United College of Engineering and Research, Allahabad

Department of Computer Science & Engineering

B.Tech CSE- V Semester

Set-4

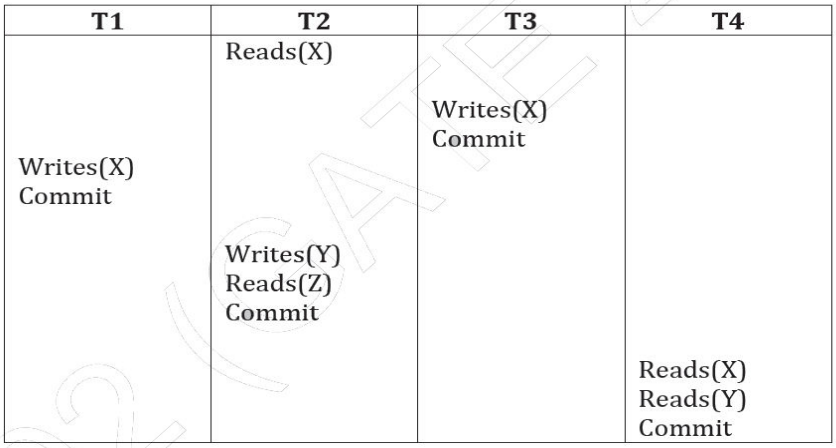
Course Name: Database Management System **AKTU Course Code:** KCS-501

Time: 60 Minutes **Max. Marks: 40**

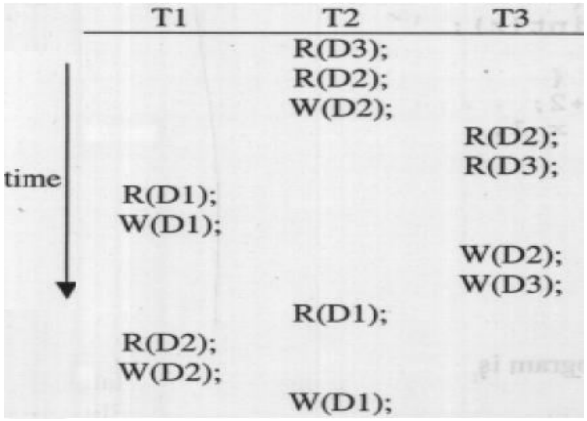
- **All Questions are compulsory.**
- **All Questions carry one mark.**

Q. No.	Questions
1	**Consider the following transactions with data items P and Q initialized to zero:** T1: read (P) ; read (Q) ; if P = 0 then Q : = Q + 1 ; write (Q) ; T2: read (Q) ; read (P) ; if Q = 0 then P : = P + 1 ; write (P) ; **Any non-serial interleaving of T1 and T2 for concurrent execution leads to** (A) A serializable schedule (B) A schedule that is not conflict serializable (C) A conflict serializable schedule (D) A schedule for which a precedence graph cannot be drawn
2	Which of the following concurrency control protocols ensure both conflict serializability and freedom from deadlock?

	I. 2-phase locking II. Time-stamp ordering (A) I only (B) II only (C) Both I and II (D) Neither I nor II
3	Consider the following schedule for transactions T1, T2 and T3: **T1** **T2** **T3** **Read (X)** **Read (Y)** **Read (Y)** **Write (Y)** **Write (X)** **Write (X)** **Read (X)** **Write (X)** Which one of the schedules below is the correct serialization of the above? (A) T1->>T3->>T2 (B) T2->>T1->>T3 (C) T2->>T3->>T1 (D) T3->>T1->>T2
4	Consider the following four schedules due to three transactions (indicated by the subscript) using read and write on a data item x, denoted by r(x) and w(x) respectively. Which one of them is conflict serializable? (A) $r_1(x)$; $r_2(x)$; $w_1(x)$; $r_3(x)$; $w_2(x)$ (B) $r_2(x)$;$r_1(x)$;$w_2(x)$;$r_3(x)$;$w_1(x)$ (C) $r_3(x)$;$r_2(x)$;$r_1(x)$;$w_2(x)$;$w_1(x)$ (D) $r_2(x)$;$w_2(x)$;$r_3(x)$;$r_1(x)$;$w_1(x)$
5	Consider the following schedule S of transactions T1, T2, T3,

