Final Examination Cover Sheet

Second Semester: 1436-1437 / 2015-2016

Course Title:	**INTRODUCTION TO DATABASE**	**Course Code:**	**IT244**
Exam Duration:	**2 HOURS**	**Number of Pages:** (including cover page)	**12**

Student Name:	**Student ID:**
Course Instructor:	**Exam Date:**

Exam Guidelines	
• **Mobile phones are not permitted.**	
Marking Scheme	
Questions	**Score**
Question 1 (20 Marks)	
Question 2 (10 Marks)	
Question 3 (10 Marks)	
Question 4 (20 Marks)	
Question 5 (5 Marks)	
Question 6 (15 Marks)	
Question 7 (20 Marks)	
Total: 100 Marks	
Total: 50 Marks	

Q. 1 For each of the following multiple choice questions, choose one correct answer. (20 x 1 = 20)

1. ..... combine a number of entity sets that share the same features into a higher-level entity set:

A. Intersect

B. Attribute inheritance

C. A bottom-up design process

D. relationship sets

2. What command is used to get back the privileges offered by the GRANT command?

A. Grant

B. Revoke

C. Execute

D. Run

3. Which of the following is NOT a type of SQL constraint?

A. PRIMARY KEY

B. ALTERNATE KEY

C. FOREIGN KEY

D. UNIQUE

4. Aggregate functions simply _____ null values

A. Take into account

B. Ignore

C. Delete

D. Reject

5. Avg, min, max, sum and count are called _____ functions.

A. Algebra

B. Normal

C. Aggregate

D. Complex

6. _____ provides the ability to query information, and insert, delete and update tuples

A. Data Manipulation Language

B. Data Definition Language

C. Data Construction Language

D. Data management Language

7. A functional dependency is a relationship between or among:

A. Tables.

B. Rows.

C. Relations.

D. Attributes.

8. DBMS is the bridge between operating system and _____.

A. User

B. Database administrator

C. Application program

D. None of these

9. Which is the component of database management system:

A. Query Language

B. Database Manager

C. File manager

D. All of these

10. From a structural point of view, 2NF is better than ____.

A. 1NF

B. 3NF

C. 4NF

D. BCNF

11. The _____ clause specifies conditions that the result must satisfy

A. Where

B. And

C. Or

D. System

12. _____ computes the join and then adds tuples form one relation that does not match tuples in the other relation to the result of the join.

A. Join

B. Natural join

C. Cartesian product

D. Outer join

13. An …….. is an object that exists and is distinguishable from other objects.

A. Entity
B. Entity set

C. Attributes

D. relationship

14. Transaction either fully executed or rolled back as if it never occurred is

A. Atomic transaction

B. Rollback work

C. Commit work

D. API

15. 4. Audit Trails are used to:

A. authorize a user

B. locate when and how a data is updated

C. encrypt data

D. reduce cost of serving pages

16. Tables in second normal form (2NF):

A. Eliminate transitive dependencies.

B. Have fields must contain a single value.

C. Have a composite key

D. Have all non key fields depend on the whole primary key

17. If attribute A determines both attributes B and C, then it is also true that:

A. A → B

B. B → A

C. C → A

D. (B,C) → A

18. Tables are in second normal form (2NF), when:

A. All non-key attributes are fully functional dependent on the primary key.

B. Have a composite key.

C. There is no transitive functional dependency.

D. None of the above.

19. ..... involve two entity sets (or degree two):

A. One-to-One Relationship

B. binary relationship

C. Domain

D. none of the above

20. _____ is a logical unit of work that contain one or more SQL statements.

A. Query

B. Workspace

C. Transaction

D. Savepoint

Q. 2 For each of the following statements, answer with True or False. (10 x 1 = 10)

S. No.	STATEMENT	TRUE/FALSE
1.	A join operation is a Cartesian product which requires that tuples in the two relations match	TRUE
2.	When an entity belongs to more than one lower-level entity set is called Overlapping	TRUE
3.	*NULL* signifies an unknown value or that a value does not exist	TRUE
4.	The HTTP protocol is connectionless.	TRUE
5.	A relation is in Boyce-Codd Normal Form (BCNF) if every determinant is a composite key.	FALSE
6.	Second normal form is based on multivalued dependencies.	FALSE
7.	Atomic attributes are attributes that can be further divided.	FALSE
8.	A database management system is a collection of interrelated data and a set of program to access those data	TRUE
9.	A Data definition language is a language that enables users to access or manipulate data	FALSE

10. The ISA relationship also referred to as superclass - subclass relationship TRUE

Q. 3 Fill in the blanks with appropriate words: (10 x 1 = 10)

Index	**Single Sign-On**	**View**	**Normalization**
Atomic	**Public Key Encryption**	**UML**	**Attribute Inheritance**
Set Difference	**Data Manipulation Language**	**Set Intersection**	**Data Access Layer**

1. **Public Key Encryption** use different keys for encryption and decryption.

2. **Data access layer** acts as an interfaces between business logic layer and the underlying database

3. The SQL **Data Manipulation Language** provides the ability to query information, and insert, delete and update tuples.

4. When a lower-level entity set inherits all the attributes and relationship participation of the higher-level entity is called **Attribute inheritance.**

5. **UML** Class Diagrams correspond to E-R Diagram, but several differences.

