University Examinations 2012/2013

THIRD YEAR, FIRST SEMESTER, EXAMINATION FOR THE DEGREE OF BACHELOR IN COMPUTER TECHNOLOGY

BCT 2304: DATABASE MANAGEMENT SYSTEM

DATE: AUGUST 2012   **TIME: 2 HOURS**

INSTRUCTIONS: *Answer question **one** and any other **two** questions*

QUESTION ONE – 30 MARKS

a. Using an example explain what a weak entity is in database design.   (2 Marks)
b. Describe the differences in meaning between the terms relation and relation schema. (2 Marks)
c. State two measures of the cost of query evaluation.   (2 Marks)
d. Explain the concept of physical data independence and its importance in database systems.   (2 Marks)
e. Explain the distinction between the terms serial schedule and serializable schedule. (2 Marks)
f. Given the role records-clerk and relation consultation, write a sql statement to grant the role the ability to enter data into the consultation relation.   (2 Marks)
g. Explain the role of an index in a relational database.   (2 Marks)
h. Explain what is meant by slicing in relation to data analysis.   (2 Marks)
i. Given a relation student, name the command you would use to change the relation schema and the category of SQL statements under which it falls.   (2 Marks)
j. Briefly describe the two – phase locking protocol used in concurrency control   (2 Marks)
k. Explain the concept of a clustered file.   (2 Marks)
l. Explain how transaction logs and checkpoints are used in backup and recovery.   (4 Marks)
m. Explain how the Bell Lapadulla security model works.   (4 Marks)

QUESTION TWO – 20 MARKS

a. State and explain three phases of database design.   (3 Marks)
b. Given the schemas, **customer(cust_id, first_name, cell), movie(movie_id, movie_name, genre) and rentals(id, date_out, cust_id, movie_id, borrow_period)** with similar field names indicating relationship between the tables. Write the statement that will create a view showing the number of movies each customer has borrowed.   (7 Marks)

      i.   Is it a simple or complex view?

     ii.   Briefly explain the implications of (1) above

c. Students at MUCST register for classes during the first three weeks of the semester, the university wants to keep track of classes a student registers for, the date and a running total of all units they have signed up for. Given this scenario:

      i.   State and explain implications of the current normal form.   (2 Marks)

     ii.   Normalize the table as much as possible and explain your rationale.   (8 Marks)

Student_Id	Names	Class Code	Lecturer	Registration_Date	Units_Registered
CT-595-001/2010	Andy M. Koby	BIT 2109	Duke	10-JUN-2010	8
		BCT 2301	James	10-JUN-2010	8
CT-595-002/2009	Daisy K. Chebet	ICS 8201	Ron	11-JUN-2010	2
		BIT 2109	Duke	10-JUN-2010	2

QUESTION THREE – 20 MARKS

a. State and explain SQL features that are intended to assist in maintaining data integrity and how they do so.

                 (5 Marks)

b. Using a data set show the problems that redundancy creates in a relational database.   (5 Marks)

c. Construct an E-R diagram for a hospital with a set of patients and a set of medical doctors. Associate with each patient a log of the various tests and examinations conducted. Your design should include an E-R diagram, a set of relational schemas, and a list of constraints, including primary – key and foreign – key constraints.   (10 Marks)

QUESTION FOUR – 20 MARKS

a. List the ACID properties of transactions and explain the usefulness of each.   (4 Marks)

b. Explain different ways you would go about implementing a distributed database.   (6 Marks)

c. Design a database for an automobile company to provide to its dealers to assist them in maintaining customer records and dealer inventory and to assist sales staff in ordering cars. Each vehicle is identified by a vehicle identification number (VIN). Each individual vehicle is a particular model of a particular brand offered by the company (e.g, the XF is a model of the car brand Jaguar of Tata Motors). Each model can be offered with a variety of options, but an individual car may have only some (or some) of the available options. The database needs to store information about models, brands and options as well as information about individual dealers, customers and cars. Your design should include an E-R diagram and a list of constraints, including primary-key and foreign-key constraints. Choose suitable attributes for the entities you identify.   (10 Marks)

QUESTION FIVE – 20 MARKS

a. Express the query below in relational algebra.   (2 Marks)
    Select first_name, last name, employeedId, salary from employee
b. Explain what a trigger is and how triggers are used in a DBMS.   (2 Marks)
c. Explain two approaches of implementing access control and implications that may exist for each
                                                                                        (6 Marks)
d. Discuss the significance of indexing and illustrate two types of indexes using diagrams.   (10 Marks)