Academic RAG Study Assistant

Sample Questions & Answers (Generated Using Fixed Chunking Strategy)

Configuration Used:
Chunking Strategy: Fixed-size chunking (500 characters with overlap)
Retrieval: Top-k = 3
Prompting: Improved prompt
Embedding Model: Sentence Transformers (all-MiniLM-L6-v2)
Language Model: FLAN-T5-base

Question 1
Explain normalization in DBMS in detail and why it is important.

Answer:
Normalization is the process of organizing the data in the database to minimize the redundancy from a relation or set of relations. It is also used to eliminate the undesirable characteristics like Insertion, Update and Deletion Anomalies.

Question 2
Explain first normal form (1NF) clearly with definition.

Answer:
A relation is in first normal form if every field contains only atomic values, that is, not lists or sets.

Question 3
Explain the ACID properties of transactions in DBMS.

Answer:
Atomicity means that all of the instructions within the transaction will be reflected in the database, or none of them will be reflected. Consistency ensures that the database remains in a valid state before and after the transaction. Isolation ensures that transactions execute independently. Durability ensures that once a transaction is committed, the changes are permanent.

Question 4
Define a transaction in DBMS and explain its purpose.

Answer:
A transaction is a set of logically related operations.

Question 5
What causes deadlock in DBMS and why does it occur?

Answer:
Deadlock occurs when transactions are waiting for each other to release resources. If more than one process takes action, circular waiting can occur and none of the transactions can proceed.

Question 6
Explain the structure and purpose of a B-tree index in DBMS.

Answer:
B+ Tree indexes are an alternative to indexed-sequential files. They are used to organize data and improve searching performance.

Question 7
Explain the difference between DELETE and TRUNCATE commands in SQL.

Answer:
DELETE is a command that is used to delete records from a table. TRUNCATE is a command that is used to delete all records from a table.

Question 8
Explain the concept of two-phase locking (2PL) in DBMS.

Answer:
The two-phase locking protocol divides the execution phase of the transaction into two phases. In the growing phase, a transaction acquires locks but does not release any. In the shrinking phase, existing locks held by the transaction may be released, but no new locks can be acquired.

Question 9
Define functional dependency and explain its role in normalization.

Answer:
Functional dependency is a relationship between two attributes where one attribute determines another.

Question 10
When should we use a hash index instead of a B-tree index in DBMS?

Answer:
A hash index is used when equality search is required. It uses a hash function to directly access the required record.