	 T4: Which one of the following statements is CORRECT? (A) S is conflict-serializable but not recoverable (B) S is not conflict-serializable but is recoverable (C) S is both conflict-serializable and recoverable (D) S is neither conflict-serializable nor is it recoverable
6	Consider the transactions T1, T2, and T3 and the schedules S1 and S2 given below. T1: r1(X); r1(Z); w1(X); w1(Z) T2: r2(Y); r2(Z); w2(Z) T3: r3(Y); r3(X); w3(Y) S1: r1(X); r3(Y); r3(X); r2(Y); r2(Z); w3(Y); w2(Z); r1(Z); w1(X); w1(Z) S2: r1(X); r3(Y); r2(Y); r3(X); r1(Z); r2(Z); w3(Y); w1(X); w2(Z); w1(Z) Which one of the following statements about the schedules is TRUE? (A) Only S1 is conflict-serializable. (B) Only S2 is conflict-serializable. (C) Both S1 and S2 are conflict-serializable. (D) Neither S1 nor S2 is conflict-serializable

7	Consider the following log sequence of two transactions on a bank account, with initial balance 12000, that transfer 2000 to a mortgage payment and then apply a 5% interest. 1. T1 start 2. T1 B old=12000 new=10000 3. T1 M old=0 new=2000 4. T1 commit 5. T2 start 6. T2 B old=10000 new=10500 7. T2 commit Suppose the database system crashes just before log record 7 is written. When the system is restarted, which one statement is true of the recovery procedure? (A) We must redo log record 6 to set B to 10500 (B) We must undo log record 6 to set B to 10000 and then redo log records 2 and 3. (C) We need not redo log records 2 and 3 because transaction T1 has committed. (D) We can apply redo and undo operations in arbitrary order because they are idempotent
8	Which of the following scenarios may lead to an irrecoverable error in a database system? (A) A transaction writes a data item after it is read by an uncommitted transaction (B) A transaction reads a data item after it is read by an uncommitted transaction (C) A transaction reads a data item after it is written by a committed transaction

	(D) A transaction reads a data item after it is written by an uncommitted transaction
9	Consider three data items D1, D2 and D3 and the following execution schedule of transactions T1, T2 and T3. In the diagram, R(D) and W(D) denote the actions reading and writing the data item D respectively.  Which of the following statements is correct? (A) The schedule is serializable as T2; T3; T1 (B) The schedule is serializable as T2; T1; T3 (C) The schedule is serializable as T3; T2; T1 (D) The schedule is not serializable
10	Consider the following transaction involving two bank accounts x and y. read(x); x := x – 50; write(x); read(y); y := y + 50; write(y) The constraint that the sum of the accounts x and y should remain constant is that of (A) Atomicity (B) Consistency (C) Isolation (D) Durability
11	Consider a simple check pointing protocol and the following set of operations in the log. (start, T4); (write, T4, y, 2, 3); (start, T1); (commit, T4); (write, T1, z, 5, 7); (checkpoint);

(start, T2); (write, T2, x, 1, 9); (commit, T2); (start, T3); (write, T3, z, 7, 2);

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

(A) Undo: T3, T1; Redo: T2

(B) Undo: T3, T1; Redo: T2, T4

(C) Undo: none; Redo: T2, T4, T3; T1

(D) Undo: T3, T1, T4; Redo: T2

12 Consider the following partial Schedule S involving two transactions T1 and T2. Only the read and the write operations have been shown. The read operation on data item P is denoted by read(P) and the write operation on data item P is denoted by write(P).

Time	Transaction-id	
	$T1$	$T2$
1	$read(A)$	
2	$write(A)$	
3		$read(C)$
4		$write(C)$
5		$read(B)$
6		$write(B)$
7		$read(A)$
8		$commit$
9	$read(B)$	

Suppose that the transaction T1 fails immediately after time instance 9. Which one of the following statements is correct?

(A) T2 must be aborted and then both T1 and T2 must be re-started to ensure transaction atomicity

(B) Schedule S is non-recoverable and cannot ensure transaction atomicity

(C) Only T2 must be aborted and then re-started to ensure transaction atomicity

(D) Schedule S is recoverable and can ensure atomicity and nothing else needs to be done

13 Which level of locking provides the highest degree of concurrency in a relational data

	base? (A) Page (B) Table (C) Row (D) Page, table and row level locking allow the same degree of concurrency
14	Consider the following schedule S of transactions T1 and T2: **T1** **T2** Read (A) Temp = 0.2*A Read(A) Write(A) A = A - 10 Read(B) Write(A) Read(B) B = B + Temp B = B + 10 Write(B) Write(B) (A) S is serializable only as T1, T2 (B) S is serializable only as T2, T1 (C) S is serializable both as T1, T2 and T2, T1 (D) S is serializable either as T1 or as T2 (E) None of these

