositions

**4. Transaction Processing**

Appearing in more recent exams (2022, 2024):

* Serializability of transaction schedules
* ACID properties of transactions
* Concurrent transaction execution and effects

**5. Indexing and Hashing**

Less frequent but still appears:

* Hash index operations
* Extendible hashing
* Understanding insert operations in hash tables

**Mark Distribution**

* E-R modeling questions: ~15-20 marks
* Relational model and SQL: ~25-35 marks
* Normalization and dependencies: ~15-25 marks
* Transaction questions: ~10-15 marks when they appear
* Indexing/hashing: ~5-10 marks when they appear

**Question Evolution Over Years**

* Earlier exams (2017-2019) focused more on theoretical aspects
* More recent exams (2021-2024) have increased the focus on practical SQL implementation
* Transaction questions have been introduced more prominently in recent years
* Recent exams seem to place higher emphasis on understanding real-world database applications

**Exam Preparation Recommendations**

1. Practice drawing E-R diagrams from textual descriptions
2. Master converting E-R diagrams to relational schemas
3. Focus on writing and interpreting SQL queries
4. Ensure strong understanding of normalization concepts and algorithms
5. Practice identifying candidate keys from functional dependencies
6. Review ACID properties and transaction serializability
7. Look at past papers to get familiar with question formats
8. Practice working with the given time constraints (2 hours)

The exams test both theoretical understanding and practical application of database concepts, with an emphasis on modeling, relational theory, and implementation via SQL

After analyzing the exam papers from 2021-2024 (the most recent three years of exams), I can identify several question types that consistently appear in all of these recent exams:

**Questions Appearing in All Recent Exams (2021-2024)**

**1. E-R Diagram Creation from Description**

Every exam includes a question asking students to draw an E-R diagram based on a textual description of a business scenario. These scenarios have included:

* RH-Solutions software company (2021)
* Airplane company database (2022)
* Innovex IT company employee system (2024)

**2. E-R to Relational Schema Conversion**

Converting an E-R diagram into relational tables appears in all recent exams, focusing on:

* Properly identifying primary keys
* Establishing foreign key relationships
* Minimizing the number of tables while preserving data integrity

**3. BCNF Definition**

All recent exams specifically ask students to define Boyce-Codd Normal Form (BCNF). This appears as a direct question, typically worth 5 marks.

**4. Transaction Serializability**

All three recent exams include a question about determining whether a given schedule of transactions is serializable, and if so, providing an equivalent serial schedule.

**5. SQL Data Manipulation**

Recent exams consistently include SQL questions focusing on:

* Creating/modifying database structures
* Queries with JOIN operations
* Queries involving aggregation (GROUP BY, COUNT, AVG)
* Data modification (UPDATE statements)

**6. Functional Dependencies and Keys**

Questions about determining candidate keys based on functional dependencies appear in both the 2022 and 2024 exams.

**7. ACID Properties**

Each recent exam asks about at least one of the ACID properties of transactions:

* 2021: Isolation
* 2024: Durability

**Unique Elements in Recent Exams**

The 2024 exam introduced a more complex transaction timing problem (showing time steps and asking for final values), which wasn't present in earlier exams.

The 2021 and 2022 exams included questions on Relational Algebra, which didn't appear in this exact format in the 2024 exam.

The 2024 exam has a specific question about lossless join decomposition that wasn't in the 2021-2022 exams.

Based on these patterns, I would prioritize studying E-R modeling, BCNF definition, transaction serializability, SQL queries (especially those with aggregation), and functional dependency analysis, as these appear to be core components of the recent exams.