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Printed Page:-4 **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 (2025 - 2026)
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

1. Attempt all parts:-

1-a. Identify the lowest level of abstraction that describes how data are actually stored. (CO1, K1) 1

(a) Abstract
(b) View
(c) User
(d) Physical

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

(a) bottom-up
(b) top-down
(c) Specialized
(d) None of the above

1-c. SQL function that is used to count the number of rows in a SQL query? (CO2,K1) 1

(a) ADD()
(b) NUMBER()
(c) SUM()
(d) COUNT(*)

1-d. Select the Aggregate function among the following. (CO2, K2) 1

(a) AVG()
(b) FIRST()
(c) LAST()
(d) All of the above

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1-e. Out of the following which normal form is based on multi valued dependency? (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. The execution sequences in concurrency control are known as _____. (CO4, K1) 1

(a) Serials
(b) Schedules
(c) Organizations
(d) Time tables

1-i. Out of the following which format is supported by MongoDB. (CO5, K2) 1

(a) SQL
(b) XML
(c) BSON
(d) All of the mentioned

1-j. Applications can also control the behavior of write operations using which concern: (CO5, K2) 1

(a) read
(b) write
(c) truncate
(d) all of the mentioned

2. Attempt all parts:-

2.a. Explain the concept of Foreign Key. (CO1, K2) 2

2.b. Explain selection operation with example in relational algebra. (CO2, K2) 2

2.c. Define functional dependency. (CO3, K2) 2

2.d. Define checkpoint in the context of transaction management. (CO4, K2) 2

2.e. Give relevant commands to add data in MongoDB with suitable examples. (CO5, K2) 2

SECTION-B 30

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3. Attempt all parts:-

3.a. Answer any one of the following:-

3.a.(i)	Give two examples with syntax for each type of command: DDL, DML, DCL,TCL. (CO1,K2)	6
3.a.(ii)	Discuss the role and responsibilities of Database Administrator.(CO1, K2)	6

3.b. Answer any one of the following:-

3.b.(i)	Explain Group by, Having clause of SQL with example (CO2,K4)	6
3.b.(ii)	Explain the different types of Integrity constraint with example. (CO2, K2)	6

3.c. Answer any one of the following:-

3.c.(i)	Find the candidate Keys of relation R={A,B,C,D,E} with FD's F={A →BC,CD →E,E → A,B → D}, Also specify prime and non-prime attributes.(CO3, K3)	6
3.c.(ii)	Discuss the various normal forms in normalization. (CO3, K2)	6

3.d. Answer any one of the following:-

3.d.(i)	Elaborate the term serializability. Discuss the conflict and view serializability with example. (CO4,K2)	6
3.d.(ii)	Define a log and explain the process of maintaining it. (CO4, K2)	6

3.e. Answer any one of the following:-

3.e.(i)	Discuss the different types of NoSQL databases. (CO5,K2)	6
3.e.(ii)	Provide the key characteristics that define NoSQL databases. (CO5, K2)	6

SECTION-C 50

4. Answer any one of the following:-

4-a.	Design an E-R diagram for an ATM system. Identify the suitable entities, attributes and relationships. Show appropriate cardinalities. (CO1, K5)	10
4-b.	Convert the following schema into ER Diagram: (CO1, K5) Driver(ID, Name, PhoneNo) Truck(LicNo, maxVol, maxWt) Trip(tripNo, tripLocation) Shipment(ShipNo, Vol, Weight, tripNo) – tripNo is foreign key referencing Trip. Journey(ID, LicNo, tripNo) – ID, LicNo, and tripNo all are foreign keys referencing Driver, Truck, and Trip relations respectively.	10

5. Answer any one of the following:-

5-a.	Consider the following relational database schema student(Student_ID,Stu_Name, Stu_Subject_ID, Stu_Marks, Stu_Age), Subject(Subject_ID, Subject_Name) (i) Write a query to create the table in Structured Query Language. (ii) Write a query to insert the data into the table. (iii) Write a query to view the specific record of the table by using the WHERE clause. (iv) Write a query to access the first record from the SQL table? (v) Write a query to update the marks of a student using Student_ID. (CO2, K5)	10
5-b.	Consider the following schema:	10

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EmployeeDetails (EmpId, FullName, ManagerId, DateOfJoining, City),
EmployeeSalary (EmpId, ProjectID, Salary)

Write the SQL queries for following statements
(i) To display the EmpId and FullName of all the employees working under Manager with id '986'.
(ii) To display the different projects available from the EmployeeSalary table.
(iii) To find the maximum, minimum, and average salary of the employees.
(iv) To find the employees name whose name begins with "Ab".
(v) To display the ManagerId of employees whose salary is more then 50,000. (CO2, K5)

6. Answer any one of the following:-

6-a. Given a relation R(X, Y, Z) and Functional Dependency set FD = { X → Y and Y → Z }, determine whether the given R is in BCNF? If not convert it into BCNF. (CO3, K4) 10

6-b. Consider a schema R(X, Y, Z, W) and functional dependencies FD = { X -> Y and Z -> W }. Then the decomposition of relational schema R into relation R1(X Y) and relation R2(Z W) is lossless join or lossy join? (CO3, K4) 10

7. Answer any one of the following:-

7-a. Analyze which of the following concurrency control protocols ensure both conflict serializability and freedom from deadlock?
Also explain the following:
a. 2-phase locking
b. Time-stamp ordering (CO4, K4) 10

7-b. Prove that the wait-die and wound-wait protocols avoid deadlock and starvation. (CO4, K3) 10

8. Answer any one of the following:-

8-a. Explain the cloud database in detail. List their advantages and disadvantages. (CO5, K2) 10

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

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