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Q.4	i.	What is Referential Integrity in database design? Explain with an example.	3	03	1,2,4 -6, 9-12	03 1-4
	ii.	Explain the different Normal Forms in database design, from 1NF to 3NF, with examples.	7	03	1,2,4 -6, 9-12	03 1-4
OR	iii.	Explain Multivalued Dependencies and how they lead to Fourth Normal Form (4NF). Provide an example.	7	03	1,2,4 -6, 9-12	03 1-4
Q.5	i.	Explain the concept of Serializability and its importance in ensuring data integrity in concurrent transactions.	4	04	1,2,4, 5, 9,11	04 2-4
	ii.	What are the basic concepts of concurrency control in transaction processing? Explain the different types of locking protocols.	6	03	1,2,4, 5, 9,11	04 2-4
OR	iii.	What is the difference between recoverability and serializability in transaction processing? Explain with examples.	6	03	1,2,4, 5, 9,11	04 2-4
Q.6	Attempt any two:					
	i.	Explain the concept of query optimization in databases. Discuss the factors that affect query optimization.	5	02	1-5, 9,10	05 1-4
	ii.	Explain the concept of hashing in databases. What are the different types of hashing techniques used for indexing?	5	02	1-5, 9,10	05 1-4
	iii.	Describe the architecture and components of a distributed database system. Discuss the challenges associated with distributed databases.	5	02	1-5, 9,10	05 1-4

Total No. of Questions: 6

Total No. of Printed Pages:4

Enrollment No.....



Faculty of Engineering / Science

End Sem Examination Dec 2024

CS3CO39 / BC3CO65 / BC3CO45

Database Management Systems

Programme: B.Tech./ B.Sc. Branch/Specialisation: CSE All/
Computer Science

Duration: 3 Hrs.

Maximum Marks: 60

Note: All questions are compulsory. Internal choices, if any, are indicated. Answers of Q.1 (MCQs) should be written in full instead of only a, b, c or d. Assume suitable data if necessary. Notations and symbols have their usual meaning.

			Marks	BL	PO	CO	PSO
Q.1	i.	What is one key advantage of a database management system (DBMS)? (a) Increased data redundancy (b) Centralized control of data (c) Lack of data security (d) Fixed storage structure	1	02	1-7, 9-12	01	1-4
	ii.	In the Entity-Relationship Model, a relationship is typically represented by a: (a) Circle (b) Diamond (c) Rectangle (d) Ellipse	1	01	1-7, 9-12	01	1-4
	iii.	Which of the following operations is NOT a basic operation in relational algebra? (a) Selection (b) Union (c) Cartesian product (d) Loop	1	01	1-5, 9-12	02	1-3
	iv.	In SQL, which statement is used to remove all rows from a table but keep its structure? (a) DELETE (b) DROP (c) TRUNCATE (d) REMOVE	1	01	1-5, 9-12	02	1-3
	v.	Which of the following defines a situation where a table is in BCNF but not in 4NF? (a) The table contains partial dependency (b) The table contains transitive dependency (c) The table contains multivalued dependency (d) The table contains foreign key violations	1	01	1,2,4 -6, 9-12	03	1-4

P.T.O.

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vi.	Which of the following is true about functional dependency?	1	02	1,2,4-6,9-12	03	1-4	iii.	Draw and explain the architecture of a DBMS, highlighting the external, conceptual, and internal levels.	5	02	1-7,9-12	01	1-4	
	(a) A functional dependency defines a relationship between attributes in a database						OR	iv.	A university library wants to create a database to manage its operations. The system should track information about books, students, librarians, and borrowing activities. Draw an ER diagram.	5	03	1-7,9-12	01	1-4
	(b) A functional dependency can exist between non-key attributes													
	(c) Functional dependency is concerned with relationships between tables													
	(d) Functional dependency only applies to Primary Keys													
vii.	Which of the following is NOT a desirable property of a transaction?	1	01	1,2,4,5,9,11	04	2-4	Q.3	i.	What is the difference between DELETE and TRUNCATE in SQL with example?	2	02	1-5,9-12	02	1-3
	(a) Atomicity							ii.	Explain the different types of JOIN operations in Relational Algebra with suitable examples. Illustrate how each join type is translated into SQL queries and discuss their significance in database querying.	8	03	1-5,9-12	02	1-3
	(b) Durability													
	(c) Isolation													
	(d) Inconsistency													
viii.	In the context of concurrency control, what is the main purpose of a locking protocol?	1	01	1,2,4,5,9,11	04	2-4	OR	iii.	Write the queries in SQL on following relation schema:	8	03	1-5,9-12	02	1-3
	(a) To prevent the database from crashing								Books(Book_ID, Title, Author, Published_Year, Genre)					
	(b) To allow transactions to execute concurrently without conflicts								Members(Member_ID, Name, Email, Join_Date)					
	(c) To improve the performance of database queries								Loans(Loan_ID, Book_ID, Member_ID, Loan_Date, Return_Date)					
	(d) To back up the database periodically								(a) Write a SQL query to display the title of each book, the name of the member who borrowed it, and the loan date. Include only records where the book has not been returned.					
ix.	What is a distributed database?	1	02	1-5,9,10	05	1-4			(b) Write a SQL query to find the total number of books borrowed by each member. Display the member's name and the number of borrowed books.					
	(a) A database that stores data on a single server								(c) Retrieve the names of members who have borrowed more than 2 books. Display their name and the total number of books borrowed.					
	(b) A database that stores data across multiple physical locations								(d) List all books published before the year 2000 along with the names of the members who borrowed them and the loan dates.					
	(c) A database where the schema is distributed													
	(d) A database that uses cloud computing													
x.	Which of the following is an example of a file organization technique?	1	01	1-5,9,10	05	1-4								
	(a) Binary search tree													
	(b) Hashing													
	(c) B+ Tree													
	(d) All of these													
Q.2	i. What is DBMS? Discuss its advantages.	2	02	1-7,9-12	01	1-4								
	ii. Explain the concept of data independence in DBMS and its importance.	3	02	1-7,9-12	01	1-4								