15	Which one of the following is NOT a part of the ACID properties of database transactions? (A) Atomicity (B) Consistency (C) Isolation (D) Deadlock-freedom
16	Consider the following two phase locking protocol. Suppose a transaction T accesses (for read or write operations), a certain set of objects {O1,...,Ok}. This is done in the following manner: **S** **tep 1**. T acquires exclusive locks to O1, . . . , Ok in increasing order of their addresses. **Step 2**. The required operations are performed. **Step 3**. All locks are released. This protocol will (A) guarantee serializability and deadlock-freedom (B) guarantee neither serializability nor deadlock-freedom (C) guarantee serializability but not deadlock-freedom (D) guarantee deadlock-freedom but not serializability
17	Suppose a database schedule S involves transactions T1, ...Tn. Construct the precedence graph of S with vertices representing the transactions and edges representing the conflicts. If S is serializable, which one of the following orderings of the vertices of the precedence graph is guaranteed to yield a serial schedule? (A) Topological order (B) Depth-first order (C) Breadth-first order (D) Ascending order of transaction indices
18	Consider the following database schedule with two transactions, T1 and T2. **S = r2(X); r1(X); r2(Y); w1(X); r1(Y); w2(X); a1; a2;** where ri(Z) denotes a read operation by transaction Ti on a variable Z, wi(Z) denotes a write operation by Ti on a variable Z and ai denotes an abort by transaction Ti . Which one of the following statements about the above schedule is TRUE?

	(A) S is non-recoverable (B) S is recoverable, but has a cascading abort (C) S does not have a cascading abort (D) S is strict
19	Consider the following three schedules of transactions T1, T2 and T3. [Notation: In the following NYO represents the action Y (R for read, W for write) performed by transaction N on object O.] **(S1)** 2RA 2WA 3RC 2WB 3WA 3WC 1RA 1RB 1WA **(S2)** 3RC 2RA 2WA 2WB 3WA 1RA 1RB 1WA 1WB **(S3)** 2RA 3RC 3WA 2WA 2WB 3WC 1RA 1RB 1WA Which of the following statements is TRUE? (A) S1, S2 and S3 are all conflict equivalent to each other (B) No two of S1, S2 and S3 are conflict equivalent to each other (C) S2 is conflict equivalent to S3, but not to S1 (D) S1 is conflict equivalent to S2, but not to S3
20	Which of the following statement is/are incorrect? 1. A schedule following strict two phase locking protocol is conflict serializable as well as recoverable. 2. Checkpoint in schedules are inserted to ensure recoverability. (A) Only 1 (B) Only 2 (C) Both 1 and 2 (D) None
21	For the schedule given below, which of the following is Correct? 1 Read A 2 Read B

	3 Write A 4 Read A 5 Write A 6 Write B 7 Read B 8 Write B (A) This schedule is serialisable and can occur in a scheme using 2PL protocol. (B) This schedule is serialisable but cannot occur in a scheme using 2PL protocol. (C) This schedule is not serialisable but can occur in a scheme using 2PL protocol. (D) This schedule is not serialisable and cannot occur in a scheme using 2PL protocol.
22	Let *R(a,b,c)* and *S(d,e,f)* be two relations in which *d* is the foreign key of *S* that refers to the primary key of *R*. Consider the following four operations *R* and *S* 1. Insert into R 2. Insert into S 3. Delete from R 4. Delete from S Which of the following can cause violation of the referential integrity constraint above? (A) None of (1), (2), (3) or (4) can cause its violation (B) All of (1), (2), (3) and (4) can cause its violation (C) Both (1) and (4) can cause its violation (D) Both (2) and (3) can cause its violation
23	Assume that Ti requests a lock held by Tj. The following table summarizes the actions taken for wait-die and wound-wait scheme:

	Wait – die scheme	Wound – wait scheme
Ti is younger than Tj	W	X
Ti is older than Tj	Y	Z

Fill correct status of Ti and Tj at W, Y, X, and Z respectively.

(A) Ti dies, Ti waits, Ti waits, and Tj aborts respectively.

(B) Ti dies, Ti waits, Ti waits, and Tj aborts respectively.

(C) Ti waits, Ti dies, Ti waits, and Tj aborts respectively.

(D) None of these

24 Consider the given schedule and choose the suitable option.
S = T1:R(x), T1:R(y), T1:W(x), T2:R(y), T3:W(y), T1:W(x), T2:R(y)

(A) Schedule is view serializable

(B) Schedule is conflict serializable but not view serializable

(C) Schedule is view serializable but not conflict serializable

(D) Neither view serializable nor conflict serializable

25 Consider the following four schedules due to three transactions (indicated by the subscript) using read and write on a data item X, denoted by r(X) and w(X) respectively. Which one of them is conflict serializable?

(A) S1: r1(X); r2(X); w1(X); r3(X); w2(X)

(B) S2: r2(X); r1(X); w2(X); r3(X); w1(X)

(C) S3: r3(X); r2(X); r1(X); w2(X); w1(X)

(D) S4: r2(X); w2(X); r3(X); r1(X); w1(X)

26 Suppose a database schedule S involves transactions T1, T2, ...,Tn. Consider the precedence graph of S with vertices representing the transactions and edges representing the conflicts. If S is serializable, which one of the following orderings of the vertices of the precedence graph is guaranteed to yield a serial schedule ?

