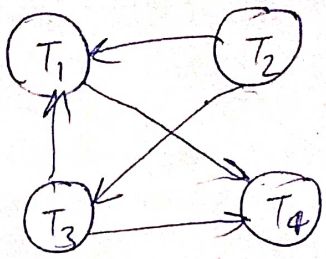
Q.61 Consider the following schedule S of transactions T_1, T_2, T_3, T_4;

No dirty read (WR)

T_1	T_2	T_3	T_4
	$R(X)$		
		$W(X)$	
$W(X)$		Commit	
Commit			
	$W(Y)$		
	$R(Z)$		
	Commit		
			$R(X)$
			$R(Y)$
			Commit



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

[GATE-2014]

Q.62 Which one of them is conflict serializable?

(A) $r_1(x); r_2(x); w_1(x); r_3(x); w_2(x)$

(B) $r_2(x); r_1(x); w_2(x); r_3(x); w_1(x)$

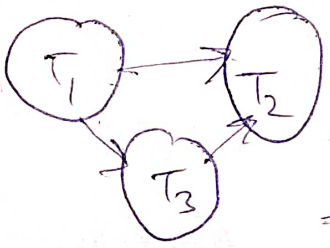
(C) $r_3(x); r_2(x); r_1(x); w_2(x); w_1(x)$

(D) $r_2(x); w_2(x); r_3(x); r_1(x); w_1(x)$

[GATE-2014]

Q.63 Consider the following schedule for transactions T1, T2 and T3:

T_1	T_2	T_3
$R(X)$		
	$R(Y)$	
	$W(Y)$	$R(Y)$
$W(X)$		
		$W(X)$
	$R(X)$	
	$W(X)$	



$T_1 \rightarrow T_3 \rightarrow T_2$

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

[GATE-2010]

Q.64 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

[GATE-2010]

Q.65 Consider the following three schedules of transactions T_1, T_2 and T_3. (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	1WB
(S2)	3RC	2RA	2WA	2WB	3WA 1RA
	1RB	1WA	1WB	3WC	
(S3)	2RA	3RC	3WA	2WA	2WB
	3WC	1RA	1RB	1WA	1WB

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 **[GATE-2008]**

Q.66 Amongst the ACID Properties of a transaction, the 'Durability' property requires that the changes made to the database by a successful transaction persist

(A) Except in case of an Operating System crash

(B) Except in case of a Disk crash

(C) Except in case of a power failure

(D) always, even if there is a failure of any kind **[GATE-2005]**

Q.67 Which level of locking provides the highest degree of concurrency in a relational data base?

(A) Page (B) Table (C) Row (D) All are same **[GATE-2004]**

Q.68 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 **[GATE-2003]**

Q.69 Given below, which of the following is correct?

T_1	T_2
$R(A)$	
	$R(B)$
$W(A)$	
	$R(A)$
	$W(A)$
	$W(B)$
$R(B)$	
$W(B)$	

cycle

(A) This schedule is serialzable and can occur in a scheme using 2PL protocol.

(B) This schedule is serializable but cannot occur in a scheme using 2PL protocol.

(C) This schedule is not serializable but can occur in a scheme using 2PL protocol.

(D) This schedule is not serializable and cannot occur in a scheme using 2PL protocol. **[GATE-1999]**

Q.70 Consider the following log sequence of two transactions on 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 record 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

[GATE-2006]

Q.71 In a database system, unique timestamps are assigned to each transaction using Lamport's logical clock. Let TS (T_1) and TS (T_2) be the timestamps of transactions T_1 and T_2 respectively. Besides, T_1 holds a lock on the resource R, and T_2 has requested a conflicting lock on the same resource R. The following algorithm is used to prevent deadlocks in the database system assuming that a killed transaction is restarted with the same timestamp.

if TS (T_2) < TS (T_1) then
T_1 is killed
else T_2 waits.

Assume any transaction that is not killed terminates eventually. Which of the following is TRUE about the database system that uses the above algorithm to prevent deadlocks?

