SRM Institute of Science and Technology
College of Engineering and Technology
School of Computing
SRM Nagar, Kattankulathur – 603203, Chengalpattu District, Tamilnadu

Academic Year: 2023-24 (EVEN) BATCH-1 SET – B (FN)

Test: CLA-T3
Course Code & Title: 18CSC303J & Database Management Systems
Year & Sem: III Year / VI Sem

Date: 29-Apr-2024
Duration: 2 Periods
Max. Marks: 50

Course Articulation Matrix:

S. No.	Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	CO1	3	2	2	-	-	-	-	-	-	-	-	-	2	2	-
2	CO2	3	2	2	-	-	-	-	-	-	-	-	-	2	2	-
3	CO3	3	3	3	-	-	-	-	-	-	-	-	-	2	2	-
4	CO4	3	3	3	2	-	-	-	-	-	-	-	-	2	2	-
5	CO5	3	2	2	-	-	-	-	-	-	-	-	-	2	2	-

Part B (2 x 5 marks= 10)
Answer any TWO questions

Q. No	Question	Marks	BL	CO	PO	PI Code
21	Compare and contrast the benefits and drawbacks of denormalization with normalization in the context of database design.	5	L3	4	2	1.7.1
22	"Stable storage helps in the protecting data during failures". State the validity of the sentences with justification.	5	L2	4	1	1.7.1
23	What is deferred DB Modification? Give an example?	5	L1	5	4	1.7.1

Part C (2 x 10 marks = 20 marks)
Answer any TWO questions

24	You are the database administrator for a banking system that handles millions of transactions daily. Recently, your team has implemented a new feature that allows customers to transfer funds between accounts. However, during stress testing, it was discovered that some transactions were not executing in a serializable manner, leading to incorrect account balances and potential financial discrepancies. Outline the steps you would take to address the issue, ensuring that all transactions maintain serializability and the system can recover from failures effectively. Consider the following aspects: a) Define the concept of serializability and explain why it is essential for maintaining data consistency in a multi-user database environment. b) Describe how you would test for serializability in the banking system, including any tools or techniques you might utilize.	10	L3	2	2	2.6.5

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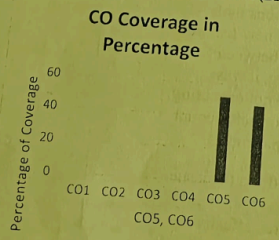
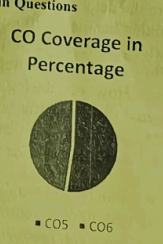
	c) Propose strategies to ensure that all transactions execute in a serializable manner, preventing conflicts and ensuring data integrity. d) Discuss the importance of system recovery mechanisms in the event of a database failure, and outline the steps you would take to implement robust recovery procedures.					
25	Case Study: A hospital maintains a database to manage patient records, including patient ID, name, diagnosis, and treatment information. The current database design lacks normalization, resulting in data redundancy and inconsistency. Normalize the database schema to eliminate these issues up to the third normal form (3NF). Explain each step of the normalization process and discuss how the resulting design improves data integrity and efficiency.	10	L3	4	3	2.6.5
26	Case Study: A university manages a database to track student enrollment, courses, and grades. Design relational algebra queries to perform the following tasks: a. Retrieve the names of students who have enrolled in a specific course. b. Calculate the average grade for each course. c. Find the courses with the highest enrollment. d. Determine the students who have failed a course.	10	L4	4	4	2.3.2

***Program Indicators are available separately for Computer Science and Engineering in AICTE examination reforms policy.**

Excel Course Outcome (CO) and Bloom's level (BL) Coverage in Questions





Approved by the Audit Professor/Course Coordinator

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3	CO3	3	3	3	-	-	-	-	-	-	-	-	-	2	2	-
4	CO4	3	3	3	2	-	-	-	-	-	-	-	-	2	2	-
5	CO5	3	2	2	-	-	-	-	-	-	-	-	-	2	2	-

Part B (2 x 5 marks= 10)
Answer any TWO questions

Q. No	Question	Marks	BL	CO	PO	PI Code
21	Why 4NF in Normal Form is more desirable than BCNF?	5	L3	4	2	1.7.1
22	Write about the importance of functional dependencies in the normalization process. Explain how identifying and understanding functional dependencies helps in achieving higher normal forms.	5	L2	4	1	1.7.1
23	Explain Two-Phase locking Protocol.	5	L1	5	4	1.7.1

Part C (2 x 10 marks = 20 marks)
Answer any TWO questions

24	Consider the below scenario: In a banking database system, two transactions, T1 and T2, are concurrently processing transactions involving the same account. T1 transfers 100 *from AccountA to AccountB, while T2 transfers* 100 from Account A to Account B , while T2 transfers 50 from Account B to Account A. Question: Based on the given scenario, explain how the concept of serializability in database management ensures that the final state of the accounts remains consistent despite the concurrent execution of transactions T1 and T2.	10	L3	2	2	2.6.5
25	Case Study: A university manages a database to track student enrollment, courses, and grades. Design relational algebra queries to perform the following tasks: a. Retrieve the names of students who have enrolled in a specific course. b. Calculate the average grade for each course.	10	L3	4	3	2.6.5

	c. Find the courses with the highest enrollment. d. Determine the students who have failed a course.					
26	You are the database administrator for a large e-commerce platform experiencing rapid growth in both user traffic and product inventory. With the increase in concurrent transactions, you've noticed occasional instances of data inconsistency and deadlock situations within the database system. Outline your approach to implementing effective concurrency control mechanisms to address these issues and ensure data integrity. Consider the following aspects: 1. Identify and explain the types of concurrency control techniques available in a DBMS, highlighting their advantages and limitations. 2. Analyze the specific challenges posed by concurrent transactions in the e-commerce platform, such as inventory updates, order processing, and user authentication. 3. Propose a concurrency control strategy tailored to the e-commerce platform's requirements, considering factors like transaction isolation levels, locking mechanisms, and deadlock detection/prevention. 4. Discuss how you would monitor and fine-tune the concurrency control mechanisms over time to accommodate the platform's evolving workload and transaction patterns. Provide detailed explanations and examples to support your approach, demonstrating your understanding of concurrency control principles and their application in a real-world scenario.	10	L4	4	4	2.3.2

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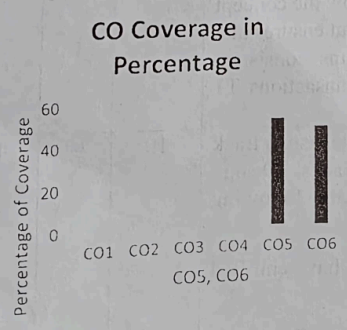

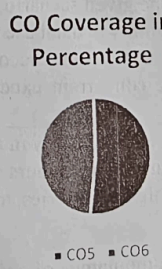

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