Printed Page:- 04 **Subject Code**:- **ACSML0603**

Roll. No:

NOIDA INSTITUTE OF ENGINEERING AND TECHNOLOGY, GREATER NOIDA

(An Autonomous Institute Affiliated to AKTU, Lucknow)

B.Tech

SEM: VI - THEORY EXAMINATION (2023 - 2024)

Subject: Advanced Database Management Systems

Time: 3 Hours **Max. Marks: 100**

General Instructions:

IMP: *Verify that you have received the question paper with the correct course, code, branch etc.*

1. *This Question paper comprises of* **three Sections -A, B, & C.** *It consists of Multiple Choice Questions (MCQ's) & Subjective type questions.*

2. *Maximum marks for each question are indicated on right -hand side of each question.*

3. *Illustrate your answers with neat sketches wherever necessary.*

4. *Assume suitable data if necessary.*

5. *Preferably, write the answers in sequential order.*

6. *No sheet should be left blank. Any written material after a blank sheet will not be evaluated/checked.*

SECTION A **20**

1. Attempt all parts:-

1-a. A table can be logically connected to another table by defining a (CO1) 1

(a) Super key

(b) composite key

(c) Primary key

(d) Unique key

1-b. To generate the output of a query, a ___ is responsible.(CO1) 1

(a) Query execution engine

(b) Query execution motor

(c) Query execution train

(d) None

1-c. The query router uses _____ to target operations to specific shards.(CO2) 1

(a) metadata

(b) cluster

(c) replica

(d) all of the mentioned

1-d. When transaction Ti requests a data item currently held by Tj, Ti is allowed to wait only if it has a timestamp larger than that of Tj (that is, Ti is younger than Tj). Otherwise, Tj is rolled back (Tj is wounded by Ti). This is (CO2) 1

(a) Wait-die

(b) Wait-wound

(c) Wound-wait

(d) Wait

1-e. Aggregation pipeline was introduced in MongoDB version _____.(CO3) 1

(a) 2.1

(b) 2.2

(c) 2.4

(d) 3

1-f. MongoDB scales horizontally using _____ for load balancing purpose.(CO3) 1

(a) Replication

(b) Partitioning

(c) Sharding

(d) None of the mentioned

1-g. _____is a query language used in object-oriented databases(CO4) 1

(a) SQL

(b) OQL

(c) PL/SQL

(d) T-SQL

1-h. Data warehouse based on (CO4) 1

(a) 1D model

(b) 2D model

(c) 3D model

(d) Multidimensional model

1-i. _____is a standard for data exchange between systems.(CO5) 1

(a) SQL

(b) JSON

(c) XML

(d) YAML

1-j. SOAP stands for (CO5) 1

(a) Simple Object Access Protocol

(b) Service-Oriented Architecture Protocol

(c) Secure Open Access Protocol

(d) Simple Online Application Protocol

2. Attempt all parts:-

2.a. Describe concurrency in Transactions (CO1) 2

2.b. Describe the common method preferred for database replication.(CO2) 2

2.c. Explain Replica Set in MongoDB.(CO3) 2

2.d. Describe spatial data types.(CO4) 2

2.e. Explain data standardization.(CO5) 2

SECTION B **30**

3. Answer any <u>five</u> of the following:-

3-a. Explain database modification.(CO1) 6

3-b. Explain left join and right join with suitable example.(CO1) 6

3-c. Explain two phases of "two-phase commit protocol"(CO2) 6

3-d. Describe the similarities and differences between parallel and distributed database management systems.(CO2) 6

3.e. Explain the concept of pipeline in the MongoDB aggregation framework.(CO3) 6

3.f. Explain the difference between temporal database and traditional database(CO4) 6

3.g. Explain the concept of XML and how it is used in web service communication(CO5) 6

SECTION C **50**

4. Answer any <u>one</u> of the following:-

4-a. Explain the features of RDBMS. Define the object-oriented model.(CO1) 10

4-b. Compare and contrast two-phase locking and deadlock prevention as concurrency control mechanisms. Discuss their advantages and limitations. (CO1) 10

5. Answer any <u>one</u> of the following:-

5-a. Compare Distributed Deadlock prevention to Distributed Deadlock Avoidance. Explain one scheme of Distributed deadlock Detection and Recovery.(CO2) 10

5-b. Explain the concept of concurrency control in distributed databases. Discuss its 10

significance in ensuring data consistency and transactional integrity. Provide examples to illustrate your points.**(C**O2)

6. Answer any <u>one</u> of the following:-

6-a. (i)Write a query to insert a new document into a collection named "products" with fields "name", "price", and "category" using MongoDB? 10

(ii) Write a query to retrieve all documents from the "orders" collection where the "status" field is set to "pending".

(iii)Write a query to update the "price" field of all documents in the "products" collection by increasing it by 10%.

(iv) Write a query to retrieve all documents from the "students" collection where the "age" field is greater than 20 and the "gender" field is "female". (CO3)

6-b. Explain the importance of indexing in MongoDB. Describe how indexes improve query performance and provide examples of scenarios where indexing is beneficial. Write a query to retrieve all documents from the "products" collection ordered by the "price" field in ascending order.(CO3) 10

7. Answer any <u>one</u> of the following:-

7-a. Explain deductive database. How query is processed in a deductive database.(CO4) 10

7-b. Explain the architecture of a typical data warehousing system. Describe the components such as data sources, ETL (Extract, Transform, Load) processes, data warehouse storage, and analytical tools.(CO4) 10

8. Answer any <u>one</u> of the following:-

8-a. Describe the differences between interoperability and integration standards, and how do they help different systems to communicate and exchange data effectively. Provide examples of each type of standard.(CO5) 10

8-b. Explain web service standards, such as WSDL and UDDI, and how do they contribute to interoperability. (CO5) 10