UNIVERSITY OF SWAZILAND

FACULTY OF SCIENCE & ENGINEERING

DEPARTMENT OF COMPUTER SCIENCE

MAIN EXAMINATION, MAY 2017

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) Define the primary and referential keys with respect to functional dependency. [4]

(b) Discuss data integrity and its purpose. [4]

(c) How do indexes and user views differ? [8]

(d) Why is it good for the DBMS to update the catalog automatically when a change is made in the database structure instead of users? [4]

Question 2

(a) Write an SQL query to create the relation **STUDENT**(Fname, Lname, <u>Stnumber</u>, Address, Gender, Year) [7]

(b) Write a query to list all students who have Mbabane in their address in (a) [5]

(c) Write a query to promote student, Stnumber = 123456, to year 4 [5]

(d) Write a query to find the name of the user who owns this table in (a) [3]

Question 3

Using entities found in a bank, create an example of a table that is not normalised, and a table in 1NF but not in 2NF, a table in 2NF but not in 3NF, and a table in 3NF. In each case justify your choice – i.e. why you think your un-normalised table is not in 1NF, why your 1NF table is not in 2NF, etc. Normalise all your relations to 3NF with justification of each normal form. [20]

Question 4

(a) Determine all functional dependencies in the following relation

ORDERS (<u>Ordnumb</u>, Orddte, Custnumb, Custname, Address, Slsrnumb, <u>Partnumb</u>, Partdesc, Numbord, Quotprce)

Where the relation represents orders made by customers for this dealership. The attributes are: order number, order date, customer number, customer name, customer address, sales rep number (for the sales rep who represents that customer), part number (for a part ordered), part description, number of units ordered (of that ordered part), and the quotation price, respectively. State your assumptions, if any. [5]

(b) Normalise the relation to a set of relations in 3NF, stating all relationships that exist between them, if any. [15]

Question 5

Complete an information-level design for a bookshop database (a bookshop that has a number of branches) that satisfy the following constraints and requirements:

(a) For each publisher, list the publisher code, the name, and the city in which the publisher is located.

(b) For each branch, list the number, the name, the location, and the number of employees;

(c) For each book, list the code, title, the code and name of the publisher, the price, and whether or not it is a paperback;

(d) For each book, list its code, title, type, and price. In addition, list the number and name of each of the authors of the book. (if there is more than one author, they must be listed in the order in which they are listed in the book. This may or may not be in alphabetical order);

(e) For each branch, list the number and name. In addition, list the code and title of each book currently in the branch as well as the number of units of the book the branch currently has;

(f) For each book, list the code and title. In addition, for each branch currently having the book, list the number and name of each branch along with the number of copies available   [20]

Question 6

(a) What does functional dependency mean, and what is its importance?   [5]

(b) Convert the following table to an equivalent collection of tables that are in 3NF (showing every step starting from the repeating group - which you must determine). The name of the table is PATIENT:

PATIENT(HHNUMB, HHNAME, HHADDR, HHBAL, PATNUMB, PATNAME, SERVCODE, SERVDESC, SERVFEE, SERVDATE)

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

PATNUMB - -> HHNUMB, HHNAME, HHADDR, HHBAL, PATNAME
HHNUMB - -> HHNAME, HHADDR, HHBAL
SERVCODE - -> SERVDESC, SERVFEE
PATNUMB, SERVCODE - -> SERVDATE   [15]