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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 (2021 - 2022)
Subject: Database Management Systems

Time: 3 Hours   Max. Marks: 100

General Instructions:
1. The question paper comprises three sections, A, B, and C. You are expected to answer them as directed.
2. Section A - Question No- 1 is 1 mark & Question No- 2 carries 2 mark each.
3. Section B - Question No-3 is based on external choice carrying 6 marks each.
4. Section C - Questions No. 4-8 are within unit choice questions carrying 10 marks each.
5. 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.   How many levels are there in architecture of database? (CO1)   1

        (a) 2

        (b) 3

        (c) 4

        (d) 5

1-b.   Select the definition of the correct key, which is used to represent relation between two   1
        tables? (CO1)

        (a) Candidate key

        (b) Foreign key

        (c) Primary key

        (d) Super key

1-c.   If E1 and E2 are relational algebra expressions, then which of the following is NOT a   1
        relational algebra expression ? (CO2)

        (a) $E1 \cup E2$

        (b) E1 / E2

        (c) E1 - E2

        (d) E1 x E2

1-d.   A set of possible data values is called (CO2)   1

        (a) Attribute

        (b) Degree

        (c) Tuple

        (d) Domain

1-e.   The process of decomposition of a table is known as (CO3)   1

        (a) Specialization

        (b) Generalization

        (c) Normalization

        (d) None of the above

1-f.   A property which ensures that each functional dependency is represented in some individual   1
        relation resulting after decomposition (CO3)

        (a) loss less join

        (b) Dependency preservation

(c) both [A] ans [B]

(d) None of the above

1-g. Throughput means (CO4)   1

    (a) number of transactions that are committed in one hour

    (b) number of operations in a transaction

    (c) number of transaction that can be aborted in a given amount of time

    (d) number of transaction that can be executed in a given amount of time

1-h. The time to process the remote backup can be reduced by (CO4)   1

    (a) Flags

    (b) Breakpoints

    (c) Redo points

    (d) Checkpoints

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. The separation of the data definition from the program is known as: (CO5)   1

    (a) Data dictionary

    (b) Data independence

    (c) Data integrity

    (d) Referential integrity

2. Attempt all parts:-

2.a. Define Schema and Instance in context with DBMS. (CO1)   2

2.b. What is group by() function in SQL? (CO2)   2

2.c. Discuss different types of anamolies. (CO3)   2

2.d. What are the ACID properties? Explain any two. (CO4)   2

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

<div align="center">SECTION B   30</div>

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

3-a. Draw an ER Diagram of a Hospital and explain the concept of Aggregation, Specialization   6
and Generalization. (CO1)

3-b. What are the characteristics of DBMS? Explain DDL, DML AND DCL. (CO1)   6

3-c. Write SQL statements for following: (CO2)   6
Student(Enrno, name, courseId, emailId, cellno) Course(courseId, course_name, duration)
i) Add a column city in student table.
ii) Find out list of students who have enrolled in "computer" course.
iii) List name of all courses with their duration.
iv) List name of all students start with "à
v) List email Id and cell no of all mechanical engineering students.

3-d. What is data integrity? Explain different types of integrity constraints with suitable   6
examples. (CO2)

3.e. Define partial functional dependency. Consider the following two sets of functional   6
dependencies F= {A ->C, AC ->D, E ->AD, E ->H} and G = {A ->CD, E ->AH}. Check
whether or not they are equivalent. (CO3)

3.f. Draw a state diagram and discuss the typical states that a transaction goes through during   6
execution. (CO4)

3.g. How does NoSQL relate to Big data? (CO5)   6

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

4-a.	A university registrar's office maintains data about the following entities:(CO1) (a) courses, including number, title, credits, syllabus, and prerequisites; (b) course offerings, including course number, year, semester, section number, instructor(s), timings, and classroom; (c) students, including student-id, name, and program; (d) instructors, including identification number, name, department, and title. Further, the enrollment of students in courses and grades awarded to students in each course (to which they are enrolled) must be appropriately modeled. Construct an E-R diagram for the registrar's office. Document all assumptions that you make about the mapping constraints.	10
4-b.	How do we reduce ER Diagrams with (i) multi valued attributes (ii) derived attributes and (iii) composite attributes to tables? (CO1)	10

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

5-a.	Explain the operators SELECT, PROJECT, UNION with suitable examples in Relational algebra. (CO2)	10
5-b.	What are nested queries? What is correlation in nested queries? How would you use the operators IN, EXISTS, UNIQUE, ANY and ALL in writing nested queries? Why are they useful ? Illustrate your answer by showing how to write the division operator in SQL. (CO2)	10

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

6-a.	Explain BCNF with suitable example (CO3)	10
6-b.	Explain dependency preservation property of decomposition with example. Let us consider a relation R (A, B, C, D,E,F) with functional dependency set F= {D –> AB, C–> EF,} and relation R is decomposed into R1(A,C,D), R2(A,D,B), R3(D,E,F), R4(C,E,F). Check whether decomposition is dependency preserving or not. (CO3)	10

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

7-a.	Discuss the problems of deadlock and starvation. Also discuss the different approaches to deal with these problems. (CO4)	10
7-b.	What are the main reasons and potential advantages of distributed databases? What additional functions does a DDBMS have over a centralized DBMS? (CO4)	10

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

8-a.	What are the CRUD operations? Why are they important? Discuss some of the CRUD operations. (CO5)	10
8-b.	Explain some of the advantages of NoSQL database over relational database. How NoSQL database and Relational Database Management System or RDBMS are different from each other? (CO5)	10