

--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

NOIDA INSTITUTE OF ENGINEERING AND TECHNOLOGY, GREATER NOIDA
(An Autonomous Institute Affiliated to AKTU, Lucknow)

BCA

SEM: IV - 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.

SECTION-A

20

1. Attempt all parts:-

- | | | |
|-------|---|---|
| (1.1) | Concurrency control ensures _____. (CO1, K2) | 1 |
| | (a) Faster hardware | |
| | (b) Data deletion | |
| | (c) Correct results with multiple users | |
| | (d) No indexing | |
| (1.2) | Data integrity ensures _____. (CO1, K2) | 1 |
| | (a) Duplication | |
| | (b) Redundancy | |
| | (c) Accuracy and validity | |
| | (d) Random storage | |
| (1.3) | A relation in SQL is implemented as a (CO2, K1) | 1 |
| | (a) View | |
| | (b) Index | |
| | (c) Schema | |
| | (d) Table | |
| (1.4) | COUNT() function returns (CO2, K1) | 1 |
| | (a) Sum | |
| | (b) Number of rows | |
| | (c) Maximum value | |
| | (d) Minimum value | |
| (1.5) | $X \rightarrow Y$ indicates (CO3, K1) | 1 |

- (a) Y determines X
 (b) X determines Y
 (c) Both
 (d) None
- (1.6) Transitivity means (CO3, K2) 1
 (a) $X \rightarrow Y$ and $Y \rightarrow Z \Rightarrow X \rightarrow Z$
 (b) $X \rightarrow Z$ only
 (c) $Y \rightarrow X$
 (d) None
- (1.7) Sequence of operations executed by DBMS is called (CO4, K1) 1
 (a) Transaction
 (b) Schedule
 (c) Lock
 (d) Process
- (1.8) Incorrect concurrent execution leads to (CO4, K2) 1
 (a) High speed
 (b) Optimization
 (c) Parallelism
 (d) Inconsistency
- (1.9) Command used to create collection in MongoDB (CO5, K1) 1
 (a) db.createCollection()
 (b) db.makeCollection()
 (c) db.newCollection()
 (d) create()
- (1.10) Select all documents query (CO5, K1) 1
 (a) find()
 (b) select()
 (c) getAll()
 (d) fetch()

2. Attempt all parts:-

- (2.1) Differentiate strong entity and weak entity with suitable example. (CO1, K3) 2
 (2.2) Write syntax of INNER JOIN in SQL (CO2, K3) 2
 (2.3) Differentiate trivial and non-trivial dependency (CO3, K4) 2
 (2.4) Analyze role of precedence graph in serializability (CO4, K4) 2
 (2.5) Define horizontal scaling with example in NO SQL model (CO5, K2) 2

SECTION-B

30

Answer any one of the following:-

- (3.1) Compare primary key, super key, minimal super key and candidate key with example (CO1, K2) 6
 (3.2) Design ER structure for university registrar system including students, instructors, 6

and subjects. (CO1, K6)

Answer any one of the following:-

- (3.3) Construct SQL queries using aggregate functions to analyze employee salary data (CO2, K5) 6
- (3.4) Illustrate working of LEFT OUTER JOIN and RIGHT OUTER JOIN with examples (CO2, K4) 6

Answer any one of the following:-

- (3.5) Analyze functional dependencies to determine minimal cover of $A \rightarrow B$, $ABCD \rightarrow E$, $EF \rightarrow GH$, $ACDF \rightarrow EG$ (CO3, K5) 6
- (3.6) Compare 1NF, 2NF and 3NF (CO3, K3) 6

Answer any one of the following:-

- (3.7) List and illustrate the deadlock prevention, detection and recovery techniques with suitable example in concurrent execution of transaction (CO4, K3) 6
- (3.8) Design a transaction scenario showing need of concurrency control and locking (CO4, K6) 6

Answer any one of the following:-

- (3.9) Compare different NoSQL data models with use cases (CO5, K4) 6
- (3.10) Design CRUD operations for user management system in NoSQL (CO5, K6) 6

SECTION-C

50

4. Answer any one of the following:-

- (4.1) Design ER diagram for departmental store and convert to relational schema, Also write the SQL query to implement data base. (CO1, K6) 10
- (4.2) Justify data model selection for banking application with design and implementation. (CO1, K5) 10

5. Answer any one of the following:-

- (5.1) Classify DDL, DML, DQL and TCL commands with detailed examples (CO2, K3) 10
- (5.2) Evaluate importance of referential integrity during update and delete operations with examples (CO2, K5) 10

6. Answer any one of the following:-

- (6.1) List and prove the Armstrong axioms and their significance in dependency inference (CO3, K4) 10
- (6.2) Validate normalization process for correctness and efficiency for the given relation $R(A,B,C,D,E)$ with functional dependencies $\{CE \rightarrow D, D \rightarrow B, C \rightarrow A\}$, Find Candidate keys and normalize up to 3NF. (CO3,K4) 10

7. Answer any one of the following:-

- (7.1) Analyze growing and shrinking phases of 2PL with suitable transaction example (CO4, K4) 10
- (7.2) Compare and contrast conflict and view serializability in concurrent transaction of execution with suitable example. (CO4, K5) 10

8. Answer any one of the following:-

- | | | |
|-------|--|----|
| (8.1) | Compare and contrast RDBMS with MongoDB in modern computing environments in terms of scalability, flexibility and performance. (CO5, K3) | 10 |
| (8.2) | Design a NoSQL schema for a Social Media feed, and show how CAP theorem influenced the NoSQL database design? (CO5, K3) | 10 |

REG_JAN_JUNE_2026