NOIDA INSTITUTE OF ENGINEERING AND TECHNOLOGY, GREATER NOIDA

(An Autonomous Institute Affiliated to AKTU, Lucknow)

MCA

SEM: II - THEORY EXAMINATION (2021 - 2022)

Subject: Database Management System

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 marker & Question No- 2 carries 2 marks 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.   Name the command which is used for removing (or deleting) a relation forms the SQL   1
database? (CO1)

          (a) Delete

          (b) Drop

          (c) Remove

          (d) All of the above

1-b.   Dashed Ellipses represent _____ (CO1)   1

          (a) Derived attributes

          (b) MultiValued Attributes

          (c) total participation of an entity in a relationship set

          (d) Weak entity type

1-c.   In SQL the statement select*from R,S is equivalent to: (CO2)   1

          (a) Select * from R natural join S

          (b) Select * from R cross join S

          (c) Select * from R union join S

(d) Select * from R inner join S

1-d.   Difference between a PRIMARY KEY and a UNIQUE KEY: (CO2)   1

(a) Primary key can store null value, whereas a unique key cannot store null value.

(b) We can have only one primary key in a table while we can have multiple unique keys

(c) Primary key cannot be a date variable whereas unique key can be

(d) None of these

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

(a) Transitive dependency

(b) Join dependency

(c) Multi valued dependency

(d) None of these

1-f.   A partial functional Dependency (PD) means that _____ (CO3)   1

(a) some attributes of an entity are not known

(b) Not all attributes on right hand side of FD are necessary

(c) No dependency exists in the entity

(d) Not all attributes on the left hand side of the FD are necessary to be Prime

1-g.   Property of transactions is required by concurrent transactions: (CO4)   1

(a) Atomicity

(b) Durability

(c) Isolation

(d) All of the mentioned

1-h.   Conflict Serializability ensures: (CO4)   1

(a) Consistency of database

(b) Isolation of Database

(c) Durability of transactions

(d) both A and B

1-i.   The protocol that indicates when a transaction may lock and unlock each of the data items is   1
called as _____ (CO5)

(a) Locking protocol

(b) Unlocking protocol

(c) Granting protocol

(d) Conflict protocol

1-j.   Exclusive locks should be applied, where data item has to _____ (CO5)   1

(a) Read

(b) Write

(c) Read and write both

(d) None of the above

2. Attempt all parts:-

2.a.   Explain cardinality ratio with it's types. (CO1)   2

2.b.   Define "foreign key" in the Relational Model. (CO2)   2

2.c.   Define Normalization with Example. (CO3)   2

2.d.   Define Concurrent transactions. (CO4)   2

2.e.   Differentiate between Shared and exclusive locks. (CO5)   2

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

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

3-a.   Explain the three levels of data abstraction. (CO1)   6

3-b.   Differentiate between Database Management System and file based system. (CO1)   6

3-c.   Explain all the aggregate functions in Relational Algebra with an example. (CO2)   6

3-d.   Explain all the operators used in Relational Algebra with an example. (CO2)   6

3-e.   Define and explain lossless join decomposition. (CO3)   6

3.f.   Explain the ACID properties with examples. (CO4)   6

3.g.   Illustrate the necessary conditions for deadlock and what are the ways of handling it. (CO5)   6

<div align="center">SECTION C   50</div>

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

4-a.   Draw an ER diagram and clearly mention the cardinality ratio , relationship among the   10
entities with all their attributes for a company database needs to store information about
employees (identified by ssn, with salary and phone as attributes), departments (identified by
dno, with dname and budget as attributes), and children of employees (with name and age as
attributes). Employees work in departments, each department is managed by an employee, a
child must be identified uniquely by name when the parent (who is an employee; assume that
only one parent works for the company) is known. We are not interested in information
about a child once the parent leaves the company. (CO1)

4-b.   Construct an ER diagram of student information system with suitable explanation of   10

relationships among entities. (CO1)

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

5-a.   Consider the following Relation Schema: (CO2)   10

EMP(eid: integer, ename: string, age: integer, salary: real)

WORKS(eid : integer, did : integer, pcttime : integer)

DEPT(did : integer, dname: string, budget: real, managerid: integer

Answer each of the following questions briefly:

(1) Give an example of a foreign key constraint that involves the DEPT relation. What are the options for enforcing this constraint when a user attempts to delete a DEPT tuple?

(2) Write SQL statements required to create the preceding relations, including appropriate versions of all primary and foreign key integrity constraints.

(3) Define the DEPT relation in SQL so that every department is guaranteed to have manager.

(4) Write an SQL statement to add John Doe as an employee with eid = 101, age = 32 and salary = 15,000.

(5) Write an SQL statement to give every employee a 10 percent raise.

5-b.   Explain relational calculus. Illustrate Tuple relational calculus and domain relational   10
calculus. (CO2)

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

6-a.   Describe the three data anomalies that are likely to occur as a result of data redundancy. Can   10
data redundancy be completely eliminated in database approach? Why or why not? (CO3)

6-b.   Determine the closer of the following set of functional dependencies for a relation scheme   10
R(A,B,C,D,E,F,G,H), F={ AB→C, BD→EF, AD→G, A→H} List the candidate keys of R. (CO3)

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

7-a.   Differentiate between conflict serializability and view serializability with the help of an   10
example. (CO4)

7-b.   Find out whether the given schedules is (conflict) serializable or not. For each serializable   10
schedule, determine the equivalent serial schedules. (CO4)

(a) r1 (X); r3 (X); w1(X); r2(X); w3(X),

(b) r1 (X); r3 (X); w3(X); w1(X); r2(X),

(c) r3 (X); r2 (X); w3(X); r1(X); w1(X),

(d) r3 (X); r2 (X); r1(X); w3(X); w1(X)

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

8-a.   Explain the features of NoSQL. How is it different from SQL explain in detail. (CO5)   10

8-b.   Differentiate between Timestamp based protocol and Validation based Protocol. Which one   10
        is better and why? (CO5)