

MCQs:

Q1. B

Q2. D

Subjective:

Q1. CREATE, ALTER, DROP, TRUNCATE, RENAME, COMMENT

Q2. Relation State: The relation state is a subset of the Cartesian product of the domains of its attributes
each domain contains the set of all possible values the attribute can take.

ACID: Atomicity, Consistency, Isolation, Durability

Atomicity - This property states that a transaction must be treated as an atomic unit, that is, either all of its operations are executed or none. There must be no state in a database where a transaction is left partially completed. States should be defined either before the execution of the transaction or after the execution/abortion/failure of the transaction.

Consistency - The database must remain in a consistent state after any transaction. No transaction should have any adverse effect on the data residing in the database. If the database was in a consistent state before the execution of a transaction, it must remain consistent after the execution of the transaction as well.

Durability - The database should be durable enough to hold all its latest updates even if the system fails or restarts. If a transaction updates a chunk of data in a database and commits, then the database will hold the modified data. If a transaction commits but the system fails before the data could be written on to the disk, then that data will be updated once the system springs back into action.

Isolation - In a database system where more than one transaction are being executed simultaneously and in parallel, the property of isolation states that all the transactions will be carried out and executed as if it is the only transaction in the system. No transaction will affect the existence of any other transaction.

Data Independence: When a schema at a lower level is changed, only the mappings between this schema and higher-level schemas need to be changed in a DBMS that fully supports data independence.

The higher-level schemas themselves are unchanged.

Candidate Key: Minimal Superkey. Can be null.

Q3. 1) No data redundancy and file inconsistency 2) Data isolation allowed or many others. Refer Slides Ch1

ER Diagram: Check yourself. You can refer to Slides Ch3 &4

Relational Algebra

Q1. $\pi_{\text{Title}}(\text{BOOKS}) - \pi_{\text{B1.Title}}(\sigma_{\text{B1.Year} > \text{B2.Year}}(\rho_{\text{B1}}(\text{BOOKS}) \times \rho_{\text{B2}}(\text{BOOKS})))$

Q2. $\text{BOOKS} \star (\pi_{\text{DocId}}(\sigma_{\text{Keyword}='database'}(\text{describes})) \cap \pi_{\text{DocId}}(\sigma_{\text{Keyword}='programming'}(\text{describes})))$ or can be written as $\text{BOOKS} \star (\text{describes} \div \{('database'), ('programming')\})$

Q3. $\pi_{\text{AName}}(\sigma_{\text{StName}='Smith'}(\text{has-written} \star (\text{borrows} \star \text{STUDENTS})))$