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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. | 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. | Which of the following is the full form of DDL. (CO1) | 1 |
| | (a) Data Definition Language
(b) Dynamic Data Language
(c) Data Derivation Language
(d) Detailed Data Language | |
| 1-c. | Which SQL keyword is used to retrieve the maximum value? (CO2) | 1 |
| | (a) MOST
(b) TOP
(c) MAX | |

(d) UPPER

- 1-d. 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-e. 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-f. The process of decomposition of a table is known as (CO3) 1
- (a) Specialization
 - (b) Generalization
 - (c) Normalization
 - (d) None of the above
- 1-g. In which state, the transaction will wait for the final statement has been executed? (CO4) 1
- (a) Active
 - (b) Failed
 - (c) Aborted
 - (d) Partially committed state
- 1-h. Which of the following causes system to crash (CO4) 1
- (a) Bug in software
 - (b) Loss of volatile data
 - (c) Hardware malfunction
 - (d) All of the mentioned
- 1-i. Which functionality is used to get high availability and disaster recovery? (CO5) 1
- (a) processing
 - (b) scalability
 - (c) replication
 - (d) all of the mentioned

- 1-j. Which of the following language is MongoDB written in? (CO5) 1
- (a) Javascript
 - (b) C
 - (c) C++
 - (d) All of the mentioned

2. Attempt all parts:-

- 2.a. Define DML and its commands? (CO1) 2
- 2.b. Explain different types of data type used in SQL? (CO2) 2
- 2.c. Explain the uses of normalization of data. (CO3) 2
- 2.d. Discuss the advantages of two-phase locking (2PL) protocol used in concurrency control. (CO4) 2
- 2.e. How data security is provided in NoSQL? (CO5) 2

SECTION B

30

3. Answer any five of the following:-

- 3-a. Discuss the concept of mapping cardinality in ER Diagram. (CO1) 6
- 3-b. How do we reduce ER Diagrams with (i) multi valued attributes (ii) derived attributes and (iii) composite attributes to table? (CO1) 6
- 3-c. Explain views in database? Give syntax and example of creating view. (CO2) 6
- 3-d. Explain Bitwise and logical operator in SQL . (CO2) 6
- 3.e. Describe the following terms : (i) Multivalued dependency (ii) Lossless join decomposition (CO3) 6
- 3.f. Explain Deadlock? How are deadlock handled? What is deadlock prevention? What is deadlock detection and Recovery? Explain with an Example. (CO4) 6
- 3.g. Which data model is related with NoSQL? Explain the different types of NoSQL database. (CO5) 6

SECTION C

50

4. Answer any one of the following:-

- 4-a. Consider an ONLINE AUCTION database system in which members (buyers and sellers) participate in the sale of items. The data requirements for this system are summarized as follows: (CO1) 10
- The online site has members, each of whom is identified by a unique member number and is described by an e-mail address, name, password, home address, and phone number.
 - A member may be a buyer or a seller. A buyer has a shipping address

recorded in the database. A seller has a bank account number and routing number recorded in the database.

- Items are placed by a seller for sale and are identified by a unique item number assigned by the system. Items are also described by an item title, a description, starting bid price, bidding increment, the start date of the auction, and the end date of the auction.

- Items are also categorized based on a fixed classification hierarchy ER Model

- Buyers make bids for items they are interested in. Bid price and time of bid is recorded. The bidder at the end of the auction with the highest bid price is declared the winner and a transaction between buyer and seller may then proceed.

Draw the ER diagram for the online auction

- 4-b. Explain with diagram the 3 Schema Architecture in detail also explain with the suitable examples the various keys and their uses in database. (CO1) 10

5. Answer any one of the following:-

- 5-a. Write short notes on the following: Data Manipulation Language (DML), Data Definition Language (DDL), Transaction Control Language (TCL) and Data Control Language (DCL). (CO2) 10
- 5-b. What do you mean by Joins? Explain various types of join with examples. (CO2) 10

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 $FD = \{ PQ \rightarrow R, P \rightarrow ST, Q \rightarrow U, \text{ and } U \rightarrow VW \}$, determine given R is in which normal form? (CO3) 10
- 6-b. Consider a relation schema $R(A, B, C, D)$ with the functional dependencies $A \rightarrow B$ and $C \rightarrow D$. Determine whether the decomposition of R into $R_1(A, B)$ and $R_2(C, D)$ is 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. Discuss the factors that do not appear in centralized systems but that affect concurrency control and recovery in distributed systems. (CO4) 10

8. Answer any one of the following:-

- 8-a. What are the CRUD operations? Why are they important? Discuss some of the CRUD operations. (CO5) 10
- 8-b. What are the different cloud database models? Explain. (CO5) 10