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NOIDA INSTITUTE OF ENGINEERING AND TECHNOLOGY, GREATER NOIDA
(An Autonomous Institute Affiliated to AKTU, Lucknow)
B.Tech
SEM: V - CARRY OVER THEORY EXAMINATION - APRIL 2023
Subject: Database Management System

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.*

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SECTION A   **20**

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1. Attempt all parts:-

1-a.   A Database Management System is a type of. (CO1)   1

                (a) It is a type of system software

                (b) It is a kind of application software

                (c) It is a kind of general software

                (d) Both A and C

1-b.   The capacity to change the internal schema without having to change the   1
conceptual schema is. (CO1)

                (a) Physical data independence

                (b) Logical data independence

                (c) External data independence

                (d) None of the above

1-c.   Which of the following is not valid unary operation in the relational algebra ?   1
(CO2)

                (a) select

(b) min

(c) project

(d) rename

1-d. The union operation is represented by (CO2) 1

   (a) ∩

   (b) U

   (c) –

   (d) *

1-e. A relation is in 1NF if it doesn't contain any (CO3) 1

   (a) Determinants

   (b) Composite Attribute

   (c) Null values in primary key fields

   (d) Functional dependencies

1-f. 5NF is designed to cope with : (CO3) 1

   (a) Transitive dependency

   (b) Join dependency

   (c) Multi valued dependency

   (d) None of these

1-g. DBMS periodically suspends all processing and synchronizes its files and journals through the use of ------------. (CO4) 1

   (a) Checkpoint facility

   (b) Backup facility

   (c) Recovery manager

   (d) Database change log

1-h. When transaction Ti requests a data item currently held by Tj, Ti is allowed to wait only if it has a timestamp smaller than that of Tj (that is, Ti is older than Tj). Otherwise, Ti is rolled back (dies). This is ------------. (CO4) 1

   (a) Wait-die

   (b) Wait-wound

   (c) Wound-wait

   (d) Wait

1-i. Point out the correct statement (CO5) 1

   (a) MongoDB is classified as a NoSQL database

(b) MongoDB favours XML format more than JSON

(c) MongoDB is column oriented database store

(d) None of the mentioned

1-j.   What is/are the advantages of NoSQL? (CO5)   1

(a) It supports semi-structured data and volatile data.

(b) It does not have schema.

(c) Read/Write throughput is very high.

(d) All of the mentioned

2. Attempt all parts:-

2.a.   Draw the representation of (i) Entity and (ii) Relationship in ER-Model. (CO1)   2

2.b.   Write the difference between DROP and TRUNCATE statements in SQL . (CO2)   2

2.c.   Define 1st normal form. (CO3)   2

2.d.   Discuss the different states of the transaction.(CO4)   2

2.e.   Explain the concept of pipeline in the MongoDB aggregation framework.(CO5)   2

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SECTION B   **30**

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

3-a.   Explain how Hierarchical data model is different from Network data model?   6
        (CO1)

3-b.   Differentiate between Schema and Instance with a suitable example.(CO1)   6

3-c.   Consider following Relational Algebra schema STUDENT (RNO, Name, DOB,   6
        Percentage, DNO) DEPARTMENT (DNO, DNAME, HEAD). Write Relational
        Algebra expressions.
        i. Find Student's name and course from Computer Department
        ii. Get the Student's name who has percentage greater than 70. (CO2)

3-d.   What is the difference between relational algebra and relational calculus?   6
        Explain. (CO2)

3.e.   Given a relation R(A, B, C, D) and Functional Dependency set FD = { AB → CD, B   6
        → C }, determine whether the given R is in 2NF? If not convert it into 2 NF. (CO3)

3.f.   Discuss the procedure of deadlock detection and recovery in transaction.(CO4)   6

3.g.   Explain Oracle NoSQL database? (CO5)   6

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SECTION C   **50**

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

4-a.   Draw an ER Diagram for a small marketing company database, assuming your   10

own data requirements. (CO1)

| 4-b. | Explain the concept of ,super, candidate, primary and alternate keys with the help of an example.(CO1) | 10 |

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

| 5-a. | Consider the following schema: Suppliers (sid : integer, sname : string, address : string) Parts (pid : integer, pname : string, color : string) Catalog (sid : integer, pid : integer, cost : real) Answer the following questions using relational algebra queries; (i) Find the name of suppliers who supply some red parts (ii) Find the sid's of suppliers who supply some red or green parts (iii) Find the sid's of suppliers who supply some red part.(CO2) | 10 |

| 5-b. | What do you understand by Triggers? What are the different uses of Database Triggers? (CO2) | 10 |

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

| 6-a. | Given a relational schema R = { SSN, ENAME, PNUMBER, PNAME, PLOCATION, HOURS } and the decomposed table R1 = { ENAME, PLOCATION } and R2 = { SSN, PNUMBER, HOURS, PNAME, PLOCATION } and FD = { SSN → ENAME, PNUMBER → { PNAME, PLOCATION}, { SSN, PNUMBER } → HOURS }. Identify whether the given decomposition of R, R1 and R2 is lossless or lossy decomposition?(CO3) | 10 |

| 6-b. | Define partial functional dependency. Consider the following two sets of functional dependencies F= {A ->C, AC ->D, E ->AD, E ->H} and G = {A ->CD, E ->AH}. Check whether or not they are equivalent.(CO3) | 10 |

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

| 7-a. | Suppose that there is a database system that never fails. Analyze whether a recovery manager required for this system? (CO4) | 10 |

| 7-b. | Define Transaction management and explain its properties with suitable example.(CO4) | 10 |

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

| 8-a. | What are the CRUD operations? Why are they Important? Discuss in detail. (CO5) | 10 |

| 8-b. | What are covered queries? What is the importance of covered queries? (CO5) | 10 |