

UNIVERSITY OF SWAZILAND

FACULTY OF SCIENCE

DEPARTMENT OF COMPUTER SCIENCE

MAIN EXAMINATION, MAY 2009

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) On relational mainframe DBMSs, who or what is responsible for the decision to use a particular index? What about on microcomputer DBMSs? [6]
- (c) Discuss the execution of a view in SQL with reference to an example. [6]
- (d) Define a primary key. [2]

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 sugar mill or pulp company 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 – each table must have at least seven attributes. In each case justify your answer stating 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 an equivalent collection of tables that are in 3NF. [20]

Patient (HhNumb, HhName, HhAddress, HhBal, PatNumb, PatName,
ServCode, ServDescr, ServFee, ServDate)

This is a table concerning information about patients of a dentist. Each patient belongs to a household. The head of the household is designated Hh in the table. The following dependencies exist in a patient:

PatNumber --> HhNumb, HhName, HhAddress, HhBal, PatName

HhNumb --> HhName, HhAddr, HhBal

ServCode --> ServDesc, ServFee

PatNumb, ServCode --> ServDate

Question 5

Prepare an information design for a database for **Cars First Workshop**. The company stores information about the maintenance of cars. Each car is required to undergo an inspection each year to test to see if it is roadworthy. After each inspection a maintenance record is created and any repairs that are needed are recorded. A repair can require new parts to be purchased and fitted. If a car needs a repair then the evaluation is set to **FAIL** until all the repairs are completed and then it is set to **PASS** [20]

Question 6

- (a) (i) Draw an ER diagram for the following database (stating all assumptions made).

STUDENT (stud_name, stud_id, address, DOB),
COURSE (crse_id, crse_title, num_hours); ENROLLED-IN(grade). [5]

- (ii) Break down the above ER diagram into tables. [5]

- (b) Write down all the special keys important for an information design level for a database; stating clearly why each one is useful and pointing out the problems that may be encountered if that particular key is not considered in the design. [10]