UNIVERSITY OF SWAZILAND

FACULTY OF SCIENCE

DEPARTMENT OF COMPUTER SCIENCE

SUPPLEMENTARY EXAMINATION, JULY 2008

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)   Why is it a good idea for the DBMS to update the catalogue automatically when a change is made in the database structure? Could users cause problems by updating the catalogue themselves? Discuss.   [6]

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

(c)   Discuss the execution of a view in SQL with reference to an example.   [8]

Question 2

Sipho owns a chain of four book stores. Design a database for his chain of book stores. Sipho gathers and organises information about publishers, authors and books. Each book has a code (uniquely identifies each book). In addition, he records the title, the publisher, the type of book, the price, and whether the book is paper back or not. He also records the author or authors of the book along with the number of units of the book that are in stock in each of the branches. Sipho uses this information in a variety of ways. For example, a customer may be interested in books written by a certain author or of a certain type. He wants to be able to tell his customers which books (by author or by type) he currently has in stock. If not in stock in one branch he needs to be able to determine if any of the other branches currently have it.

        Design a database to manage Sipho's chain of book stores database.   [20]

Question 3

Using entities found in a library environment like the one in question 2, 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 answer – i.e. why you think your 1NF table is not in 2NF, and why your 2NF table is not in 3NF. Normalise your 1NF table to 3NF table(s); as well as your 2NF table.   [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 of 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 are 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),
                COURSE (crse_id, crse_title); ENROLLED-IN(grade).   [5]

        (ii)   Illustrate the relationship ENROLLED_IN with a table.   [5]

(b)   Describe aggregation with the aid of an ER diagram where: employees work on a project and use different machines in their work; each employee has a name, and an id-number; the work they do is quantified in hours; the projects they work on are identified by id-numbers and so are the machines they use.   [10]