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 (2023 - 2024)

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) 1

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

1-b. Any row of a relation is known as? (CO1) 1

(a) Tuple
(b) Attribute
(c) Entity
(d) Degree

1-c. Which of the following SQL clause is used to DELETE tuples from a database table? (CO2) 1

(a) DELETE
(b) REMOVE
(c) DROP
(d) CLEAR

1-d. Select the Aggregate function(s) among the following. (CO2) 1

(a) AVG()

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(b) ADD()
(c) SUB()
(d) All of the above

1-e. For any pin code, there is only one city and state. Also, for given street, city and state, there is just one pin code. In normalization terms, this relation is in: (CO3) 1

(a) 1 NF only
(b) 2 NF and hence also in 1 NF
(c) 3NF and hence also in 2NF and 1NF
(d) BCNF and hence also in 3NF, 2NF and 1NF

1-f. A relation is in 1NF if it does not contain any (CO3) 1

(a) Determinants
(b) Repeating groups
(c) Null values in primary key fields
(d) Functional dependencies

1-g. Which of the following is not a property of transactions? (CO4) 1

(a) Atomicity
(b) Concurrency
(c) Isolation
(d) Durability

1-h. We generally recover from a deadlock: (CO4) 1

(a) By aborting all the transactions
(b) By rolling back all the transactions
(c) By rolling back only selected number of transactions
(d) None of the mentioned

1-i. MongoDB is a _____ database that provides high performance, high availability, and easy scalability. (CO5) 1

(a) graph
(b) key value
(c) Cross platform document oriented
(d) all of the mentioned

1-j. These indexes use spherical geometry to return results. (CO5) 1

(a) 3dsphere
(b) 2dsphere
(c) 1dsphere
(d) none of the mentioned

2. Attempt all parts:-

2.a. Explain the concept of Foreign Key. (CO1) 2

2.b. Differentiate between ANY and ALL logical operator in SQL ? (CO2) 2

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2.c.	Demonstrate canonical cover. (CO3)	2
2.d.	Discuss the different states of the transaction. (CO4)	2
2.e.	Discuss some of the advantages of MongoDB? (CO5)	2

SECTION-B 30

3. Answer any five of the following:-

3-a.	Explain the concept of Primary key, Candidate Key and Foreign Key with an example of each. (CO1)	6
3-b.	Explain the concept of Aggregation, specialization and Generalization. (CO1)	6
3-c.	Discuss uses of Database Triggers in detail? (CO2)	6
3-d.	Describe Anomalies and also explain insertion, deletion and modification anomalies with suitable examples. (CO2)	6
3.e.	Let us consider a relational schema R ={A,B,C,D,E} having two functional dependency(FD) set E and F, (CO3) E= {A → B, AB → C, D → AC, D → E} andF = {A → BC, D → AE}. Check whether two sets are equivalent or not.	6
3.f.	Define the terms : Lock Point, Strict 2PL, Starvation. (CO4)	6
3.g.	Define real time database? Explain the timing constraints and deadlines for the same. (CO5)	6

SECTION-C 50

4. Answer any one of the following:-

4-a.	Convert the following schema into ER Diagram for a bank: Branch (branch_name, branch_city, assets) Account (account_number, balance, Branch_name) Customer (customer_name, customer_street, customer_city) Loan (loan_number, amount, Branch_name) borrower (customer_name, loan_number) Depositor (customer_name, account_number) (CO1)	10
4-b.	With help of diagram, discuss the two tier and three tier architecture of Database Applications in detail. (CO1)	10

5. Answer any one of the following:-

5-a.	Explain the operators SELECT, PROJECT, UNION with suitable examples in Relational algebra. (CO2)	10
5-b.	Using the following schema represent the following queries using SQL: Branch(branch_no, street,city,pincode) , Staff(staffno,fName, LName,position, dOB, gender, salary, branch_no). (i) Give all staff a 3% pay increase. (ii) Find all staff whose salary is larger than the salary of atleast one member of staff at branch B003. (iii) Find the number of staff working in each branch and the sum of their salaries. (CO2)	10

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6. Answer any one of the following:-

6-a. Given a relation R(P, Q, R, S, T, U, V, W) and Functional Dependency set FD = { PQ → R, P → ST, Q → U, and U → VW }, determine given R is in which normal form? (CO3) 10

6-b. Consider a relation schema R(X Y Z W P) is decomposed into R1(X Y Z) and R2(W P), determine whether the above R1 and R2 are Lossless or Lossy? (CO3) 10

7. Answer any one of the following:-

7-a. What do you mean by deadlock? What are the various conditions in which deadlock occur? Discuss the wait-die and wound-wait in detail. (CO4) 10

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). 10
T1: r1 (X); r1 (Z); w1 (X);
T2: r2 (Z); r2 (Y); w2 (Z); w2 (Y);
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);
S2: r1 (X); r2 (Z); r3 (X); r1 (Z); r2 (Y); r3 (Y); w1 (X); w2 (Z); w3 (Y); w2 (Y);
(CO4)

8. Answer any one of the following:-

8-a. Explain NoSQL database in detail. List out the several NoSQL database types. (CO5) 10

8-b. Explain CRUD operations in Mongo DB. (CO5) 10

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