Ministry of Higher Education
Saudi Electronic University
College of Computing and Informatics

Midterm Examination Cover Sheet

Second Semester: 1435-1436 / 2014-2015

Course Instructor:		**Exam Date:**	**17-03-2015**
Course Title:	**Database Management Systems**	**Course Code:**	**IT 344**
Exam Duration:	**1 Hour**	**Number of Pages:** (including cover page)	**SEVEN**

Exam Guidelines

- **Mobile phones are not permitted.**
- **Calculators are permitted.**

Marking Scheme

Questions	Score
1 (10 Marks)	
2 (10 Marks)	
3 (5 Marks)	
4 (5 Marks)	
5 (5 Marks)	
6 (5 Marks)	
Total Marks = 40	

Student Name: _____ **Student ID:** _____

Question 1: MULTIPLE CHOICE QUESTIONS

[10 MCQs of 10 Marks]

1. Data striping is used in which of the following techniques?

   A. Dynamic hashing
   B. RAID
   C. SAN
   D. Extendible hashing

2. Ordered file is also named as_____.
   A. Heap file
   B. Pile file
   C. Sequential file
   D. Binary file

3. A clustering index differs from a primary by _____.

   A. being dense
   B. being faster
   C. more efficient
   D. being specified on a non-key field

4. Which of the following data structures is used for multilevel indexes?

   A. linked list
   B. graph
   C. B-tree
   D. Stack

5. What is the first step in a heuristic optimization of a relational algebra query tree?

   A. Cascade of project
   B. Cascade of select
   C. Commuting project with select
   D. Commutating the project operation

6. In relation algebra, ____ symbol is used for aggregation function.

A. $\mathcal{F}$
B. Π
C. Σ
D. X

7. An example of denormalization of a relation is _____

A. changing a relation from first to second normal form
B. changing a relation from third to second normal form
C. changing a relation from second to third normal form
D. all of the above

8. Which of the following is NOT an important factor influencing physical database design?

A. analysis of the database queries
B. analysis of the frequency of queries and transactions
C. number of users
D. analysis of the uniqueness constraints on attributes

9. When one transaction is calculating an aggregate function on a number of records while other transactions are updating some of these records. This problem is known as:

A. Lost Update Problem.
B. Temporary Update Problem
C. Dirty Read Problem
D. Incorrect Summary Problem

10. _____means that the transaction has ended unsuccessfully, so that any changes or effects that the transaction may have applied to the database must be undone.

A. Commit
B. Rollback
C. Undo
D. Redo

Question 2: TRUE OR FALSE QUESTIONS [10 Marks]

Write True or False in front of each statement.

1. If sequential search is used for an ordered file of N blocks then average access time will be $\log_2 N$. **FALSE**

2. Storage Area Networks provide one-to-one connectivity between servers and storage disks. **FALSE**

3. An index can be specified on one or more fields of the file. **TRUE**

4. The index file usually occupies more disk blocks than the original data file. **FALSE**

5. Query optimization is the process of choosing a suitable execution strategy for processing a query. **TRUE**

6. Linear search is to search all the file blocks to retrieve all records satisfying the selection condition. **TRUE**

7. Database tuning is done to make applications run faster. **TRUE**

8. There is no need to tune a query if it issues frequent disk accesses. **FALSE**

9. Being serializable is the same as being serial. **FALSE**

10. A schedule S is recoverable if no transaction T in S commits until all transactions T' that have written an item that T reads have committed. **TRUE**

Question 3: [5 Marks]

Suppose we are using RAID technology for parallelizing disks, why **RAID level 0** has the risk of data loss associated with it?

Answer:

Raid level 0 has no redundant data. There is no added redundancy for handling disk failures and failure of one disk causes the loss of the entire RAID 0 volume and hence the data recovery possibilities are reduced.

Question 4: [5 Marks]

Assume a data file with number of records r = 30000 records, record size R = 150 bytes and block size B = 512 bytes.

a) Calculate the blocking factor (number of records per block) **bfr.**

bfr= B/R= 512/150 = 3 records per block

b) Calculate the number of blocks **b** of the data file

b= r/bfr= 30000/3 = 10000 blocks

Question 5: **[5 Marks]**

Briefly describe the five cost components that are used to estimate query execution cost.

Answer:

The cost of executing a query includes the following components:

1) Access Cost to secondary storage – This is the cost of transferring data blocks between secondary disk storage and main memory buffers.
2) Disk storage cost – This is the cost of storing on disk any intermediate files that are generated by an execution strategy for the query.
3) Computation cost – This is the cost of performing in-memory operations on the records within the data buffers during query execution such as searching for and sorting records.
4) Memory usage cost – This is the cost pertaining to the number of main memory buffers needed during query execution.
5) Communication cost – This is the cost of shipping the query and its results from the database site to the site or terminal where the query originated.

Question 6: **[5 Marks]**

Describe the meaning of concurrent execution of database transactions in a multiuser system.

Answer:

In multiuser systems, many users can use the system and hence access the database concurrently.

For example, an airline reservations system is used by hundreds of travel agents and reservation clerks concurrently. In similar systems, hundreds or thousands of users are typically operating on the database by submitting transactions concurrently to the system. Transactions submitted by the various users may execute concurrently and may access and update the same database items.

OR Any another correct answer