



BCA/DMS-401

2024

(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) Explain database system 2-tier, 3-tier architecture with diagram in detail. 6
- (b) Explain the following terms : 3
 - (i) Schema
 - (ii) Database
 - (iii) Instances

Or

- (c) What is entity relationship model? Explain types of attributes with example. 5
- (d) Explain generalization feature of ER diagram with suitable example. 4
2. (a) Explain view. How is it different from table? Explain how a view/table can be created and destroyed with proper syntax and example. 5
- (b) Explain entity integrity, referential integrity in detail. 4

Or

- (c) Define set operators. Explain different types of operator with proper syntax and example. 5
- (d) Relational calculus is said to be a declarative language. In contrast, relational algebra is said to be a procedural language. Explain the distinction in your own words. 4

3. (a) Consider the relation scheme

$R(E, F, G, H, I, J, K, L, M, N)$

and the set of functional dependencies

$F = \{EF \rightarrow G, F \rightarrow IJ, EH \rightarrow KL, K \rightarrow M, L \rightarrow N\}$

List all the keys for R . Determine the total number of candidate keys and super keys.

5

- (b) What is functional dependency? Explain its usage design.

4

Or

- (c) Consider table $R(A, B, C, D, E)$ with $F = \{A \rightarrow B, BC \rightarrow E \text{ and } ED \rightarrow A\}$. The table is in which form? Justify your answer.

5

- (d) Why should normalization be performed on a table and what are its benefits? Explain 3NF and BCNF.

4

4. (a) State any three data problems that can happen due to improper concurrency control. Why is recovery needed in database systems?

5

- (b) Explain deadlock detection mechanism in detail.

4

Or

- (c) What is a transaction? What are the four desirables of transactions—commonly called ACID properties? Explain them. 5
- (d) Explain conflict serializability with example. 4
5. (a) Define locking. Explain two-phase locking protocol. 5
- (b) What is the method of recovery in the case of a catastrophic crash? 4

Or

- (c) Explain the two possible states of a binary lock. Why is shared/exclusive locking scheme required? 5
- (d) Describe the shadow-paging recovery technique. Under what circumstances does shadow paging not require a log? What are some of the drawbacks of shadow-paging technique? 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 of the following is the property of transaction that protects data from system failure?

(a) Atomicity ()

(b) Isolation ()

(c) Durability ()

(d) Consistency ()

2. Which normalization form is based on the transitive dependency?

(a) 1 NF ()

(b) 2 NF ()

(c) 3 NF ()

(d) BCNF ()

3. For performing task like creating the structure of the relations, deleting relation which of the following is used?

(a) Data definition language ()

(b) Data derivation language ()

(c) Data transaction language ()

(d) Data control language ()

4. What is row of a relation known as?

(a) Degree ()

(b) Entity ()

(c) Tuple ()

(d) None of the above ()

5. During transaction before commit which of the following statements is done automatically in case of shutdown?

(a) Rollback ()

(b) Commit ()

(c) View ()

(d) Flashback ()

6. Consider a relation scheme $R(A, B, C)$. If $A \rightarrow B$ and $B \rightarrow C$ are functional dependencies on R , then which of the following can be considered as a candidate key?

(a) AB ()

(b) B ()

(c) BC ()

(d) A ()

7. Two concurrent transactions T_1 and T_2 are in conflict when

(a) T_1 reads from X , T_2 reads from Y ()

(b) T_1 reads from X , T_2 writes to X ()

(c) T_1 reads from X , T_2 writes to Y ()

(d) T_1 writes to X , T_2 writes to Y ()

8. Log files are read from end to end by the _____ system.

(a) recovery ()

(b) storage ()

(c) DBMS ()

(d) data ()

9. Which of the following techniques is sometimes used to solve integrity problems in a concurrent transaction scenario?

(a) First-Come First-Served ()

(b) Greedy Algorithm ()

(c) Strassen Algorithm ()

(d) Two-phase Locking ()

10. Which one of the following problems can occur due to introducing locks in a concurrent transaction scenario?

(a) Information overwrite ()

(b) Loss of information ()

(c) Deadlock ()

(d) Lack of integrity ()

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

1. Properties of an object are stored as rows in a table.

(T / F)

2. The qualified DISTINCT must be used in an SQL statement when we want to eliminate duplicate rows.

(T / F)

3. From $A \rightarrow B$, we can derive $AC \rightarrow BC$, which can further lead to $A \rightarrow BC$.

(T / F)

4. Concurrent processing of a database only poses problem when two or more processes attempt to use same data.

(T / F)

5. Generally the more restrictive the transaction isolation level, the less the throughput of database processing.

(T / F)

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

1. Discuss the responsibilities of Database Administration (DBA).

2. What is the difference between Total and Partial participation?

3. What is Attribute Closure? How to find candidate key and super key using attribute closure?

4. Why is recovery needed in database system?

5. What do you understand by the term starvation?
