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. What distinguishes information from data? (CO1) 1

(a) Information is raw, while data is processed
(b) Data is organized, while information is raw
(c) Data is raw, while information is processed and meaningful
(d) Information is meaningless, while data has meaning

1-b. Which database model stores data in tables with rows and columns? (CO1) 1

(a) Hierarchical
(b) Network
(c) Relational
(d) Object-oriented

1-c. How do you define the structure of a database using SQL? (CO 2) 1

(a) Using DML commands
(b) Using DCL commands
(c) Using DDL commands
(d) Using TCL commands

1-d. How do you add a new column to an existing table in SQL? (CO 2) 1

(a) Using ALTER TABLE
(b) Using SELECT INTO
(c) Using INSERT INTO

(d) Using DELETE FROM

1-e. In a Cartesian Product of two tables with m and n rows respectively, how many rows will the resulting table have? (CO3) 1

(a) m
(b) n
(c) m * n
(d) m + n

1-f. In an Inner Join, the result set includes: (CO3) 1

(a) All rows from both tables
(b) Only rows that match the join condition from both tables
(c) All rows from the left table and matched rows from the right table
(d) All rows from the right table and matched rows from the left table

1-g. Which SQL statement is used to grant privileges to a user in a database transaction? (CO4) 1

(a) GRANT
(b) REVOKE
(c) COMMIT
(d) ROLLBACK

1-h. What happens during the commit phase of the transaction life cycle? (CO4) 1

(a) The transaction is rolled back
(b) The transaction is aborted
(c) The changes made by the transaction are permanently saved
(d) The transaction is paused

1-i. In which type of NoSQL database are data stored in nodes, edges, and properties, representing relationships between data points? (CO5) 1

(a) Key-Value Stores
(b) Document Stores
(c) Graph Databases
(d) Column-based Stores

1-j. How do NoSQL databases ensure high availability? (CO5) 1

(a) By distributing the workload across multiple servers or clusters
(b) By supporting flexible schemas
(c) By offering fast response times even with large datasets
(d) By running on clusters of servers with multiple copies of the data

2. Attempt all parts:-

2.a. What do you mean by recursive relation type? Explain with example. (CO1) 2

2.b. Differentiate between ALTER and UPDATE commands. (CO2) 2

2.c. What is a Nested Query or Subquery?(CO3) 2

2.d.	What is view serializability? (CO4)	2
2.e.	List two example of Document-Based NoSQL Databases (CO5)	2

SECTION-B 30

3. Answer any five of the following:-

3-a.	What is data abstraction? Explain the different levels of abstraction. (CO1)	6
3-b.	Describe an Entity-Relationship (E.R.) Diagram along with its symbols. (CO1)	6
3-c.	Explain different types of constraints in SQL? (CO2)	6
3-d.	Write an algorithm to determine the closure of attributes in the context of functional dependencies. (CO2)	6
3.e.	Discuss the differences between a Left Outer Join and a Full Outer Join. (CO3)	6
3.f.	Discuss the types of schedules in DBMS with suitable example. (CO4)	6
3.g.	What are the common characteristics shared by NoSQL databases in terms of scalability, specialized use cases, and schema flexibility? (CO5)	6

SECTION-C 50

4. Answer any one of the following:-

4-a.	What are the characteristics that distinguishes a database management system from traditional file processing system. (CO1)	10
4-b.	Consider the following relations Agent (agent_id, a_name, a_address) Part (pid. P_name, color) Catalog (agent_id, pid, cost) Write the query in relational algebra: 1) Find the name of agent who supplies ‘Red part’. 2) Find the name of agent who supplies both ‘Red part’ and ‘green part’. 3) Find the name of agent who supplies all the parts 4) Find the names of parts along with their corresponding costs. (CO1)	10

5. Answer any one of the following:-

5-a.	Describe various types of SQL commands with syntax.(CO2)	10
5-b.	What is normalization ? Explain each type of normal form with suitable example(CO2)	10

6. Answer any one of the following:-

6-a.	Consider the following tables: Students (StudentID, StudentName, DateOfBirth, Major, Fees, DepartmentID) Courses (CourseID, CourseName, Credits, DepartmentID) Departments (DepartmentID, DepartmentName, HeadInstructorID) Enrollments (StudentID, CourseID, Grade, HoursSpent) Write SQL queries for the following tasks: a) Find the course ID and course name for courses with credits greater than 4. b) Find the student name, course name, major, and hours spent for all enrollment records.	10

c) Find the student name, department name, and major. (CO3)

6-b. Consider the following table: 10
EmployeesDetails(EmpId, Ename, Salary, Age)
Write SQL queries for the following tasks:
a) To retrieve the names and ages of all employees whose salary is greater than the average salary of all employees.
b) To find the name of employee whose age is second highest among all ages. (CO3)

7. Answer any one of the following:-

7-a. What is Concurrency? Why is Concurrency control required? Explain it with a suitable example. (CO4) 10

7-b. For each of the following schedules, determine if they are conflict serializable. If so, provide an equivalent serializable schedule. 10
S1: r1(x); r2(x); w2(x); r1(y); w1(x)
S2: r1(x); w2(y); r2(y); w1(x); w2(x)
S3: r1(x); w1(y); r2(x); w2(y); r1(y) (CO4)

8. Answer any one of the following:-

8-a. Explain the meaning of ACID and BASE acronyms in the context of database operations? (CO5) 10

8-b. How do you create a new database in MongoDB? Write the MongoDB query to insert a new document into a collection named "users" with fields "name", "age", and "email". (CO5) 10