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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 (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

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1. Attempt all parts:-

- 1-a. The Rectangles in E-R diagram represents (CO1) 1
- (a) Entity set
- (b) Relationship set
- (c) Attributes of a relationship set
- (d) Primary key
- 1-b. A strong entity set with any number of multi valued attributes will require two tables in relational model. (CO1) 1
- (a) TRUE
- (b) FALSE
- (c) May be true or false
- (d) None of the above
- 1-c. Consider the relation Sale(Date, Customer, Product, Vendor, VendorCity, SalesRep) Vendor -> VendorCity, Product -> Vendor {Date, Customer, Product} is the composite candidate key and the following functional dependencies are also given: Vendor -> VendorCity, Product -> Vendor. What is the highest 1

normal form of the sale relation? (CO2)

- (a) 0NF
- (b) 1NF
- (c) 2NF
- (d) 3NF

1-d. Consider the relation schema: Singer(singerName, songName). What is the highest normal form satisfied by the "Singer" relation schema? (CO2) 1

- (a) 1NF
- (b) 2NF
- (c) 3NF
- (d) BCNF

1-e. Which of the following is not a DDL command? (CO3) 1

- (a) UPDATE
- (b) TRUNCATE
- (c) ALTER
- (d) None

1-f. Which function returns the largest value of the column? (CO3) 1

- (a) MIN()
- (b) MAX()
- (c) LARGE()
- (d) AVG()

1-g. Assume transaction A holds a shared lock R. If transaction B also requests for a shared lock on R. (CO4) 1

- (a) It will result in a deadlock situation
- (b) It will immediately be rejected
- (c) It will immediately be granted
- (d) It will be granted as soon as it is released by A

1-h. Serializability of schedules can be ensured through a mechanism called? (CO4) 1

- (a) Concurrency control policy
- (b) Evaluation control policy
- (c) Execution control policy
- (d) Cascading control policy

1-i. Which of the following is an essential process in which the intelligent methods 1

are applied to extract data patterns? (CO5)

- (a) Warehousing
- (b) Data Mining
- (c) Text Mining
- (d) Data Selection

- 1-j. Which of the following is/are the main goals of a distributed database? (CO5) 1
- (a) interconnection of database
 - (b) Incremental growth
 - (c) Reduced communication overhead
 - (d) All of the above

2. Attempt all parts:-

- 2.a. Define weak and strong entity sets? (CO1) 2
- 2.b. Define axioms. (CO2) 2
- 2.c. What is the difference between relational algebra and relational calculus? (CO3) 2
- 2.d. Explain ACID properties to preserve the integrity of database. (CO4) 2
- 2.e. Explain Web Database? (CO5) 2

SECTION B

30

3. Answer any five of the following:-

- 3-a. What are the three levels of abstraction in DBMS? (CO1) 6
- 3-b. Discuss the two tier and three tier architecture of Database Applications. (CO1) 6
- 3-c. MVD is a special case of Join Dependencies. Discuss. (CO2) 6
- 3-d. Why is concurrency control needed? Explain lost update, Inconsistent retrievals and uncommitted dependency anomalies. (CO2) 6
- 3.e. Insert the keys 78,52,81,40,33,90,85,20 and 38 in this order in an initially empty B-Tree of order 3. (CO3) 6
- 3.f. Describe the shadow paging recovery technique. Under what circumstances does it not require a log? (CO4) 6
- 3.g. Explain Descriptive Data minig. (CO5) 6

SECTION C

50

4. Answer any one of the following:-

- 4-a. Construct an E-R diagram for a hospital with a set of patients and a set of medical doctors. Associated with each patient, a log of the various tests and examinations conducted. (CO1) 10

- 4-b. What is meant by an entity-relationship (E-R) model? Explain the terms Entity, Entity Type, and Entity Set in DBMS. (CO1) 10

5. Answer any one of the following:-

- 5-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? (CO2) 10
- 5-b. Given a relational schema $R = \{ SSN, ENAME, PNUMBER, PNAME, PLOCATION, HOURS \}$ and the decomposed table $R1 = \{ SSN, ENAME \}$, $R2 = \{ PNUMBER, PNAME, PLOCATION \}$, $R3 = \{ SSN, PNUMBER, HOURS \}$, $FD = \{ SSN \rightarrow ENAME, PNUMBER \rightarrow \{ PNAME, PLOCATION \}, \{ SSN, PNUMBER \} \rightarrow HOURS \}$. Identify whether the given decomposition of R, R1 R@, and R3 is lossless or lossy decomposition? (CO2) 10

6. Answer any one of the following:-

- 6-a. Explain different DDL commands with Example. (CO3) 10
- 6-b. What is Aggregate Function in SQL? Write SQL query for different Aggregate Function. (CO3) 10

7. Answer any one of the following:-

- 7-a. Explain the deferred and immediate modification versions of the log based recovery scheme. (CO4) 10
- 7-b. Check whether the given schedule S is conflict serializable or not. S: R1(A), R2(A), W2(A), R2(B), W1(A), R1(B), W1(B), W2(B). (CO4) 10

8. Answer any one of the following:-

- 8-a. Explain DBMS architecture? Differentiate Between RDBMS and OODBMS. (CO5) 10
- 8-b. What are the kinds of attacks from which IPS protects the network? What are the strengths Of NIDS? (CO5) 10