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JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST -3 EXAMINATION- 2021

B.Tech – 3rd Semester (CSE & IT)

COURSE CODE: 18B11CI313 MAX. MARKS: 35

COURSE NAME: Database Management Systems

COURSE CREDITS: 3 MAX. TIME: 2 Hours

Note: *All questions are compulsory. Carrying of mobile phone during examinations will be treated as case of unfair means.*

Q1. *Describe the responsibilities of Database Administrator.* *(3)*

Q2. *Write SQL statements for creating two tables 'department'and 'course'. The department relation has attributes (dept_name, building, budget) with dept_name as the primary key. The course relation has attributes (course_id, title, dept_name, credits) with course_id as the primary key and dept_name as the foreign key referencing dept_name of the department relation.* *(2)*

Q3. *What is a weak entity set? Explain it with a suitable example and represent it with an E-R diagram.* *(3)*

Q4. *The following Schema and dependencies among the attributes are given as below. It satisfies which normal form? What need to be done to bring it to the lowest normal form which it does not satisfy?* *(2)*

Schema{Title, PubID, PageCount, Price }

Key → {Title, PubId}

{Title, PubId} → {PageCount}

{PageCount} → {Price}

Q5. Which of the SQL aggregate operation is/are most costly while performing incremental view maintenance in materialized views? Justify your answer. *(3)*

Q6. *Describe ACID properties in the context of transactions.* *(3)*

Q7. *Is the following schedule (1) conflict-serializable (2) recoverable? Justify your answer. Also draw a precedence graph of the following schedule.*

(PTO)

T1	T2	T3	T4
	R(X)		
		W(X)	
		Commit	
W(X)			
Commit			
	W(Y)		
	R(Z)		
	Commit		
			R(X)
			R(Y)
			Commit

(4)

Q8. *Describe Validation-Based Protocol.* (3)

Q9. *In a database system, unique timestamps are assigned to each transaction using a logical clock. Let TS(T1) and TS(T2) be the timestamps of transactions T1 and T2 respectively. Besides, T1 holds a lock on R , and T2 has requested a conflicting lock on the same resource R. The following algorithm is used to prevent deadlocks in the database system assuming a killed transaction is restarted with the same timestamp.*

If(TS(T2) < TS(T1) Then T1 is killed Else T2 waits.

Assume any transaction that is not killed terminates eventually. If any database system uses the above algorithm to prevent deadlocks then explain the status of the database with respect to (1) Deadlock (2) Starvation. (3)

Q10. *Consider the database that is organized in terms of the following hierarchy of objects. The database itself is an object (D), and it contains two files (F1 and F2) each of which contains 100 pages (P1..P1000 and P1001..P2000 respectively). Each page contains 100 records, and records are identified as P:R, where P is the page identifier and R is the slot of the record on that page. Multiple-granularity locking is used, with S,X,IS,IX,SIX locks, and database level, file level, page level, and record level locking . Write and describe the correct sequence of locking to be used for the operation "Delete Record R1500:99".* (3)

Q11. *Describe deferred and immediate approaches of log based recovery.* (3)

Q12. *A log contains the following operations.* (3)

<T4 Start>; <T4, A,10,20>; <T1 Start>; <T1, B, 30,40>; <Checkpoint {T4,T1}>; <T2 Start>; <T2,C,50,60>; <T2 Commit>; <T3 Start>; <T3,B,70,80>

If a crash happens in the end and the system tries to recover using undo and redo operations, what are the contents of undo list and redo list?