Printed Page:-04 Subject Code:- AMICSE0506

Roll. No:

NOIDA INSTITUTE OF ENGINEERING AND TECHNOLOGY, GREATER NOIDA

(An Autonomous Institute Affiliated to AKTU, Lucknow)

M.Tech (Integrated)

SEM: V - THEORY EXAMINATION (2024 - 2025)

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.

SECTION-A 20

1. Attempt all parts:-

1-a. For performing tasks like adding, deleting and updating of tuples in a relation, which of the following is used? (CO1,K1) 1

(a) Data definition language

(b) Data control language

(c) Data manipulation language

(d) Transaction control language

1-b. Generalization is a _____ approach. (CO1,K1) 1

(a) bottom-up

(b) top-down

(c) Specialized

(d) None of the above

1-c. Out of the following which SQL keyword is used to retrieve a maximum value? (CO2,K1) 1

(a) MOST

(b) TOP

(c) MAX

(d) UPPER

1-d. If you don't specify ASC or DESC after a SQL ORDER BY clause, the following is used by default (CO2,K2) 1

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(a) ASC
(b) DESC
(c) There is no default value
(d) None

1-e. A composite attribute is converted to individual attributes in which Normal Form. (CO3,K2) 1

(a) First
(b) Second
(c) Third
(d) Fourth

1-f. After normalization, the original table can be obtained by: (CO3,K1) 1

(a) Delete operation
(b) Cascade operation
(c) Join operation
(d) None of the above

1-g. Out of the following which is not a property of transactions. (CO4,K2) 1

(a) Atomicity
(b) Concurrency
(c) Isolation
(d) Durability

1-h. A protocol that ensures that system will never enter a deadlock state is called ----------.(CO4,K1) 1

(a) Deadlock detection
(b) Deadlock elimination
(c) Deadlock prevention
(d) Deadlock recovery

1-i. Functionality that gives you high availability and disaster recovery. (CO5,K2) 1

(a) processing
(b) scalability
(c) replication
(d) all of the mentioned

1-j. In MongoDB which operations modify the data of a single collection. (CO5,K1) 1

(a) CRUD
(b) GRID
(c) READ
(d) All of the mentioned

2. Attempt all parts:-

2.a. Explain the concept of Foreign Key. 2

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2.b.	Discuss Referential Integrity with a suitable example.(CO2)	2
2.c.	Discuss different type of anomalies. (CO3)	2
2.d.	Explain the properties of a transaction.	2
2.e.	Discuss the term " Document in MongoDB".	2

SECTION-B 30

3. Answer any five of the following:-

3-a.	Discuss the various types of Database Languages. Explain each with an example. (CO1,K2)	6
3-b.	Compare and contrast between file system and database management systems. (CO1,K4)	6
3-c.	Explain aggregate functions with example. (CO2,K2)	6
3-d.	Explain set operations of relational algebra with examples. (CO2,K2)	6
3.e.	Let us consider a R=(A,C,D,E,H) with two functional dependencies set F1 and F2 F1={A->C, AC->D, E->AD, E->H}, F2={A->CD, E->AH} Check whether F1 and F2 are equivalent or not? (CO3,K4)	6
3.f.	Discuss the types of serializable schedules. (CO4,K2)	6
3.g.	Discuss CAP theorem. How is it applicable to NoSQL systems? (CO5,K2)	6

SECTION-C 50

4. Answer any one of the following:-

4-a.	Create ER Diagram for following scenario: A salesperson may manage many other salespeople. A salesperson is managed by only one salespeople. A salesperson can be an agent for many customers. A customer is managed by one salespeople. A customer can place many orders. An order can be placed by one customer. An order lists many inventory items. An inventory item may be listed on many orders. An inventory item is assembled from many parts. A part may be assembled into many inventory items. Many employees assemble an inventory item from many parts. A supplier supplies many parts. A part may be supplied by many suppliers. (CO1,K5)	10
4-b.	Convert the following schema into ER Diagram: Branch (branch_name, branch_city, assets) Account (account_number, balance, Branch_name) Customer (customer_name, customer_street, customer_city) Loan (loan_number, amount, Branch_name) borrower (customer_name, loan_number) Depositor (customer_name, account_number) (CO1,K2)	10

5. Answer any one of the following:-

5-a.	Discuss Joins. Elaborate various types of joins with examples. (CO2,K2)	10
5-b.	Using the following schema represent the following queries using SQL: Branch(branch_no, street,city,pincode) , Staff(staffno,fName, LName,position,	10

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dOB, gender, salary, branch_no).
(i) Give all staff a 3% pay increase.
(ii) Find all staff whose salary is larger than the salary of atleast on member of staff at branch B003.
(iii) Find the number of staff working in each branch and the sum of their salaries. (CO2,K5)

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

6-a. Given a relation R(P, Q, R, S, T) and Functional Dependency set FD = { QR → PST, S → Q }, determine given R is in which normal form. (CO3,K5) 10

6-b. Consider a relation schema R(X Y Z W P) (above table R) is decomposed into R1(X Y Z) and R2(W P), determine whether the above R1 and R2 are Lossless or Lossy. (CO3,K5) 10

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

7-a. Define schedule . Define the concepts of recoverable, cascadeless, and strict schedules, and compare them in terms of their recoverability. (CO4,K2) 10

7-b. Define deadlock? Explain the deadlock prevention schemes "Wait-die" and "Wound-wait" in detail. (CO4,K2) 10

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

8-a. Describe CRUD operations with suitable examples. (CO5,K2) 10

8-b. Define NoSQL databases and analyze their key characteristics that differentiate them from traditional relational databases. (CO5,K4) 10

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