	(A) Topological order (B) Depth - first order (C) Breadth - first order (D) Ascending order of transaction indices
27	Which of the following concurrency control protocol ensures both conflict serializability and free from deadlock? (A) Time stamp ordering (B) 2 Phase locking (C) Both (A) and (B) (D) None of the above
28	ACID properties of a transactions are (A) Atomicity, consistency, isolation, database (B) Atomicity, consistency, isolation, durability (C) Atomicity, consistency, integrity, durability (D) Atomicity, consistency, integrity, database
29	Which one of these is characteristic of RAID 5? (A) Dedicated parity (B) Double parity (C) Hamming code parity (D) Distributed parity
30	Consider following schedules involving two transactions: S1 : r1(X); r1(Y); r2(X); r2(Y); w2(Y); w1(X) S2 : r1(X); r2(X); r2(Y); w2(Y); r1(Y); w1(X) Which of the following statement is true?

	(A) Both S1 and S2 are conflict serializable. (B) S1 is conflict serializable and S2 is not conflict serializable. (C) S1 is not conflict serializable and S2 is conflict serializable. (D) Both S1 and S2 are not conflict serializable.
31	Consider the following log sequence of two transactions on a bank account, with initial balance 12000, that transfer 2000 to a mortgage payment and then apply a 5% interest. 1. T1 start 2. T1 B old=1200 new=10000 3. T1 M old=0 new=2000 4. T1 commit 5. T2 start 6. T2 B old=10000 new=10500 7. T2 commit Suppose the database system crashes just before log record 7 is written. When the system is restarted, which one statement is true of the recovery procedure? (A) We must redo log record 6 to set B to 10500 (B) We must undo log record 6 to set B to 10000 and then redo log records 2 and 3 (C) We need not redo log records 2 and 3 because transaction T1 has committed (D) We can apply redo and undo operations in arbitrary order because they are idempotent.
32	Assume the following information: Original timestamp value = 46 Receive timestamp value = 59 Transmit timestamp value = 60 Timestamp at arrival of packet = 69 Which of the following statements is correct? (A) Receive clock should go back by 3 milliseconds (B) Transmit and Receive clocks are synchronized (C) Transmit clock should go back by 3 milliseconds

	(D) Receive clock should go ahead by 1 milliseconds
33	Which of the following is the highest isolation level in transaction management? (A) Serializable (B) Repeated Read (C) Committed Read (D) Uncommitted Read
34	Which of the following concurrency protocol ensures both conflict serializability and freedom from deadlock? (a) 2 - phase Locking (b) Time stamp – ordering (A) Both (a) and (b) (B) (a) only (C) (b) only (D) Neither (a) nor (b)
35	What is the equivalent serial schedule for the following transactions? **T1 T2 T3** R(Y) R(Z) R(X) W(X) W(Y) W(Z) W(Z) R(Y) W(Y) R(Y) W(Y) R(X) W(X) (A) T1 – T2 – T3

	(B) T3 − T1 − T2 (C) T2 − T1 − T3 (D) T1 − T3 − T2
36	Which of the following contains complete record of all activity that affected the contents of a database during a certain period of time? (A) Transaction log (B) Query language (C) Report writer (D) Data manipulation language
37	Which of the following RAID level provides the highest Data Transfer Rate (Read/Write) (A) RAID 1 (B) RAID 3 (C) RAID 4 (D) RAID 5
38	Which of the following is correct with respect to Two phase commit protocol? (A) Ensures serializability (B) Prevents Deadlock (C) Detects Deadlock (D) Recover from Deadlock
39	_____ rules used to limit the volume of log information that has to be handled and processed in the event of system failure involving the loss of volatile information. (A) Write-ahead log (B) Check-pointing

	(C) Log buffer (D) Thomas
40	Let S be the following schedule of operations of three transactions T1, T2 and T3 in a relational database system: R2(Y),R1(X),R3(Z),R1(Y)W1(X),R2(Z),W2(Y),R3(X),W3(Z) Consider the statements P and Q below: • **P:** S is conflict-serializable. • **Q:** If T3 commits before T1 finishes, then S is recoverable. Which one of the following choices is correct? (A) Both P and Q are true (B) P is true and Q is false (C) P is false and Q is true (D) Both P and Q are false

Answer

1-B	2-B	3-A	4-D	5-C	6-A	7- B	8-D	9-D	10-B
11-A	12-B	13-C	14-E	15-D	16-A	17-A	18-C	19-D	20-B
21-D	22-D	23-B	24-C	25-D	26-A	27-A	28-B	29-D	30-C
31-B	32-A	33-A	34-C	35-B	36-A	37-A	38-A	39-B	40-B