UPES
End Semester Examination, Dec 2024

Course: Advanced Databases
Program: BCA
Course Code: CSEG2063

Semester: III
Time   : 03 hrs.
Max. Marks: 100

Instructions: Do as directed.

SECTION A
(5Qx4M=20Marks)

S. No.		Marks	CO
Q. 1	Explain the concept of mirroring in database with a suitable example.	4 M	CO1
Q. 2	Differentiate between serial schedule and serializable schedule with suitable example.	4 M	CO2
Q. 3	Explain, what makes MongoDB a popular choice among NoSQL databases, and what kind of data model does it use?	4 M	CO3
Q. 4	Discuss the concept of encapsulation and tell how it is used to create abstract datatype.	4 M	CO4
Q. 5	Describe the primary characteristics of an OID.	4 M	CO4

SECTION B
(4Qx10M= 40 Marks)

Q. 6	Consider the following scenario with three transactions, T1, T2, and T3, and three resources, R1, R2, and R3: T1 holds a lock on R1 and requests a lock on R2. T2 holds a lock on R2 and requests a lock on R3. T3 holds a lock on R3 and requests a lock on R1. If each transaction can only hold one lock at a time and must wait until it acquires all requested locks, explain why or why not a deadlock will occur. Additionally, suggest one technique that can prevent a deadlock from happening.	10M	CO2
Q. 7	Explain, why was NoSQL developed, and what specific challenges of traditional relational databases does it address?	10 M	CO3
Q. 8	Illustrate the primary types of NoSQL databases, and how does each one differ in terms of data storage?	10 M	CO3
	(OR)		
	i. Compare a collection and a document in MongoDB with suitable example.	5 M	CO3
	ii. Compare a single-node and a multi-node MongoDB deployment.	5 M	

Q. 9	Explain the different types of distributed database systems. Explain data fragmentation, replication and allocation techniques for distributed design.	10 M	CO4

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SECTION-C
(2Qx20M=40 Marks)

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Q. 10	Describe the following in brief with suitable example.
	   i. Heap file
	   ii. Insertion in B+ Tree (consider your own example)
	   iii. Buffering of blocks
	   iv. Hashing
		5M* 4=20M	CO1

Q. 11	i. During its execution, a transaction passes through several states, until it finally commits or aborts. List all possible sequences of states through which a transaction may pass. Explain why each state transition may occur.
	
	ii. Consider the following two transactions:
	
	$T31$: read(A);
	read(B);
	if $A = 0$ **then** $B := B + 1$;
	write (B).
	
	$T32$: read(B);
	read(A);
	if $B = 0$ **then** $A := A + 1$;
	write (A).
	
	Add lock and unlock instructions to transactions $T31$ and $T32$, so that they observe the two-phase locking protocol. Can the execution of these transactions result in a deadlock?
		10 M
		
		10 M
			CO2

	(OR)		
	i. Explain the use of timestamp ordering protocol in DBMS with a suitable example. Explain advantages and disadvantages of timestamp Ordering protocol. ii.Compare basic timestamp ordering protocol and strict timestamp ordering protocol.	10 M 10 M	CO2