Marking Scheme
CS3CO39(T)-BC3CO65 Database Management Systems

- Q.1 i) What is one key advantage of a database management system (DBMS)? **1**
 Answer: b) Centralized control of data
- ii) In the Entity-Relationship Model, a relationship is typically represented by a: **1**
 Answer: b) Diamond
- iii) Which of the following operations is NOT a basic operation in Relational Algebra? **1**
 Answer: d) Loop
- iv) In SQL, which statement is used to remove all rows from a table but keep its structure? **1**
 c) TRUNCATE
- v) Which of the following defines a situation where a table is in BCNF but not in 4NF? **1**
 C) The table contains multivalued dependency.
- vi) Which of the following is true about Functional Dependency? **1**
 A) A functional dependency defines a relationship between attributes in a database.
- vii) Which of the following is NOT a desirable property of a transaction? **1**
 Answer: d) Inconsistency
- viii) In the context of concurrency control, what is the main purpose of a locking protocol? **1**
 Answer: b) To allow transactions to execute concurrently without conflicts
- ix) What is a distributed database? **1**
 Answer: b) A database that stores data across multiple physical locations
- x) Which of the following is an example of a file organization technique? **1**
 Answer: d) All of the above

- Q.2 i. Definition of DBMS **1 Mark** **2**
 Advantages **1 Mark**

- ii. Explain the concept of data independence in DBMS. **2 Mark** **3**
 Importance of data independence. **1 Mark**
- iii. Draw and explain the architecture of a DBMS **2.5 Marks** **5**
 Highlighting the external, conceptual, and internal levels **2.5 Marks**

- OR iv. Draw an E-R diagram for library management system. Here university library wants to create a database to manage its operations. The system should track information about books, students, librarians, and borrowing activities. **5**
 Identifying Entities **1 Mark**
 Identifying Attributes and key attributes **1 Mark**
 Identifying relationship between entities **1 Mark**
 E-R Diagram **2 Mark**

- Q.3 i. What is the difference between DELETE and TRUNCATE in SQL with example? **2**
 Two Differences **1 Mark**
 SQL Example **1 Mark**
- ii. Explain the different types of JOIN operations in Relational Algebra with suitable examples. **4 Marks** **8**
 Illustrate how each join type is translated into SQL queries and discuss their significance in database querying. **4 Marks**

- OR iii. a) SELECT Books.Title, Members.Name, Loans.Loan_Date FROM Loans JOIN Books ON Loans.Book_ID = Books.Book_ID JOIN Members ON Loans.Member_ID = Members.Member_ID WHERE Loans.Return_Date IS NULL; **8**
- b) SELECT Members.Name, COUNT(Loans.Loan_ID) AS Total_Borrowed FROM Loans JOIN Members ON Loans.Member_ID = Members.Member_ID GROUP BY Members.Name;
- c) SELECT Members.Name, COUNT(Loans.Loan_ID) AS Total_Borrowed FROM Loans JOIN Members ON Loans.Member_ID = Members.Member_ID GROUP BY Members.Name HAVING COUNT(Loans.Loan_ID) > 2;
- d) SELECT Books.Title, Members.Name, Loans.Loan_Date FROM Loans JOIN Books ON Loans.Book_ID =

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Books.Book_ID JOIN Members ON Loans.Member_ID =
Members.Member_ID WHERE Books.Published_Year <
2000; **2 Marks each**

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- Q.4 i. What is Referential Integrity in database design? Explain with an example. **3**
Explanation **2 Marks**
Example **1 Mark**
- ii. 1NF with examples. **2 Marks** **7**
2NF, with examples. **2 Marks**
3NF with examples. **3 Marks**
- OR iii. Multivalued Dependencies **2.5 Marks** **7**
How they lead to Fourth Normal Form (4NF). **2.5 Marks**
Example. **2 Marks**
- Q.5 i. Explain the concept of Serializability **1.5 Marks** **4**
Serializability importance in ensuring data integrity in concurrent transactions. **2.5 Marks**
- ii. What are the basic concepts of concurrency control in transaction processing? **3 Marks** **6**
Explain the different types of locking protocols. **3 Marks**
- OR iii. What is the difference between Recoverability and Serializability in transaction processing? **4 Marks** **6**
Explain with examples. **2 Marks**
- Q.6 i. Explain the concept of query optimization in databases. **5**
2.5 Marks
Discuss the factors that affect query optimization. **2.5 Marks**
- ii. Explain the concept of hashing in databases. **2.5 Marks** **5**
What are the different types of hashing techniques used for indexing? **2.5 Marks**
- iii. Describe the architecture and components of a distributed database system. **3 Marks** **5**
Discuss the challenges associated with distributed databases. **2 Marks**
