

## Data Engineering & ETL Quiz

**Instructions:** Select the correct option(s) for each question. Some questions may have multiple correct answers. Provide a short explanation for all.

**Question 1)** Which mechanisms help achieve exactly-once semantics in a Kafka + Spark Streaming pipeline?

- A) Idempotent writes at the sink
- B) At-least-once message delivery
- C) Checkpointing with offset tracking
- D) Stateless transformations

**Question 2)** In a star schema, the large transactional table that stores numeric measures is called the:

- A) Fact table
- B) Dimension table
- C) Bridge table
- D) Lookup table

**Question 3)** Delta Lake provides which ACID guarantees by default?

- A) Atomicity
- B) Consistency
- C) Isolation
- D) Durability

**Question 4)** Which scheduling strategy in Apache Airflow is best for pipelines triggered by external file arrival?

- A) Cron schedule
- B) Trigger rule
- C) Sensor operator
- D) DAG concurrency control

**Question 5)** ELT differs from traditional ETL primarily because:

- A) Transformations occur after data is loaded into the warehouse
- B) It always uses batch jobs
- C) It requires proprietary appliances
- D) It eliminates data-validation steps

**Question 6)** In columnar storage formats like Parquet, predicate push-down improves query performance by:

- A) Reading only relevant row groups
- B) Repartitioning files on the fly
- C) Compressing the entire dataset
- D) Increasing the replication factor

**Question 7)** The most appropriate way to version schema changes in a data lake is:

- A) Keep separate folders per date
- B) Use Delta Lake time-travel
- C) Rename columns directly in-place
- D) Drop and recreate tables