Printed Page:- 04 **Subject Code:- ACSE0506**

Roll. No:

NOIDA INSTITUTE OF ENGINEERING AND TECHNOLOGY, GREATER NOIDA

(An Autonomous Institute Affiliated to AKTU, Lucknow)

B.Tech

SEM: V - THEORY EXAMINATION - (2023 2024)

Subject: Database Management System

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. A top-to-bottom relationship among the items in a database is established by a 1

(a) Hierarchical schema

(b) Network schema

(c) Relational schema

(d) None of the above

1-b. Out of the following which is a top-down approach in which the entity at the 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. The _____ operation, denoted by −, allows us to find tuples that are in one relation but are not in another. (CO2) 1

(a) Union

(b) Natural Join

(c) Set Difference

(d) None of the above

1-d. Out of the following which operation is not specified in triggers? (CO2) 1

(a) Alter

(b) Update
(c) Insert
(d) Delete

1-e. 2NF relations are those that are in 1NF with all the attribute types dependent on the ___ key. (CO3) 1

(a) Foreign
(b) Primary
(c) Composite
(d) None of the above

1-f. __ is the right side of making functional dependency. (CO3) 1

(a) Dependency
(b) Determinants
(c) Independency
(d) None of the above

1-g. ___ states that all operations of a transaction must occur simultaneously; otherwise, the transaction will be aborted.(CO4) 1

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

1-h. What is the Dirty Read Problem also known as? (CO4) 1

(a) Write -Write Conflict
(b) Read-Read Conflict
(c) Write-Read Conflict.
(d) All of the above

1-i. A record in MongoDB is a ___. (CO5) 1

(a) Table
(b) Document
(c) Record
(d) None of the above

1-j. Which MongoDB command is used to display the database you are currently using? (CO5) 1

(a) Show db
(b) Use db
(c) Show CurrentDatabase
(d) db

2. Attempt all parts:-

2.a. Define Instances and schemas of database? (CO1) 2

2.b.	Define procedural and non procedural language? (CO2)	2
2.c.	Discuss different type of anomalies. (CO3)	2
2.d.	Define checkpoint. (CO4)	2
2.e.	Illustrate the term "Collection in MongoDB" . (CO5)	2

SECTION-B 30

3. Answer any five of the following:-

3-a.	Discuss physical and logical data independence in DBMS. (CO1)	6
3-b.	List the different types of attributes in ER Diagram. Explain all with suitable example. (CO1)	6
3-c.	Explain the different types of Integrity constraint with example. (CO2)	6
3-d.	Explain set operations of relational algebra with examples. (CO2)	6
3.e.	Let us consider a R=(A,C,D,E,H) with two functional dependencies set F1 and F2 F1={A->C, AC->D, E->AD, E->H}, F2={A->CD, E->AH} Check whether F1 and F2 are equivalent or not? (CO3)	6
3.f.	Define distributed databases. Give the various advantages and disadvantages of distributed database management system. (CO4)	6
3.g.	List the advantages and disadvantages of NOSQL. (CO5)	6

SECTION-C 50

4. Answer any one of the following:-

4-a.	Construct an E-R diagram for a car-insurance company whose customers own one or more cars each. Each car has associated with it zero to any number of recorded accidents. (CO1)	10
4-b.	Explain the different types of data model with their advantages and disadvantages. (CO1)	10

5. Answer any one of the following:-

5-a.	Let us consider following databases sailors (sid, sname, rating, age) boats (bid,bname,color) reserves(sid, bid, day) Write the relational algebra queries for the following statement. (i)Find the names of sailors who have reserved boat number 103 (ii) Find the names of sailors who have reserved a red boat (iii) Find the id of sailors with age over 20 who have not reserved red boat (iv) Find the names of sailors who have reserved at least one boat (v) Find the id of sailors who reserved every boat. (CO2)	10
5-b.	Let us consider the table	10

EMP(empno , deptno, ename ,salary, Designation, joiningdate, DOB,city)
Write SQL query for following statements
(i) Display names of employees whose experience is more than 10 years.
(ii) Display age of employees.
(iii) Display average salary of all employee.
(iv) Display name of employee who earned highest salary.
(v) Display the deptno of employee whose salary is more than 50,000 and city is 'Greater Noida'. (CO2)

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

6-a.	Let us consider a relation R (ABCDEG) with the functional dependencies F= {AB -> C, C -> A, BC -> D, D -> G, BE -> C, CG -> B, CE -> G}. Find the candidate key's for relation R. (CO3)	10
6-b.	Explain 1NF, 2NF and 3NF with suitable example. Also illustrate the problems with these normalizations. (CO3)	10

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

7-a.	Explain 2 phase locking protocol and why 2 PL protocol is needed ? How does 2PL guarantee serializability? (CO4)	10
7-b.	Differentiate between serial and non-serial schedule. Explain the conflict serializability with example. (CO4)	10

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

8-a.	Explain CAP theorem and base properties of NoSQL. (CO5)	10
8-b.	Explain the CRUD operations in MongoDB with example. (CO5)	10