

Maharishi University of Management

CS-422 Database Systems

Midterm Exam

Time allocated 2 Hours

Instructions:

- **PLEASE READ ALL QUESTIONS CAREFULLY IN ORDER TO AVOID INCORRECT ASSUMPTIONS!!!**
- The Exam is closed book, closed notes
- Answer all questions
- No electronic devices are permitted including computers, calculators, cell phones, and PDAs.
- No additional blank paper is permitted. Each exam packet includes 10 blank sheets.
- **It is your responsibility to monitor start time and end time**

1. **5 points.** Explain how the **GROUP BY** clause works. What is the difference between **WHERE** and **HAVING** clauses?
2. **10 points.** List some advantages (5 points) and disadvantages (5 points) of DMBS (in short, no long essays needed).
3. **2 points.** DML allows users to:
 - A. Retrieve the information in the database
 - B. Insert new information into the database
 - C. Delete information from the database
 - D. All of the above.
4. **2 points.** Which of the following is Database Language:
 - A. DDL (Data Definition Language)
 - B. DML (Data Manipulation Language)
 - C. Query Language
 - D. All of the above

5. **total 42 points.** Given the following database tables

User (**userId**, firstName, lastName, email)

CreditCard(**userId**, **cardNumber**, securityCode, expirationDate)

Item(**itemId**, name, description, pricePerUnit)

Order(**orderId**, **userId**, **cardNumber**, orderTotalAmount)

ItemsInOrder(**orderId**, **itemId**, quantity)

Formulate the following SQL Statements:

- a. Write the DDL to create the table CreditCard. **5 points**
- b. List the email(s) of the user(s) which have the highest number of expired credit cards. The email should be printed only once. If more than one user has the highest number, print all emails, but each should be printed just once. **10 points**
- c. List the first and last name of all users which did not make any purchases. **10 points**
- d. List all items (itemId, name, description) purchased by user John Smith (first name is John last name is Smith). **Do you see any problems with this query (searching by name)?** **17 points**

6. What is your name? (1 point)
7. **18 points.** You are the DBMS expert at a small car rental facility – “The SQL wheels”. Design the database and show the relationship between the tables. **You need to create an E-R diagram and also show the tables that will physically go into the database.** Keep it simple – each car has a fixed price per day. A few queries that your design should be able to answer are:
- How many customers rented a car from us on July 4th 2019?
 - What is our most valuable customer (brought us the most money)?
 - Which car has the highest mileage?
8. **10 points.** Explain the concept of “Referential integrity constraint”. Please structure your answer in 3 parts:
- How referential integrity is created between tables
 - Examples of actions (sql commands) which can violate the constraint.
 - How Sql server can help in avoiding the violation of the integrity constraint? (not just by returning an error).
9. **10 points.** Explain the “Rishi Devata and Chandas” (knower, known and the process of knowing) SCI concept and how it is manifested in the DBMS world.

Good Luck!