Printed Page:- 05 **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 (2022-2023 **)**

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. Which of the following is a top-down approach in which the entity's higher level can be divided into two lower sub-entities? (CO1) 1

(a) Aggregation

(b) Generalization

(c) Specialization

(d) All of the above

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. An expression in the domain relational calculus is of the form (CO2) 1

(a) {P(x1, x2, . . . , xn) | < x1, x2, . . . , xn > }

(b) {x1, x2, . . . , xn | < x1, x2, . . . , xn > }

(c) { x1, x2, . . . , xn | x1, x2, . . . , xn}

(d) {< x1, x2, . . . , xn > | P(x1, x2, . . . , xn)}

1-e. 5NF is also known as (CO3) 1

(a) PJNF

(b) DKNF

(c) BCNF

(d) None of the above

1-f. When a relation is in 2NF and there is ___, it is in 3NF. (CO3) 1

(a) Transitive Dependency

(b) No Transitive Dependency

(c) Relational Dependency

(d) No Relational Dependency

1-g. Depending on the situation each node in a Distributed Database system can act as (CO4) 1

(a) A Client

(b) A server

(c) Both client and server

(d) None of the mentioned

1-h. If a transaction has obtained a _____ lock, it can read but cannot write on the item (CO4) 1

(a) Shared mode

(b) Exclusive mode

(c) Read only mode

(d) Write only mode

1-i. Initial release of MongoDB was in the year? (CO5) 1

(a) 2000

(b) 2005

(c) 2009

(d) 2011

1-j. Applications can also control the behavior of write operations using which concern? (CO5) 1

(a) read

(b) write

(c) truncate

(d) all of the mentioned

2. Attempt all parts:-

2.a. Explain the concept of Transaction Management in Database System. (CO1) 2

2.b. How many types of cursors are available in PL/SQL. Explain them (CO2) 2

2.c. What is Canonical Cover (CO3) 2

2.d. Explain the properties of a transaction. (CO4) 2

2.e. Discuss some of the advantages of MongoDB? (CO5) 2

SECTION B **30**

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

3-a. What are different database languages? Explain types with examples (CO1) 6

3-b. Define unary, binary and n-ary relationship with example? (CO1) 6

3-c. Explain Natural Join With Example. What are the types of Outer join? (CO2) 6

3-d. Explain the following SQL constructs with examples: 6
(1) Order by
(2) BETWEEN
(3) Exists (CO2)

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) 6

3.f. Discuss various deadlock prevention schemes (CO4) 6

3.g. What are CRUD operations in MongoDB? Explain each (CO5) 6

SECTION C **50**

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

4-a. Construct an E-R diagram for a hospital with a set of patients and a set of medical doctors. 10
Associate with each patient a log of the various tests and examinations

conducted.(CO1)

4-b. With help of diagram, discuss the two tier and three tier architecture of Database Applications in detail. (CO1) 10

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

5-a. Consider the following relational database schema consisting of the four relation schemas: 10

passenger (pid, pname, pgender, pcity)
agency (aid, aname, acity)
flight (fid, fdate, time, src, dest)
booking (pid, aid, fid, fdate)
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)

5-b. Consider the following schema: EmployeeDetails(EmpId, FullName, ManagerId, DateOfJoining, City), 10
EmployeeSalary(EmpId, Project, Salary, Variable)
Answer the following questions using SQL queries:
(i) Write an SQL query to fetch the EmpId and FullName of all the employees working under Manager with id – '986'.
(ii) Write an SQL query to fetch the different projects available from the EmployeeSalary table.
(iii) Write an SQL query to find the maximum, minimum, and average salary of the employees.
(iv) Write an SQL query to fetch the employees whose name begins with any two characters, followed by a text "hn" and ending with any sequence of characters. (CO2)

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

6-a. Explain lossless join decomposition with example. Let a relation R (A,B,C,D,E,F) with given functional dependencies {AB –> C, C –> D, D –> EF, F -> A,D ->B} is decomposed into sub relations R1(A,B,C) , R2(C,D,E) & R3(E,F). Check whether decomposition is lossless or lossy decomposition. (CO3) 10

6-b. Explain multi valued dependency and lossless decomposition. Also, explain Fourth and Fifth normal form with the help of examples.(CO3) 10

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

7-a.	a) What is log based recovery and explain its approaches b) What is the use of checkpoints? (CO4)	10
7-b.	What is multiversion scheme of Concurrency control, discuss with example (CO4)	10

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

8-a.	What are the main challenges facing a traditional DBMS in the context of today's Internet applications? How does new age databases attempt to address them? (CO5)	10
8-b.	Explain CAP theorem and the applications of CAP theorem? (CO5)	10