جامعة العلوم والتقانة
كلية علوم الحاسوب وتقانة المعلومات
بكلاريوس تكنولوجيا المعلومات و الإتصالات

إمتحانات نهاية الفصل للعام 2017-2018
السنة **الرابعة** الفصل **الثامن** الدفعة ICT2014/2015
المقرر : نظم قواعد البيانات الموزعة

التاريخ : 2018/5/7م **الزمن :3 ساعات**

الإسم ..... الرقم .....

أجب عن جميع الأسئلة

ورقة الإمتحان تشتمل على 7 صفحات

Question (1):

(A)For each of the following terms below pick up the best answer or the correct definition and put it on the left column. (10 Marks)

Schedule , System Log ,Transaction,Data Replication, Data Fragmentation,rollback transaction ,commit transaction, Timestamp , Distributed Database Management System , Mandatory Access Control, Discretionary Access Control,In-place update, Shadow update.

1.		Logical unit of database processing that includes one or more access operations
2.		A software system that manages a distributed database while making the distribution transparent to the user
3.		A type of access control that grants or restricts object access via an access policy determined by an object's owner group and/or subjects.
4.		Split a relation into logically related and correct parts.
5.		It is an ordering of the operations of the transactions subject to the constraint that, for each transaction Ti that participates in S, the operations of T1 in S must appear in the same order in which they occur in T1.
6.		The modified version of a data item does not overwrite its disk copy but is written at a separate disk location.
7.		The disk version of the data item is overwritten by the cache version.
8.		A monotonically increasing variable (integer) indicating the age of an operation or a transaction
9.		This signals that the transaction has ended unsuccessfully, so that any changes or effects that the transaction may have applied to the database must be undone
10		A type of access control in which only the administrator manages the access controls

(B)Write down two of the followings: (4 Marks)

1. Threats to databases:

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2. Informal design guidelines for relation schemas:

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3. Transaction states:

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4. Recovery techniques based on immediate update:

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Question (2): (10 Marks)

Answer by TRUE or FALSE and **correct** the false answers:

1. [ ] To reconstruct Relation from complete horizontal fragments a OUTER UNION is applied.

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2. [ ] Undo is similar to rollback except that it applies to a single operation rather than to a whole transaction.

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3. [ ] In the Access Matrix Model rows represents objects represents .

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4. [ ] The purpose of concurrency control to enforce isolation among conflicting transactions.

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5. [ ] Problems with NULLs values in tuples wasted storage space and understanding meaning.

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6. [ ] Every relation in BCNF is also in 2NF

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7. [ ] Optimization criteria of query processing in distributed databases to minimizing access time.

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8. [ ] In multidatabase distributed database systemeach site may run different database system but the data access is managed through a single conceptual schema

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9. [ ] Wound-Wait and Wait-Die algorithms use timestamps to avoid deadlocks by rolling-back victim.

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10. [ ]Only one write lock on data item can exist at any time and no shared lock can be applied by any other transaction .

Question (3): Select the correct answer, from options (a, b, c, d) to each of the following questions: (15 Marks)

1. ____transparency exists when the end user or programmer must specify the database fragment names but does not need to specify where these fragments are located.	
a. Transaction	b. Location
c. Local mapping	d. Fragmentation
2. ____ ensures that once transaction changes are done, they cannot be undone or lost, even in the event of a system failure.	
a. Atomicity	b. Consistency
c. Durability	d. Isolation
3. Checkpoints are a part of :	
a. Security measures	b. Recovery measures
c. Concurrency measures	d. Authorization measures

4. A distributed ____ allows a transaction to reference several different remote sites.

a. request	b. site
c. data location	d. transaction

5. The write-ahead logging (WAL) protocol simply means that:

a. writing of a data item should be done ahead of any logging operation.	b. the log record for an operation should be written before the actual data is written
c. all log records should be written before a new transaction begins execution	d. the log never needs to be written to disk.

6. ____means that the data used during the execution of a transaction cannot be used by a second transaction until the first one is completed:

a. Atomicity	b. Consistency
c. Durability	d. Isolation

7. "A transaction must hold all its exclusive locks till it commits/aborts" this protocol is :

a. Timestamp-Based protocol	b. Rigorous two-phase locking protocol
c. Strict two-phase locking protocol	d. None of the above

8. The countermeasures to covert channelssecurity problem is called :

a. Flow control	b. Access control
c. Inference control measures	d. Encryption

9. In Mandatory Access Control the restriction "A subject S is not allowed read access to an object O unless class(S) ≥ class(O)" known as :

a. Simple security property	b. Star property
c. System property	d. None of the above.

