Printed Page:-04 **Subject Code**:- **ACSAI0402**

Roll. No:

NOIDA INSTITUTE OF ENGINEERING AND TECHNOLOGY, GREATER NOIDA

(An Autonomous Institute Affiliated to AKTU, Lucknow)

B.Tech

SEM: IV - THEORY EXAMINATION (2024- 2025)

Subject: 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. For performing tasks like adding, deleting and updating of tuples in a relation, which of the following is used? (CO1) (K1) 1

(a) Data definition language
(b) Data control language
(c) Data manipulation language
(d) Transaction control language

1-b. In which one of the following, the multiple lower entities are grouped (or combined) together to form a single higher-level entity? (CO1) (K1) 1

(a) Specialization
(b) Generalization
(c) Aggregation
(d) None of the above

1-c. If you do not specify ASC or DESC after a SQL ORDER BY clause, which of the following is used by default. (CO2) (K2) 1

(a) ASC
(b) DESC
(c) There is no default value
(d) None

1-d. Select _____ dept_name from instructor; Here which of the following displays 1

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the unique values of the column? (CO2) (K2)

(a) All
(b) From
(c) Distinct
(d) Name

1-e. Functional Dependencies are the types of constraints that are based on (CO3) (K2) 1

(a) Key
(b) Key revisited
(c) Superset key
(d) None of the mentioned

1-f. After normalization, the original table can be obtained by – (CO3) (K2) 1

(a) Delete operation
(b) Cascade operation
(c) Join operation
(d) None of the above

1-g. The part of a database management system which ensures that the data remains in a consistent state is (CO4) (K1) 1

(a) authorization and integrity manager
(b) buffer manager
(c) transaction manager
(d) file manager

1-h. If the database modifications occur while the transaction is still active, then the modification technique is (CO4) (K1) 1

(a) Deferred
(b) Immediate
(c) More than one of the mentioned
(d) None of the mentioned

1-i. In MongoDB which operations modify the data of a single collection? (CO5) (K1) 1

(a) CRUD
(b) GRID
(c) READ
(d) All of the mentioned

1-j. Identify the option that is not a NoSQL database. (CO5) (K1) 1

(a) SQL Server
(b) MongoDB
(c) Cassandra
(d) None of the above

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2. Attempt all parts:-

2.a.	Explain the concept of Foreign Key. (CO1) (K2)	2
2.b.	Define Intersection operation with example in relational algebra. (CO2) (K2)	2
2.c.	Discuss different types of anomalies with suitable examples (CO3) (K3)	2
2.d.	Draw and Discuss the different states of the transaction. (CO4) (K2)	2
2.e.	Discuss some of the advantages of MongoDB? (CO5) (K2)	2

SECTION-B 30

3. Answer any five of the following:-

3-a.	Explain Query Processing with the help of a diagram. (CO1) (K3)	6
3-b.	List the different types of database languages. Explain each of them with examples (CO1) (K2)	6
3-c.	Explain triggers in databases with the help of an example. Also discuss the uses of Database Triggers in detail. (CO2) (K3)	6
3-d.	Define Aggregate functions? Explain various Aggregate functions used in SQL with examples. (CO2) (K3)	6
3.e.	Given a relation R(A, B, C, D, E) and Functional Dependency set FD = { A → B, B → E, C → D}, determine whether the given R is in 2NF? If not convert it into 2 NF. (CO3) (K3)	6
3.f.	Discuss the deferred update technique of recovery. What are the advantages and disadvantages of this technique? Why is it called the NO-UNDO/REDO method? (CO4) (K3)	6
3.g.	Define real time database? Explain the timing constraints and deadlines for the same. (CO5) (K2)	6

SECTION-C 50

4. Answer any one of the following:-

4-a.	Create ER Diagram for following scenario: A salesperson may manage many other salespeople. A salesperson is managed by only one salespeople. A salesperson can be an agent for many customers. A customer is managed by one salespeople. A customer can place many orders. An order can be placed by one customer. An order lists many inventory items. An inventory item may be listed on many orders. An inventory item is assembled from many parts. A part may be assembled into many inventory items. Many employees assemble an inventory item from many parts. A supplier supplies many parts. A part may be supplied by many suppliers.(CO1) (K5)	10
4-b.	Construct an E-R diagram for a hospital with a set of patients and a set of medical doctors. Associate with each patient a log of the various tests and examinations conducted.(CO1) (K5)	10

5. Answer any one of the following:-

5-a.	Consider the following relational database schema consisting of the four relation schemas: passenger (pid, pname, pgender, pcity) agency (aid, aname, acity) flight (fid, fdate, time, src, dest) booking (pid, aid, fid, fdate)	10

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Answer the following questions using relational algebra queries:
(i) Get the complete details of all flights to New Delhi.
(ii) Find only the flight numbers for passenger with pid 123 for flights to Chennai before 06/11/2020.
(iii) Get the details about all flights from Chennai to New Delhi.
(iv) Find the agency names for agencies that are located in the same city as passenger with passenger id 123. (CO2) (K4)

5-b. Consider the following schema: 10
EmployeeInfo (EmpId, Emp_fname,Emp_Lname,dept, project, address, dob, gender),
EmployeePosition (EmpId, EmpPosition, DateOfJoining, Salary) .
Answer the following questions using SQL queries:
(i) Write a query to fetch the Emp_Fname from the EmployeeInfo table in upper case and use the ALIAS name as EmpName.
(ii) Write a query to get the current date.
(iii) Write a query to create a new table which consists of data and structure copied from the other table.
(iv) Write a query to find all the employees whose salary is between 50000 to 100000. (CO2) (K4)

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

6-a. Given a relation R(P, Q, R, S, T) and Functional Dependency set FD = { QR → PST, S → Q }, determine given R is in which normal form? (CO3) (K3) 10

6-b. Given a relational schema R(X, Y, Z, W, V) set of functional dependencies P and Q such that: P = { X → Y, XY → Z, W → XZ, W → V} and Q = { X → YZ, W → XV } using FD sets P and Q are equivalent or not. (CO3) (K4) 10

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

7-a. What is a schedule? Define the concepts of cascading, cascadeless, and strict schedules, and compare them in terms of their recoverability. (CO4) (K4)

7-b. Consider the three transactions T1, T2, and T3, and the schedules S1 and S2 given below. Draw the serializability (precedence) graphs for S1 and S2, and state whether each schedule is serializable or not. If a schedule is serializable, write down the equivalent serial schedule(s).
T1: r1 (X); r1 (Z); w1 (X);
T2: r2 (Z); r2 (Y); w2 (Z); w2 (Y); 10
T3: r3 (X); r3 (Y); w3 (Y);
S1: r1 (X); r2 (Z); r1 (Z); r3 (X); r3 (Y); w1 (X); w3 (Y); r2 (Y); w2 (Z); w2 (Y); 10
S2: r1 (X); r2 (Z); r3 (X); r1 (Z); r2 (Y); r3 (Y); w1 (X); w2 (Z); w3 (Y); w2 (Y);
(CO4) (K4)

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

8-a. Explain different types of NoSql databases in detail with suitable diagrams. (CO5) (K2) 10

8-b. Discuss index in MongoDB? Why is indexing important in MongoDB? (CO5) (K2) 10

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