(A) The database system is both deadlock-free and starvation-free

(B) The database system is deadlock-free, but not starvation-free

(C) The database system is starvation-free, but not deadlock-free

(D) The database system is neither deadlock-free nor starvation-free **[GATE-2017]**

Q.72 Two transactions T_1 and T_2 are given as

T_1 : $r_1(X)w_1(X)r_1(Y)w_1(Y)$ $T_1 \rightarrow T_2 \Rightarrow$ 1 way

T_2 : $r_2(Y)w_2(Y)r_2(Z)w_2(Z)$ $T_2 \rightarrow T_1 \Rightarrow {}^6C_2 + {}^5C_2 \times 2 + {}^4C_2 \times 3 =$ 53 ways

Where $r_i(V)$ denotes a read operation by transaction T_i on a variable V and $w_i(V)$ denotes a write operation by transaction T_i on a variable V. The total number of conflict serializable schedules that can be formed by T_1 and T_2 is 54 Ans **[GATE-2017]**

Q.73 Find the number of conflict serializable schedule for the following transaction :

$T_1 : R_1(A)W_1(A)R_1(B)W_1(B)$

$T_2 : R_2(A)W_2(A)R_2(B)W_2(B)$

Q.74 Which one of the following statements in not correct about the B^+ tree data structure used for creating an index of a relational data base table?

(A) Each leaf node has a pointer to the next leaf node.

(B) Non leaf node have pointer to data str. (X)

(C) B^+ tree is a height balanced free.

(D) Key values in each node are kept in sorted order. **[GATE-2019]**

Q.75 In a B^+-tree, if the search-key value is 8 bytes long. The block size is 512 bytes and the block pointer size is 2 bytes, then the maximum order of the B^+-tree is 52. $\Rightarrow (x-1)*8 + x*2 \leq 512$ **[GATE-2017]**

Ans $x = 52$

Q.76 B^+ Trees are considered BALANCED because

(A) The lengths of the paths from the root to all leaf nodes are all equal.

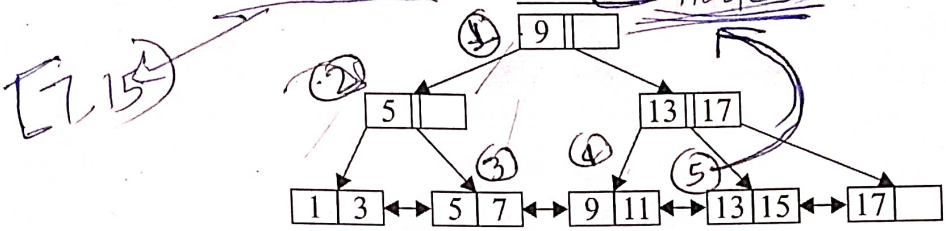
(B) The lengths of the paths from the root to all leaf nodes differ from each other by atmost 1.

(C) The number of children of any two non-leaf sibling nodes differ by at most 1.

(D) The number of records in any two leaf nodes differ by at most 1. **[GATE-2016]**

Q.77 Consider a B^+-tree in which the search key is 12 bytes long, block size is 1024 bytes, record pointer is 10 bytes long and block pointer is 8 bytes long. The maximum number of keys that can be accommodated in each non-leaf node of the tree is _____ **[GATE-2015]**

Q.78 With reference to the B^+ tree index of order 1 shown below, the minimum number of nodes (including the Root node) that must be fetched in order to satisfy the following query: "Get all records with a search key greater than or equal to 7 and less than 15" is _____



[GATE-2015]

Q.79 A file is organized so that the ordering of data records is the same as or close to the ordering of data entries in some index. Then that index is called

(A) Dense (B) Sparse (C) Clustered (D) Unclustered **[GATE-2015]**

Q.80 Consider a B^+-tree in which the maximum number of keys in a node is 5. What is the minimum number of keys in any non-root node?

(A) 1 (B) 2 (C) 3 (D) 4 **[GATE-2010]**

Q.81 A clustering index is defined on the fields which are of type

(A) Non-key and ordering.

(B) Non-key and non-ordering.

(C) Key and ordering.

(D) Key and non-ordering. **[GATE-2008]**

Q.82 The order of a leaf node in a B^+-tree is the maximum number of (value, data record pointer) pairs it can hold. Given that the block size is 1K bytes, data record pointer is 7 bytes long, the value field is 9B and a block pointer is 6 bytes long. What is the order of the leaf node?

(A) 63 (B) 64 (C) 67 (D) 68 **[GATE-2007]**

Q.83 A B-tree used as an index for a large database table has four levels including the root node. If a new key is inserted in this index, then the maximum number of nodes that could be newly created in the process are

(A) 5 (B) 4 (C) 3 (D) 2 **[GATE-2005]**

Q.84 Which of the following is correct?

(A) B-trees are for storing data on disk and B^+ trees are for main memory.

(B) Range queries are faster on B^+ trees.

(C) B-trees are for primary indexes and B^+ trees are for secondary indexes.