6. **Normalization** is a process to help reduce the likelihood of data anomalies

7. **Index** is a data structure used to speed up access to records with specified values.

8. **Single Sign-On** allows user to be authenticated once, and applications can communicate with authentication service to verify user's identity without repeatedly entering passwords.

9. A relational schema R is in first normal form if the domains of all attributes of R are **Atomic**.

10. The **Set Difference** operation, denoted by −, allows us to find tuples that are in one relation but are not in another.

Q. 4 Answer the following questions briefly.
(5 x 4 = 20)

(What are the Attribute types? explain with example? (5 marks .1

Answer:

Simple and composite attributes.

Single-valued and multivalued attributes

Example: multivalued attribute: phone_numbers

Derived attributes

Can be computed from other attributes

Example: age, given date_of_birth

2. What is the difference between commit work and rollback work in transaction?

Answer: Commit work commits the current transaction; that is, it makes the updates performed by the transaction become permanent in the database. After the transaction is committed, a new transaction is automatically started.

Rollback work causes the current transaction to be rolled back; that is, it undoes all the updates performed by the SQL statements in the transaction. Thus, the database state is restored to what it was before the first statement of the transaction was executed.

3. Explain the distinction between total and partial constraints.

Answer: In a generalization–specialization hierarchy, a total constraint means that an entity belonging to the

higher level entity set must belong to the lower level entity set. A partial constraint means that an entity belonging to the higher level entity set may or may not belong to the lower level entity set.

4. Explain relational algebra and write fundamental operations of relational algebra.

Answer: Relational algebra is a procedural query language, which takes instances of relations as input and yields instances of relations as output. It uses operators to perform queries. An operator can be either unary or binary. They accept relations as their input and yield relations as their output. Relational algebra is performed recursively on a relation and intermediate results are also considered relations.

The fundamental operations of relational algebra are as follows −

- Select
- Project
- Union
- Set different
- Cartesian product
- Rename

5. What is Materialized Views?

Answer: Certain database systems allow view relations to be stored, but they make sure that, if the actual relations used in the view definition change, the view is kept up-to-date.

Q. 5 Define the difference between lossy and lossless join decomposition. (5 Marks)

Answer: We say that the decomposition is a lossless decomposition if there is no loss of information by replacing r (R) with two relation schemas r1(R1) andr2(R2). A decomposition that is not a lossless decomposition is called a lossy decomposition. the decomposition is lossy when the join result lost information about which identifiers correspond to other attributes.

Q. 6 Consider the bank database.
(15 marks)

branch(branch name, branch city, assets)
customer (customer name, customer street, customer city)
loan (loan number, branch name, amount)
borrower (customer name, loan number)
account (account number, branch name, balance)
depositor (customer name, account number)

Give an expression in the relational algebra for each of the following queries:

a. Find all loan numbers with a loan value greater than $50,000.
b. Find the names of all depositors who have an account with a value
greater than $9,000.
c. Find the names of all depositors who have an account with a value
greater than $8,000 at the “Uptown” branch.

Answer:

a. $\pi_{loan\ number}\ (\sigma_{amount > 50000}(loan)$
b. $\pi_{customer\ name}\ (\sigma_{balance > 9000}\ (depositor\ X\ account))$
c. $\pi_{customer\ name}\ (\sigma_{balance > 8000 \wedge branch\ name = \text{“Uptown”}}\ (depositor\ X\ account))$

Q. 7 Use the tables below to answer the following questions:

customers

customerid	firstname	lastname	city	state
10101	John	Gray	Lynden	Washington
10298	Leroy	Brown	Pinetop	Arizona
10299	Elroy	Keller	Snoqualmie	Washington
10315	Lisa	Jones	Oshkosh	Wisconsin

10325	Ginger	Schultz	Pocatello	Idaho

items_ordered

customerid	order_date	item	quantity	price
10330	30-Jun-1999	Pogo stick	1	28.00
10101	30-Jun-1999	Raft	1	58.00
10298	01-Jul-1999	Skateboard	1	33.00
10101	01-Jul-1999	Life Vest	4	125.00
10299	06-Jul-1999	Parachute	1	1250.00

Write SQL statements for the following queries: (5 x 4 = 20)

1. List all customers IDs along with their items and order date. (Customer who has not ordered any item should also be shown in the result)

   Answer:

   SELECT customerid, item, order_date

   FROM customers NATURAL LEFT OUTER JOIN items_ordered;

2. Create a view *Idaho_customers* to show customers information in Idaho State only.

   Answer:

   CREATE VIEW Idaho_customers AS

   (SELECT customerid, firstname, lastname, city

   FROM customers

   WHERE state=”Idaho”);

3. Find the customerid of customers in the customers table that have 10101 as customerid.

   Answer:

   SELECT CUSTOMERID

   FROM CUSTOMERS

   WHERE CUSTOMERID = ’10101’

4. Find the highest price of an item in items_ordered table. (4 marks)

   Answer:

   SELECT MAX(PRICE)

   FROM ITEMS_ORDERED;

5. Give the user Manager the privilege of reading data from items_ordered relation.

   Answer:

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GRANT SELECT ON items_ordered TO Manager;
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----------ALL THE BEST----------