10. Assume transaction A holds a shared lock R. If transaction B also requests for a shared lock on R.:

a. It will result in a deadlock situation	b. It will immediately be rejected
c. It will immediately be granted	d. It will be granted as soon as it is released by A

11. In dirty read problem …….:

a. one transaction reads the committed value for another transaction	b. one transaction reads an uncommitted value of another transaction
c. one transaction reads another transaction	d. one transaction commits another transaction

12. Which of the following is not one of the Distributed Databases concurrency control and recovery problems:

a. Distributed deadlock	b. Failure of individual sites
c. Communication link failure	d. All of the above

13. Selection operation δ Ci (R) :

a. Defines a relation that contains a vertical subset of R.	b. Define a relation that contains a horizontal subset of R.
c. A combination of Vertical and Horizontal fragmentation.	d. None of the above

14. A schedule that "where every transaction reads only the items that are written by committed transactions" is :	
a. Strict Schedules	b. Recoverable schedule
c. Serial Schedule	d. Cascadeless schedule
15. In which the database can be restored up to the last consistent state after the system failure?	
a. Backup	b. Recovery
c. Both	d. None of the above

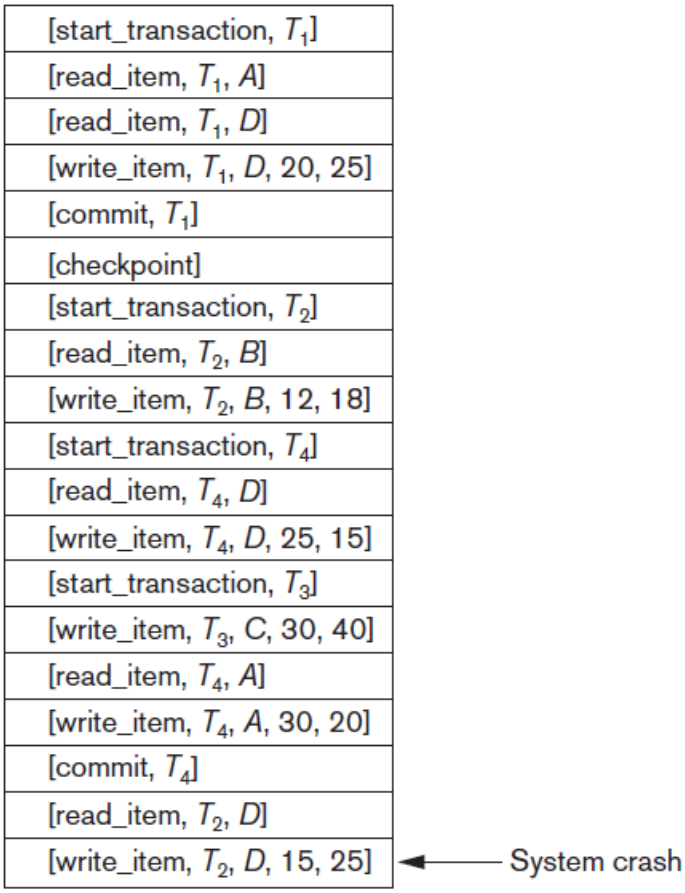
Question (4): (11 Marks)

1. Which of the following schedules is (conflict) serializable? For each serializable schedule, determine the equivalent serial schedules.
   a. $r1(X)$; $r3(X)$; $w1(X)$; $r2(X)$; $w3(X)$;
   b. c. $r3(X)$; $r2(X)$; $w3(X)$; $r1(X)$; $w1(X)$;

2. Write code performs the read operation in Two-Phase Locking Techniques?

3.Consider the following figure, which shows the log corresponding to a particular schedule at the point of a system crash for four transactions T1, T2, T3, and T4, to answer the below questions**:**

***Suppose that we use the immediate update protocol with check pointing .



a. Describe the recovery process from the system crash.

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b. Specify which transactions are rolled back.

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c. Which operations in the log are redone and which (if any) are undone, and whether any cascading rollback takes place.

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Question (5): (10 Marks)

1. What are the before image (BFIM) and after image (AFIM) of a data item?

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2. Explain the differences between the following :

   a. In-place updating **and** Shadowing, with respect to their handling of BFIM and AFIM?

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   b. Homogeneousdistributed database systems **and** Heterogeneousdistributed database systems

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   c. Deferred-modification technique **and** Immediate -modification technique

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3.Explain how the distributed database system Increased reliability and availability?

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Question (6): (10 Marks)

1. Explain why the following relation schema is not in 1NF and illustrate the process of normalizing it to 1NF.

Dname	Dnumber	Mgrssn	Dlocation

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2. Given a relation with scheme {ID, Name, Address, Postcode, CardType, CardNumber}, the candidate key {ID}, and the following functional dependencies:

- {ID} → {Name, Address, Postcode, CardType, CardNumber}
- {Address} → {Postcode}
- {CardNumber} → {CardType}

(i) Explain why this relation is in second normal form, but not in third normal form.

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(ii) Show how this relation can be converted to third normal form. You should show what functional dependencies are being removed, and give the relation(s) that result.

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(iii) Give an example of a relation that is in third normal form, but that is not in Boyce-Codd normal form, and explain why it is in third, but not Boyce-Codd, normal form.

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End of Exam / Good Luck