(D) The height of a B^+ tree is independent of the number of records. **[GATE-1999]**

Q.85 B^+-trees are preferred to binary trees in databases because

(A) Disk capacities are greater than memory capacities.

(B) Disk access is much slower than memory access.

(C) Disk data transfer rates are much less than memory data transfer rates.

(D) Disk are more reliable than memory. **[GATE-2000]**

Q.86 A B^+-tree index is to be built on the Name attribute of the relation STUDENT. Assume that all student names are of length 8 bytes, disk blocks are of size 512 bytes, and index pointers are of size 4 bytes. Given this scenario, what would be the best choice of the degree (i.e. the number of pointers per node) of the B^+-tree?

(A) 16 (B) 42 (C) 43 (D) 44 **[GATE-2002]**

Q.87 The order of an internal node in a B^+ tree index is the maximum number of children it can have. Suppose that a child pointer takes 6 bytes, the search field value takes 14 bytes, and the block size is 512 bytes. What is the order of the internal node?

(A) 24 (B) 25 (C) 26 (D) 27 **[GATE-2004]**

Q.88 Which one of the following is a key factor for preferring B^+-trees to binary search trees for indexing data base relations?

(A) Database relations have a large number of record.

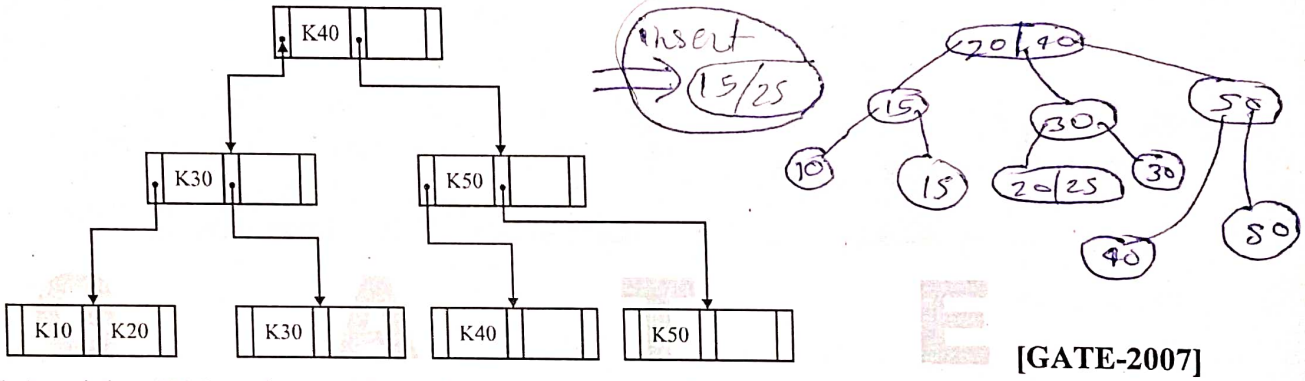
(B) Database relations are sorted on the primary key.

(C) B^+-trees requires Less memory than binary search trees.

(D) Data transfer from disk is in blocks. **[GATE-2005]**

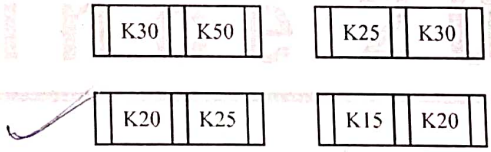
Common Data for Questions 89 to 90

Consider the B^+-tree in adjoining figure, where each node has at most two keys and three links



[GATE-2007]

Q.89 Keys K15 and then K25 are inserted into this tree in that order. Exactly how many of the following nodes (disregarding the links) will be present in the tree after the two insertions?



only 1 present out of 4

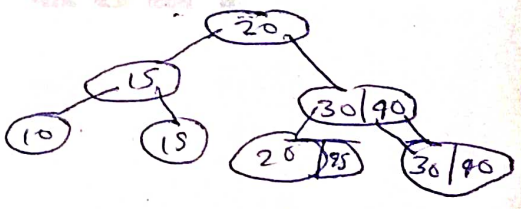
(A) 1 (B) 2 (C) 3 (D) 4

Q.90 Now the key K50 is deleted from the B^+-tree resulting after the two insertions made earlier. Consider the following statements about the B^+-tree resulting after this deletion.

(i) The height of the tree remains the same.

(ii) The node K20 (disregarding the links) is present in the tree.

(iii) The root node remains unchanged (disregarding the links).



Which one of the following options is true?

(A) Statements (i) and (ii) are true (B) Statements (ii) and (iii) are true

(C) Statements (iii) and (i) are true (D) All the statements are false