B.E/B.TECH DEGREE EXAMINATIONS: NOV/DEC 2024

(Regulation 2018)

Third / Fourth Semester

INFORMATION TECHNOLOGY

U18ITI4303: Database Management Systems

COURSE OUTCOMES

CO1: Outline an ER model for a defined problem.

CO2: Explain the basic concepts of query processing and query optimization algorithms.

CO3: Describe the concepts of transaction and storage management.

CO4: Explain the basic concepts of database security and NoSQL.

CO5: Design a database for a given problem.

CO6 Develop an RDBMS application.

Time: Three Hours   **Maximum Marks: 100**

Answer all the Questions:-
PART A (10 x 2 = 20 Marks)
(Answer not more than 40 words)

1. Explain how a full table scan can impact query performance and provide an example	CO3	[K_2]
2. What is SQL injection?	CO4	[K_1]
3. Compare the concepts of Discretionary Access Control (DAC) and Role-Based Access Control (RBAC) in database security.	CO4	[K_2]
4. Define data independence and explain why it is crucial in a database management system	CO1	[K_1]
5. Describe a scenario where using an index improves query performance and explain how it achieves this.	CO2	[K_3]
6. Develop a basic ER model for a library management system, identifying key entities and attributes for each.	CO5	[K_3]
7. Calculate the storage required for a table with 20,000 records, where each record uses 150 bytes.	CO3	[K_3]
8. Discuss the importance of data abstraction in a database system.	CO1	[K_2]
9. Describe the importance of the ACID properties in transaction management and how they ensure database consistency.	CO3	[K_2]
10. Design a schema for an e-commerce database including entities like Customer, Product, and Order. Briefly explain each entity and its primary attributes.	CO5	[K_3]

Answer any FIVE Questions:-
PART B (5 x 16 = 80 Marks)
(Answer not more than 400 words)

11.   Scenario: **:** A local food delivery service, QuickBite, needs a database to manage its orders, customers, and restaurant data. QuickBite wants to efficiently manage customer orders, track order status, and ensure transaction security.

    a)   Design an ER diagram for QuickBite's database, including entities for Customer, Restaurant, Order, and Menu.   7   CO1   [K$_3$]

    b)   Describe the process of a customer order, covering stages from placing an order to delivery, using ACID properties.   7   CO1   [K$_3$]

    c)   Identify two integrity constraints for the database and justify their importance.   2   CO2   [K$_2$]

12.   Scenario: CityLibrary is a digital library management system that manages book loans, member records, and book inventory. CityLibrary requires a secure system to handle member queries, track borrowing history, and manage overdue fines.

    a)   Create a relational schema with tables for Books, Members, and Borrowing transactions, specifying primary and foreign keys.   10   CO5   [K$_3$]

    b)   Justify how normalization would help improve efficiency in CityLibrary's database.   6   CO2   [K$_3$]

    Relational Schema Format for Part (a):

Table Name	Attributes	Primary Key	Foreign Key
Books	Book ID, Title, Author, PublicationYear	Book ID	-
Members	Member ID, Name, Contact Information	Member ID	-
Borrow	Transaction ID, Member ID, Book ID, Borrow Date, Due Date	Transaction ID	Member ID, Book ID

13. a)   Define query optimization and explain two common query optimization algorithms.   7   CO2   [K$_2$]

    b)   Describe static and dynamic hashing and how each can be applied in database indexing.   7   CO3   [K$_2$]

	c)	Explain query equivalence with an example.	2	CO2	[K$_2$]
14.	a)	Explain the basic concepts of lock-based concurrency control in DBMS.	7	CO3	[K$_2$]
	b)	Describe timestamp-based concurrency control with a brief example.	7	CO3	[K$_3$]
	c)	Define serializability in the context of transaction management.	2	CO3	[K$_2$]
15.	a)	Compare Discretionary Access Control (DAC) and Role-Based Access Control (RBAC) in terms of database security.	7	CO4	[K$_3$]
	b)	Describe intrusion detection and one method to prevent SQL injection in databases.	7	CO4	[K$_2$]
	c)	Define database authentication and its significance in DBMS security.	2	CO4	[K$_2$]
16.	a)	Explain B+ Tree indexing and its purpose in database search optimization.	7	CO2	[K$_2$]
	b)	Describe RAID storage and compare RAID levels 1 and 5.	7	CO3	[K$_3$]
	c)	Define a data dictionary and its role in a database management system.	2	CO2	[K$_2$]

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