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

**Roll. No:**

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**NOIDA INSTITUTE OF ENGINEERING AND TECHNOLOGY, GREATER NOIDA**

**(An Autonomous Institute Affiliated to AKTU, Lucknow)**

**B.Tech**

**SEM: IV - CARRY OVER THEORY EXAMINATION - APRIL 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. Which one of the following refers to the "data about data"? (CO1) 1

(a) Directory

(b) Sub Data

(c) Warehouse

(d) Meta Data

1-b. Relational calculus is a (CO1) 1

(a) Procedural language.

(b) Non- Procedural language.

(c) Data definition language.

(d) High-level language.

1-c. The variables in the triggers are declared using (CO2) 1

(a) –

(b) @

(c) /

(d) /@

1-d. Stored procedure is which set of one or more SQL statements. 1
(CO2)

(a) interpreted

(b) compiled

(c) pre compiled

(d) None

1-e. An association between two attributes of the same table is known as 1
(CO3)

(a) FD

(b) MVD

(c) JD

(d) None of the above

1-f. If a multivalued dependency holds and is not implied by the corresponding functional dependency, it usually arises from one of the following sources. 1
(CO3)

(a) A many-to-many relationship set

(b) A multivalued attribute of an entity set

(c) A one-to-many relationship set

(d) A many-to-many relationship set and A multivalued attribute of an entity set

1-g. Three-tier architecture includes which of the following? 1
(CO4)

(a) Three server layers

(b) A client layer and two server layers

(c) Two client layers and one server layer

(d) Three client layers

1-h. Which one of the following is the deadlock avoidance algorithm? 1
(CO4)

(a) banker's algorithm

(b) round-robin algorithm

(c) elevator algorithm

(d) karn's algorithm

1-i. What is the main limitation of Hierarchical Databases? (CO5) 1

(a) Limited capacity (unable to hold much data)

(b) Limited flexibility in accessing data

(c) Overhead associated with maintaining indexes

(d) The performance of the database is poor

1-j. Instead of Primary Key MongoDB uses. (CO5) 1

(a) Mongo key_id

(b) Mongo_id

(c) Default key _id

(d) None of the above

**2. Attempt all parts:-**

2.a. Explain the difference between Data and Information. (CO1) 2

2.b. Define Intersection operation in SQL. Give example. (CO2) 2

2.c. Define the rule of 2NF. (CO3) 2

2.d. Explain ACID Properties. (CO4) 2

2.e. What are MongoDB Charts? (CO5) 2

**SECTION B** **30**

**3. Answer any <u>five</u> 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. State the use of Projection operator in Relational Algebra with example. (CO2) 6

3-d. What is Redundancy? Explain with example. (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) 6

E= {A → B, AB → C, D → AC, D → E} andF = {A → BC, D → AE}. Check whether two sets are equivalent or not.

3.f. Differentiate between Centralized database and Distributed Database. (CO4) 6

3.g. What Scalability Problems have you encountered using a NoSQL Data Store? (CO5) 6

## SECTION C 50

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

4-a. Convert the following schema into ER Diagram: STUDENT (Student_ID, Student_Name, DOB, Street, City, Pin) (CO1) 10

CLASS (Class_ID, Class_Name, Student_ID, DateOfJoin, Hours)

Student_ID is the foreign key refers STUDENT table

SUBJECT (Subject_ID, Subject_Name, Teacher, Student_ID)

Student_ID is the foreign key refers STUDENT table

SECTION (Section_ID, Class_ID, Section_Name)

Class_ID is the foreign key refers CLASS table

4-b. Create an ER diagram for each of the following descriptions: (CO1) 10

a. Each company operates four departments, each department belongs to one company.

b. Each department in part (a) employs one or more employees and each employee works for one department

c. Each of the employees in part (b) may or may not have one or more dependents, and each dependent belong to one employee

d. Each employee in part (c) may or may not have an employment history.

e. Represent all the ER diagrams describes in (a),(a),(c) and (d) in a single ER Diagram.

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

5-a. Consider the database given by the following schemas: Customer (Cust_No, Sales_ Person_No ,City) (CO2) 10

Sales_ Person (Sales_ Person_No ,Sales_ Person_Name, Common_Prec,Year_of_Hire).

Give an expression in SQL for each of the following queries:

1)Display the list of all customers by Cust_No with the city in which each is located.

2)List the names of the sales persons who have accounts in Delhi.

5-b. Using the following schema represent the following queries using Tuple relational calculas: PROJECT(projectnum, project name, project type, project manager) 10

(CO2)

EMPLOYEE( Empnum, Empname) ASSIGNED_TO(projectnum, Empnum)

(i) Find employee details working on a project on a project name start with 'L'

(ii) List all employee details who are working under project manager "Clevee"

(iii) List the employee who are still not assigned with any project.

(iv) List the employees who are working in more than one project.

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

6-a. What is the need of Normalization?. Explain the concept of Denormalization. (CO3) 10

6-b. Given a relation R( X, Y, Z) and Functional Dependency set FD = { X → Y and Y → Z }, determine whether the given R is in BCNF? If not convert it into BCNF. (CO3) 10

**7. Answer any <u>one</u> 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. Analyze which of the following concurrency control protocols ensure both conflict serializability and freedom from deadlock? Explain the following: (CO4) 10

a. 2-phase locking
b. Time-stamp ordering

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

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

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