NOIDA INSTITUTE OF ENGINEERING AND TECHNOLOGY, GREATER NOIDA

(An Autonomous Institute Affiliated to AKTU, Lucknow)

M.Tech (Integrated)

(SEM:V, THEORY EXAMINATION (2022-2023)

Subject: Database Management System

Time: 3Hours   Max. Marks:100

General Instructions:

IMP: Verify that you have received question paper with 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. Which of the following features is supported in the relational database model? (CO1)   1
   (a). Complex data-type
   (b). Multivalued attributes
   (c). Association with Multiplicities
   (d). Generalization relationship

1-b. Which of the following is the right syntax for the assertion? (CO1)   1
   (a). Create assertion 'assertion-name' check 'predicate';
   (b). Create assertion check 'predicate' 'assertion-name';
   (c). Create assertions 'predicates';
   (d). All of the mentioned above

1-c. Which data manipulation command is used to combine the records from one or more tables? (CO2)   1
   (a). SELECT
   (b). PROJECT
   (c). JOIN
   (d). PRODUCT

1-d. Data integrity constraints are used to: (CO2)   1
   (a). Control who is allowed access to the data
   (b). Ensure that duplicate records are not entered into the table
   (c). Improve the quality of data entered for a specific property (i.e., table column)
   (d). Prevent users from changing the values stored in the table

1-e.	Which of the following provides the ability to query information from the database and insert tuples into, delete tuples from, and modify tuples in the database? (CO3)	1

      (a). DML (Data Manipulation Language)

      (b). DDL (Data Definition Language)

      (c). Query

      (d). Relational Schema

1-f.	In a given relationship R, if an attribute A uniquely defines all other attributes, then the attribute A is a key attribute which is also known as the _____ key. (CO3)	1

      (a). Candidate

      (b). Join

      (c). Functional

      (d). None of the above

1-g.	Which of the following is a concurrency problem? (CO4)	1

      (a). Temporary Update Problem

      (b). Incorrect Summary Problem

      (c). Lost Update Problem

      (d). All of the above

1-h.	This occurs when more than one database transaction attempts to read or write the same database item simultaneously (i.e., concurrent execution), causing the values of the item to become incorrect, resulting in a/an ___ database. (CO4)	1

      (a). Consistent

      (b). Inconsistent

      (c). Concurrent

      (d). Not-concurrent

1-i.	Which of the following is a NoSQL Database Type? (CO5)	1

      (a). SQL

      (b). Document databases

      (c). JSON

      (d). All of the mentioned above

1-j.	NoSQL databases is used mainly for handling large volumes of _____ data. (CO5)	1

      (a). Unstructured

      (b). Structured

      (c). semi-structured

      (d). all of the mentioned above

2. Attempt all parts:-

2.a.	Give the difference between DDL and DML. (CO1)	2
2.b.	Describe the characteristics of SQL database. (CO2)	2
2.c.	Why should normalization be performed on a table and what are its benefits. (CO3)	2
2.d.	What is Conflict &View serializable? Describe it. (CO4)	2
2.e.	What are the advantages of NoSQL over traditional RDBMS? (CO5)	2

SECTION – B

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

3-a.	Draw E-R diagram for student management system with the necessary assumption. (CO1)	6
3-b.	Consider the relational database given below. Give an expression in the relational algebra to express each of the following queries: (CO1)	6

Employee (person-name, street, city), Works (person-name, company-name, salary), Company (company-name, city), Manages (person-name, manager-name)
(1) Find name of all employees.
(2) Find city of employee whose name is 'Jaini'.
(3) Find name and city of all employees who are having salary>50000.
(4) Find total salary of all employees who are working for company 'HCL'

3-c. Consider the following relations and write SQL queries for given statements. Assume suitable constraints. (CO2)   6
job (job-id, job-title, minimum-salary, maximum-salary)
employee (emp-no, emp-name, emp-salary, dept-no)
deposit (acc-no, cust-name, branch-name, amount, account-date)
borrow (loan-no, cust-name, branch-name, amount)
department (dept-no, dept-name)

(1) Give name of employees whose employee number is '001'
(2) Give name of depositors whose branch name starts from 'S'.
(3) Give employee name(s) whose salary is between Rs. 20000 to 30000 and department name is Finance.
(4) Update the salary of employee by 10% of their salary who is working in the Finance department.

3-d. Write a PL/SQL program that fetches records of all students and insert record as students having CPI > 4 in ELIGIBLE table and students having CPI <= 4 in NOT_ELIGIBLE table from student_master table. (CO2)   6

3-e. Normalize the following schema, with given constraints, to 4NF.   (CO3)   6
books(*accessionno*, *isbn*, *title*, *author*, *publisher*)
users(*userid*, *name*, *deptid*, *deptname*)
List of constraints:
accessionno → isbn
isbn → title
isbn → publisher
isbn →→ author
userid → name
userid → deptid
deptid → deptname

3-f. Explain Log based recovery method. (CO4)   6
3-g. Explain the difference between NoSQL v/s Relational database? (CO5)   6

SECTION – C

4. Answer any <u>one</u> of the following-
4-a. Explain DBMS system architecture with diagram. (CO1)   10
4-b. Enlist and explain the advantages of DBMS over traditional file system with example. (CO1)   10

5. Answer any <u>one</u> of the following-
5-a. Explain following relational algebraic operation (i) Division (ii) inner join (iii) intersection (iv) Triggers and (v) outer join. (CO2)   10
5-b. Differentiate strong entity set and weak entity set. Demonstrate the concept of both using real-time example using E-R diagram. (CO2)   10

6. Answer any <u>one</u> of the following-
6-a. What is redundant functional dependency? Explain trivial and non-trivial functional dependency with example. (CO3)   10
6-b. Consider the relation R = {A, B, C, D, E, F, G, H, I, J} and the set of functional dependencies F={{A, B} → C, A → {D, E}, B → F, F →{G, H}, D →{I, J}} What is the key for R? Decompose R into 2NF, 3NF and BCNF relations. (CO3)   10

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

7-a.	What is the use of two-phase locking protocol in concurrency control? Describe the two-phase locking protocol in detail with example. (CO4)	10
7-b.	What is a deadlock in transaction? How to detect deadlock in system? Explain with example. (CO4)	10

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

8-a.	What are the main CRUD operations of MongoDB and How do you perform CRUD operation in MongoDB compass? Explain briefly. (CO5)	10
8-b.	Describe the main characteristics of NoSQL systems with example and write the script for NoSQL DB configuration. (CO5)	10