Sub:	**Database Management System**					Sub Code:	**BCS403**	Branch:	**AIML /CSE(AIML)**	
Date:	**6.8.2024**	Duration:	**90 minutes**	Max Marks:	**50**	Sem/Sec:		**IV**		**OBE**

		Scheme and Solutions	**MARKS**	**CO**	**RBT**
1	a	Discuss the ACID properties of database transaction. **Answer:** There are 4 properties (1 mark) 1. Atomicity, 2. Consistency, 3. Isolation and 4. Durability To ensure consistency, completeness of the database in scenario of concurrent access, system failure , the following ACID properties can be enforced on to database. (4x1=4) **Atomicity:** ☐ This property states that all of the instructions within a transaction must be executed or none of them should be executed. ☐ This property states that all transactions execution must be atomic i.e. all actions should be carried out or none of the actions should be executed. **Consistency:** ☐ The database must remain in consistence state even after performing any kind of transaction ensuring correctness of the database. ☐ If we execute a particular transaction in isolation (or) together with other transaction in multiprogramming environment , the transaction should give same result in any case. **Isolation:** ☐ When executing multiple transactions concurrently & trying to access shared resources the system should create an order such that the only one transaction can access the shared resource at the same time & release it after completion of it's execution for other transaction. ☐ This property ensures that multiple transactions can occur concurrently without leading to inconsistency of database state. Transactions occur independently without interference. Changes occurring in a particular transaction will not be visible to any other transaction until that particular change in that transaction is written to memory or has been committed. **Durability**: ☐ This property states that once after the transaction is completed the changes that made should be permanent & should be recoverable even after system crash/power failure. ☐ This property ensures that once the transaction has completed execution, the updates and modifications to the database are stored in and written to disk and they persist even is system failure occurs. These updates now become permanent and are stored in a non-volatile memory.	5	CO4	L2
	b	Define Schedule? Illustrate with an example. **Answer:** Schedule (3Marks) ☐ It refers to the list of actions to be executed by transaction. ☐ A schedule is a process of grouping the transactions into one and executing them in a predefined order. Example (2 Marks)	5	CO4	L2
2	a	Explain the following with examples a) Lost Update Problem b) Temporary Update problem c)The unrepeatable read problem Answer:- a) Lost Update Problem:- The problem occurs when two different database transactions perform the read/write operations on the same database items in an	10	CO4	L2

		interleaved manner (i.e., concurrent execution) that makes the values of the items incorrect hence making the database inconsistent.+Example (4 Marks)			
	b)	This problem occurs when one transaction updates a database item and then the transaction fails for some reason.+Example(3 Marks)			
	c)	Also known as Inconsistent Retrievals Problem that occurs when in a transaction, two different values are read for the same database item.+Example(3Marks)			
3	a	Demonstrate the Database Transaction with transaction diagram. Answer: Diagram (3Marks) State explanation (3Marks)	6	CO4	L2
	b	Differentiate between recoverable and irrecoverable schedules. Answer: • **Recoverable Schedule:** A schedule is recoverable if it allows for the recovery of the database to a consistent state after a transaction failure. In a recoverable schedule, a transaction that has updated the database must commit before any other transaction reads or writes the same data. If a transaction fails before committing, its updates must be rolled back, and any transactions that have read its uncommitted data must also be rolled back.(2 Marks) • **Irrecoverable schedule:** The schedule will be irrecoverable if Tj reads the updated value of Ti and Tj committed before Ti commit.(2 Marks)	4	CO4	L2
4	a	Explain CAP theorem. Answer: Each point 1 mark each with diagram • Consistency: – Sequential consistency (a data item behaves as if there is one copy) • Availability: – Node failures do not prevent survivors from continuing to operate • Partition-tolerance: – The system continues to operate despite network partitions CAP says that "A distributed system can satisfy any two of these guarantees at the same time but not all three"(1 mark)	5	CO5	L2
	b	What is NOSQL Graph database? Explain Neo4j. Answer:	5	CO5	L2

		• Graph databases • Data represented as a graph • Collection of vertices (nodes) and edges • Possible to store data associated with both individual nodes and individual edges Neo4j • Open source system • Uses concepts of nodes and relationships Nodes can have labels • Zero, one, or several • Both nodes and relationships can have properties • Each relationship has a start node, end node, and a relationship type • Properties specified using a map pattern • Somewhat similar to ER/EER concepts			
5	a	Demonstrate the Two-phase locking protocol used for concurrency control and how it can lead to deadlocks. Answer: Two Phases-(7 Marks+ Example) (a) Locking (Growing) (b) Unlocking (Shrinking). Locking (Growing) Phase: □ A transaction applies locks (read or write) on desired data items one at a time. Unlocking (Shrinking) Phase: □ A transaction unlocks its locked data items one at a time. Requirement: □ For a transaction these two phases must be mutually exclusively, that is, during locking phase unlocking phase must not start and during unlocking phase locking phase must not begin Two phase locking could lead to deadlock+ Example (3 Marks)	10	CO5	L2
6	a	Write a program to demonstrate the CRUD operations in MongoDB. Answer: Program needs to be written to a)create database -1Mark b)create collection-1Mark c)insert()-2Marks d)delete()-2Marks e)update()-2Marks f)find()-1Mark	10	CO5	L3

CI   **CCI**   **HOD**