



BCA/DMS-401

2025

(4th Semester)

BACHELOR OF COMPUTER APPLICATIONS

Paper : DMS-401

(Database Management System)

Full Marks : 70

Pass Marks : 45%

Time : 3 hours

(PART : B—DESCRIPTIVE)

(Marks : 45)

*The figures in the margin indicate full marks
for the questions*

1. (a) Compare and contrast the following : 5
 - (i) Data and Information
 - (ii) Primary key and Foreign key
 - (iii) Physical and Logical data independence
- (b) Explain specialization of ER diagram with suitable example. 4

Or

- (c) What are keys? How many types of keys are used in database? Explain each. 5
- (d) Who is DBA? What are the responsibilities of DBA? Explain in detail. 4
2. (a) Describe JOIN in SQL with an example for each type. 5
- (b) Explain the importance of procedural and non-procedural query languages in databases. 4

Or

- (c) What is a cursor in SQL? Explain its types with example. 5
- (d) Differentiate between DELETE, TRUNCATE and DROP Commands with suitable examples. 4
3. (a) Given the relation $R(M, N, O, P, Q)$ with $F = \{ M \rightarrow NO, O \rightarrow P, P \rightarrow Q \}$.
(i) Identify the candidate key for R .
(ii) Is R in BCNF? If not, decompose it into BCNF. 5
- (b) Describe what is meant by transitive dependency and explain how this type of dependency relates to 3NF. 4

Or

- (c) Given a relation $R(A, B, C, D)$ with $F = \{ AB \rightarrow CD, B \rightarrow C \}$. Determine whether the given R is in 2NF. If not, convert it into 2NF. 5
- (d) Explain the concept of multi-valued dependency (MVD) with an example. 4
4. (a) Explain the process of log-based recovery and its importance in transaction management. 5
- (b) What is meant by cascading roll back? How can it be prevented in a transaction system? 4
- Or
- (c) What is checkpoint mechanism in DBMS? How does it help in transaction recovery? 5
- (d) Discuss the concept of deadlock in transaction processing and also discuss the possible ways to handle it. 4
5. (a) Define the locking techniques for concurrency control. Distinguish between shared and exclusive locks. 5
- (b) What is database recovery? Why are backups important in transaction management? 4

Or

- (c) Explain data fragmentation in distributed database. What are the types of fragmentation and how do they affect query processing? 5
- (d) Explain locking mechanism in concurrency control. How does 2PL ensure serializability? 4

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(4th Semester)

BACHELOR OF COMPUTER APPLICATIONS

Paper : DMS-401

(Database Management System)

(PART : A—OBJECTIVE)

(Marks : 25)

The figures in the margin indicate full marks for the questions

A. Choose the correct answer by putting a Tick (✓) mark
in the brackets provided : 1×10=10

1. Which data structure is used in hierarchical model records?

- (a) Graph ()
- (b) Tree ()
- (c) Linked list ()
- (d) Stacks ()

2. Which normal form deals with multivalued dependency?
- (a) 1 NF ()
 - (b) 2 NF ()
 - (c) 3 NF ()
 - (d) 4 NF ()
3. Which of the following is known as minimal super key?
- (a) Primary key ()
 - (b) Candidate key ()
 - (c) Foreign key ()
 - (d) Super key ()
4. Which of the following operators is used to compare a value to a list of literal values that have been specified?
- (a) ANY ()
 - (b) BETWEEN ()
 - (c) IN ()
 - (d) ALL ()

5. 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.

- (a) candidate ()
- (b) join ()
- (c) functional ()
- (d) None of the above ()

6. Consider a relation schema $R = (U, V, W, X, Y, Z)$ on which the following functional dependencies hold :

$$(U \rightarrow V, VW \rightarrow X, Y \rightarrow W, X \rightarrow U)$$

The candidate keys of R are

- (a) UY, VY ()
- (b) UY, VY, XY ()
- (c) UYZ, VYZ, VWZ ()
- (d) UYZ, VYZ, XYZ ()

7. If transaction T_1 reads a change made by transaction T_2 , then T_1 commits only after T_2 commits. This property of a transaction schedule is known as

- (a) strict ()
- (b) serializable ()
- (c) recoverable ()
- (d) cascadeless ()

8. Any deadlock situation is detected in advance by the _____ mechanism.

- (a) deadlock detection ()
- (b) deadlock recognition ()
- (c) deadlock avoidance ()
- (d) deadlock rehabilitation ()

9. In context of database, let T_1 and T_2 are two concurrent transactions. Consider the following sequence of operations on data X :

$T_1:R(X)$ $T_1:W(X)$ $T_2:R(X)$ $T_2:W(X)$

This is a _____ problem.

- (a) dirty read ()
- (b) lost update ()
- (c) incorrect summary ()
- (d) unrepeatable read ()

10. The lost update problem also known as

- (a) $W-W$ conflict ()
- (b) $W-R$ conflict ()
- (c) $R-R$ conflict ()
- (d) None of the above ()

B. Indicate whether the following statements are *True* (T) or *False* (F) by putting a Tick (✓) mark : 1×5=5

1. Relational algebra is a procedural query language used in relational database.

(T / F)

2. SQL operators like UNION and INTERSECT help combine results from multiple queries.

(T / F)

3. If A and B are both candidate keys, then $A \rightarrow B$ and $B \rightarrow A$ always hold.

(T / F)

4. A recoverable schedule ensures that transactions commit before undo operations are performed.

(T / F)

5. Data fragmentation in distributed database is used to break large datasets into smaller, more manageable pieces.

(T / F)

C. Answer the following questions in short : 2×5=10

1. What do you mean by instance and schema?
Explain the differences between these.

2. What are aggregate functions? List the aggregate function supported by SQL.

3. Explain the terms 'super key' and 'candidate key' in functional dependancy with suitable examples.

4. How does log-based recovery help in database management?

(10)

5. How does starvation impact system performance in DBMS?
