Printed Page:- 04 **Subject Code:- AMICA0402**

Roll. No:

NOIDA INSTITUTE OF ENGINEERING AND TECHNOLOGY, GREATER NOIDA

(An Autonomous Institute Affiliated to AKTU, Lucknow)

MCA (Integrated)

SEM: IV - THEORY EXAMINATION (2023 - 2024)

Subject: Database 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. When data is organized, processed, or analyzed, it becomes: (CO1) 1

(a) Information

(b) Raw data

(c) Meaningless

(d) Unorganized data

1-b. Choose the type of relationships represented in the Network Data Model: (CO1) 1

(a) Only one-to-one relationships

(b) Only one-to-many relationships

(c) Only many-to-many relationships

(d) Both one-to-many and many-to-many relationships

1-c. What does DDL stand for in SQL? (CO 2) 1

(a) Data Definition Language

(b) Data Declaration Language

(c) Data Development Language

(d) Database Description Language

1-d. Which of the following is a TCL command? (CO 2) 1

(a) SELECT

(b) COMMIT

(c) UPDATE

(d) DELETE

1-e. Which of the following is an example of a Non-Equi Join condition? (CO3) 1

(a) WHERE table1.column1 = table2.column2

(b) WHERE table1.column1 > table2.column2

(c) WHERE table1.column1 = table2.column2 + 1

(d) WHERE table1.column1 = table2.column2 AND table1.column3 = table2.column4

1-f. The IN operator is used in a subquery to: (CO3) 1

(a) Check if a value exists in a set of values

(b) Check if a value does not exist in a set of values

(c) Perform an Inner Join

(d) Perform a Left Outer Join

1-g. In case of any shut down during transaction before commit which of the following statement is done automatically? (CO4) 1

(a) View

(b) Commit

(c) Rollback

(d) Flashback

1-h. The “all-or-none” property is commonly referred to as_____ (CO4) 1

(a) Isolation

(b) Durability

(c) Atomicity

(d) None of the mentioned

1-i. What does NoSQL stand for? (CO5) 1

(a) Non-Sequential Query Language

(b) Not Only SQL

(c) New Object-Oriented Syntax and Language

(d) None of the above

1-j. Which method is used to insert a single document in MongoDB Collection? (CO5) 1

(a) db.collection.insert()

(b) db.collection.addone()

(c) db.collection.create()

(d) db.collection.insertone()

2. Attempt all parts:-

2.a. List any five data model. (CO1) 2

2.b. How do you create a view in SQL? (CO2) 2

2.c. Explain the purpose of using a Nested Query or Subquery in a SQL statement.(CO3) 2

2.d. Define Shared Lock (S) and its role in concurrency control. (CO4) 2

2.e. List two example of Key-Value NoSQL Databases (CO5) 2

SECTION B **30**

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

3-a. Differentiate between Hierarchical Model and Network Model. (CO1) 6

3-b. How to convert ER Diagrams into Tables in Database Management Systems (DBMS)? Explain it with an example. (CO1) 6

3-c. What is an aggregate function? Explain any five aggregate functions with an example. (CO2) 6

3-d. What is the closure form of an attribute? If a relation R has attributes A, B, C, D, and the functional dependencies are A -> BC, C -> D, and B -> C, find the closure of the attribute set {A, B}. (CO2) 6

3.e. Discuss the differences between a Left Outer Join and a Full Outer Join. (CO3) 6

3.f. Differentiate between conflict serializability and view serializability, and provide examples to illustrate each concept. (CO4) 6

3.g. How does MongoDB differ from traditional relational databases in terms of data storage? (CO5) 6

SECTION C **50**

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

4-a. Create an Entity-Relationship Diagram (ERD) for an online bookstore. (CO1) 10

4-b. What is relational algebra? Explain each basic operation in relational algebra with a suitable example. (CO1) 10

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

5-a. What is Canonical Cover ? Given functional dependencies are as follows: 10

A -> B

B -> C

AB -> D

D -> A . Determine the Canonical Cover.(CO2)

5-b. What is a candidate key, and how is it related to the closure form of attributes? Given a relation R with attributes A, B, C, D, and functional dependencies A -> B, B -> C, and C -> D, find the candidate keys using the closure form of attributes. (CO2) 10

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

6-a. What are the advantages and disadvantages of using a Natural Join compared to other join types? When would you choose to use a Natural Join over an Equi Join or an Outer Join?(CO3) 10

6-b. Consider the following table: 10

Book (<u>BookId</u>, Bname, AuthorID)

Author (<u>AuthorID</u>, Author_Name)

Write SQL queries for the following tasks:

a) Retrieve the names of all authors along with the titles of their books.

b) List all books along with their corresponding author names.

c) Find the titles of books written by authors whose names start with 'J'.

d) List the titles of books along with their corresponding authors, sorted alphabetically by author name.(CO3)

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

7-a. What is the transaction life cycle? Explain the different states a transaction can go through, from its initiation to its successful completion or failure. How does the DBMS handle each state? (CO4) 10

7-b. Provide examples to illustrate the difference between serial and non-serial schedules, and discuss their impact on transaction processing. (CO4) 10

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

8-a. What are the key differences between the ACID and BASE models in database management? (CO5) 10

8-b. What are CRUD operations in MongoDB? How do you retrieve a specific document in MongoDB? (CO5) 10