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.*

<p align="center">SECTION A   20</p>

1. Attempt all parts:-

1-a.   A weak relationship is represented in E-R diagram as   (CO1)   1

        (a) Double diamonds

        (b) Undivided rectangles

        (c) Dashed lines

        (d) Diamond

1-b.   For performing tasks like creating the structure of the relations, deleting   1
relation, which of the following is used? (CO1)

        (a) Data definition language

        (b) Data control language

        (c) Data manipulation language

        (d) Transaction control language

1-c.   _____ is not a part of SQL. (CO2)   1

        (a) TCL

        (b) SCL

        (c) DCL

        (d) DDL

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

        (a) ASC

        (b) DESC

        (c) There is no default value

        (d) None

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 functional dependency that exist between two non-key attributes. (CO3)   1

        (a) Non-transitive dependency

        (b) Transitive dependency

        (c) Partial transitive dependency

        (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)   1

        (a) authorization and integrity manager

        (b) buffer manager

        (c) transaction manager

        (d) file manager

1-h. A transaction can do read and write operation on a data item when it acquires (CO4)   1

        (a) read mode

        (b) exclusive lock

        (c) shared lock

        (d) write mode

1-i. NoSQL databases is used mainly for handling large data volumes of this category. (CO5)   1

(a) unstructured

(b) structured

(c) semi-structured

(d) all of the mentioned

1-j.   MongoDB stores all documents in. (CO5)   1

(a) tables

(b) collections

(c) rows

(d) all of the mentioned

2. Attempt all parts:-

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

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

2.c.   Describe functional dependencies. (CO3)   2

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

2.e.   Explain how MongoDB is better than SQL databases? (CO5)   2

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SECTION B   **30**

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

3-a.   Discuss the two tier and three tier architecture of Database Applications. (CO1)   6

3-b.   Discuss the concept of mapping cardinality in ER Diagram. (CO1)   6

3-c.   Discuss uses of Database Triggers in detail? (CO2)   6

3-d.   Explain Redundancy with example.   (CO2)   6

3-e.   Given a relation schema R = {A,B,C,D,E}and a set of functional dependencies F=   6
          {A → BC, CD → E,B → D, E → A }, To find the minimal cover for above given FD's
          (CO3)

3.f.   Define schedule and its types? Explain view serializable and cascadeless   6
          schedule with suitable example of each. (CO4)

3.g.   Can you explain the transaction support by using a BASE in NoSQL? (CO5)   6

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SECTION C   **50**

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

4-a.   Explain the term DBMS? Elaborate the difference between database and file   10
          system with a suitable example show the uses of DBMS. (CO1)

4-b.   Consider a database used to record the marks that students get in different   10
          exams of different

course offerings.

Construct an E-R diagram that models exams as entities, and uses a ternary relationship, for

the above database. Assuming and elaborating the attributes to depict the model. (CO1)

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

5-a.   Explain Different types of operators in SQL.   (CO2)   10

5-b.   Using the following schema represent the following queries using Domain   10
Relational Calculus:

customer(customername, street, city)

Loan (loanno,branchname,amount)

Borrower(customername, loan no)

(i) Find the loan number, branch, amount of loans of greater than or equal to 100 amount.

(ii) Find the loan number for each loan of an amount greater or equal to 150.

(iii) Find the names of all customers having a loan at the "Main" branch and find the loan amount .(CO2)

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

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

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

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

7-a.   Discuss the problems of deadlock and starvation. Also discuss the different   10
approaches to deal with these problems. (CO4)

7-b.   Elaborate concurrency control and list its techniques? Discuss about locking   10
techniques of Concurrency control (CO4)

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

8-a.   Name some of the principle features of the NoSQL database. Discuss key value   10
store NoSQL database in detail.   (CO5)

8-b.   Explain CAP theorem and the applications of CAP theorem? (CO5)   10