Birla Institute of Technology and Sciences, Pilani

Comprehensive Examination 2023

Subject: Data Management & Warehousing (MPBA –G506) (Part-A)

Duration: 45mins

Full Marks = 20

Name: …….. Roll No ……

Instructions

- *Choose the correct option from the multiple choice questions.*
- *Mark the correct option in the boxes given below.*

1.	2.	3.	4.	5.	6.	7.	8.	9.	10.
11.	12.	13.	14.	15.	16.	17.	18.	19.	20.

1. What is a Data Warehouse?

a) A real-time database system

b) A centralized repository for storing and managing data from various sources

c) A transaction processing system

d) A file-based data storage system

2. Which of the following is a primary goal of a Data Warehouse?

a) Real-time processing

b) Efficient transaction management

c) Support for online transaction processing (OLTP)

d) Decision support and business intelligence

3. What is ETL in the context of Data Warehousing?

a) Extract, Transform, Load

b) Extend, Transfer, Log

c) Execute, Transform, Load

d) Extract, Transmit, Load

4. In a Data Warehouse, what is the purpose of OLAP (Online Analytical Processing)?

a) Real-time transaction processing

b) Ad-hoc querying and multidimensional analysis

c) Data cleaning and normalization

d) Query optimization

5. Which of the following is *NOT* a characteristic of Data Warehousing?

a) Historical data storage

b) Subject-oriented

c) Online Transaction Processing (OLTP)

d) Non-volatile data storage

6. What a sequence of one or more query instruction in DBMS called?

a) A query operation

b) A transaction

c) A Schedule

d) A database schema

7. Which property of a transaction ensures that it leaves the database in a consistent state?

a) Atomicity

b) Durability

c) Isolation

d) Consistency

8. What is the purpose of the ACID properties in transaction management?

a) To ensure security of the database

b) To maintain data integrity in transactions

c) To support efficient indexing

d) To facilitate parallel processing

9. What is a phantom read in a Database Management System (DBMS)?

a) A transaction reading a value that is later deleted by another committed transaction.

b) A transaction reading a value that has been modified by another uncommitted transaction.

c) A transaction reading a value that is later rolled back by another transaction.

d) A transaction reading a value that is written by an uncommitted transaction.

10. In the context of Conflict Serializability which of the following statements is true?

a) Conflict serializability allows transactions to bypass the two-phase locking protocol.

b) Conflict serializability is a property that ensures the final state of the database is the same regardless of the order in which transactions are executed.

c) Conflict serializability ensures that transactions are executed in the order they are received.

d) Conflict serializability guarantees that transactions can run concurrently without any conflicts.

11. What is the main goal of concurrency control in database systems?

a) To ensure data durability

b) To maximize data redundancy

c) To manage simultaneous access to the database by multiple transactions

d) To optimize query performance

12. Which concurrency control technique allows transactions to lock individual data items?

a) Two-Phase Locking (2PL)

b) Time-stamp ordering

c) Optimistic concurrency control

d) Multi-Version Concurrency Control (MVCC)

13. What is a deadlock in the context of concurrency control?

a) A situation where two transactions are waiting for each other to release locks

b) A situation where a transaction is waiting indefinitely for a resource held by another transaction

c) A situation where multiple transactions are executing simultaneously

d) A situation where a transaction is rolled back

14. Which of the following statements is true regarding View Serializability??

a) It ensures that a schedule is conflict-serializable.

b) It focuses on the temporal order of transactions.

c) It guarantees that the final state of the database is consistent with a serial execution of the transactions.

d) It allows transactions to be interleaved without considering their conflicts

15. Which of the following statements describes the Two-Phase Locking protocol?

a) Transactions can acquire locks at any time and release them in an arbitrary order.

b) All locks must be acquired before any are released, and once a lock is released, no more locks can be acquired.

c) Transactions can release locks at any time, but they must acquire all necessary locks before the first unlock.

d) Locks can be acquired and released freely throughout the entire transaction execution.

16. In the storage hierarchy, which level is closest to the CPU for faster access?

a) Secondary storage

b) Tertiary storage

c) Primary storage (RAM)

d) External storage

17. What is the primary characteristic of cache memory in the storage hierarchy?

a) Large capacity

b) Volatility

c) High speed

d) Non-volatile

18. Which storage level is typically used for long-term, non-volatile data storage?

a) Cache memory

b) Secondary storage

c) Primary storage (RAM)

d) Virtual memory

19. What is the purpose of a shared lock in a locking protocol?

a) To allow multiple transactions to write to a data item simultaneously

b) To allow multiple transactions to read a data item simultaneously

c) To prevent other transactions from reading a data item

d) To prevent other transactions from writing to a data item

20. What is the purpose of assigning a unique timestamp to each transaction?

a) To optimize query performance by prioritizing certain transactions.

b) To enable rollback and recovery in case of system failures.

c) To ensure serializability by enforcing a total order of transactions.

d) To enable rollback and recovery in case of system failures.

Birla Institute of Technology and Sciences, Pilani

Comprehensive Examination 2023

Subject: Data Management & Warehousing (MPBA –G506) (Part-B)

Duration: 2hrs 15mins

Full Marks = 50

Answer Any FIVE

1.
   a. Describe the various states that a transaction goes through during its execution in a DBMS. Provide a schematic diagram to illustrate the state transition. (6)

   b. State the differences between OLAP and OLTP systems, with a focus on their purposes and characteristics. (4)

2.
   a. Discuss the fundamental features of data warehouse, emphasizing aspects like subject orientation, integration, time-variant data, and non-volatility. (4)

   b. Explain with short examples - Dirty Read, Blind Write, Cascading rollback (6).

3.
   a. What is transaction in a DBMS? Discuss the ACID properties in details. (2+4)

   b. Explain Thomas Write Rule in Time-stamping protocol with a short example.(4)

4.
   a. What are three components in Data warehouse architecture? Explain the tasks they perform.(2+2)

   b. What is DataMart? Write four advantages of DataMart? (2+4)

5.
   a. What is Exclusive and Shared Lock in Lock-based Protocol? Explain the two phases in Two-Phase Locking protocol. (2+2)

   b. Is Conservative 2-Phase locking protocol recoverable and cascadeless? Explain with example. (6)

6.
   a. Draw the storage hierarchy and explain each media in physical storage systems in the light of cost per unit data and speed. (6)

   b. What RAID and Explain different RAID-Levels. (4)