UNIVERSITY OF SWAZILAND

FACULTY OF SCIENCE

DEPARTMENT OF COMPUTER SCIENCE

FINAL EXAMINATION, 2011

Title of Paper   :   Databases and their Design II

Course Number   :   CS 346

Time Allowed   :   Three (3) Hours

Instruction   :   Answer **ANY FIVE** questions

This paper should not be opened until permission has been granted by the invigilator.

Question 1

(a)   What are the advantages of using indexes? The disadvantages?   [2]

(b)   Define the primary and the referential keys.   [4]

(c)   On relational mainframe DBMSs, who or what is responsible for the decision to use a particular index? What about on microcomputer DBMSs?   [4]

(d)   Why is it a good idea for the DBMS to update the catalog automatically when a change is made in the database structure? Could users cause problems by updating the catalog themselves?   [4]

(e)   How can the structure of a table be change in SQL? What general types of changes are possible? What commands are used to implement these changes?   [6]

Question 2

Design a database for a chain of bookstores. The database should keep information about publishers, authors and obviously books. Each book has a code that uniquely identifies the book. In addition, record the title, the publisher, the type of book, the price and whether the book is paperback. Also record the author or authors of the books along with the number of units of te book that are in stock in each of the branches of the chain.

This information is to be used in a variety of ways. For example, a customer may be interested in books written by a certain author or of a certain type. You need to be able to tell the customer which books by the author or of that type are currently in stock. If not in stock in that branch you have to be able to determine which branch currently has that book.

Question 3

Using entities found in a democratic political system, create an example of a table that is in 1NF but not in 2NF and an example that is in 2NF but not in 3NF. In each case justify your example – i.e. why you think your 1NF table is not in 2NF, and why your 2NF table is not in 3NF. Normalise your 1NF and 2NF tables into 3NF tables.   [20]

Question 4

Convert the following table to 3NF

STUDENT (stud_numb, stud_name, numb_cred, adv_numb, adv_name, crse_numb, crse_desc, grade)

where: stud-numb determines stud_name, numb_cred, adv_numb, and adv_name; adv_numb determines adv_name; the combination of a stud_numb and a crse_numb determines a grade.

[20]

Question 5

(a)   Describe a third normal form and state what types of problems are encountered in tables that are not in third normal form.   [5]

(b)   List the functional dependencies in the following table, subject to the specified conditions. Convert this table to an equivalent collection f tables that are in 3NF

        INVOICE(inv_numb, cust_numb, cust_name, address, invdate, part_numb, part_desc, unit_pce, numb_ship)

        This table concerns invoice information. for a given invoice (identified by the invoice number) there will be a single customer. The customer's number, name, and address appear on the invoice as well as the invoice date. Also, there may be several different parts appearing on the invoice. For each part that appears, the part number, description, price, and number shipped will be displayed. The prices is from the current master price list.   [15]

Question 6

(a)   (i)   Draw an ER diagram for the following database.

                STUDENT (stud_name, stud_id, address, DOB, PIN),
                COURSE (crse_id, crse_title, crse_code);
                ENROLLED-IN (grade,date)   [5]

                Illustrate the relationship ENROLLED_IN with a table;
                show its primary key.   [5]

(b)   Describe aggregation with the aid of an ER diagram without the involvement of work or school environment   [10]