UNIVERSITY OF SWAZILAND

FACULTY OF SCIENCE

DEPARTMENT OF COMPUTER SCIENCE

MAIN EXAMINATION, 2018

Title of Paper	:	**Databases and their Design II**
Course Number	:	**CSC 371/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 considerations should be taken into account when using indexes, and why? [4]

(b) How does the ***choice of index to be used differ*** between mainframe and microcomputer relational databases? Which one do you prefer and why? [6]

(c) Briefly discuss the purpose of two of the tables found in a system's catalog. [4]

(d) i) Write an SQL command to delete a table called **CUSTOMER** in a database.
ii) Write a command to add an attribute called **NAME** into a table called **EMP**. [6]

Question 2

(a) Describe the different categories (eg minimally relational) of relational models. [10]
(b) Discuss three advantages of a relational system over a hierarchical (or network) system and a two disadvantages of a relational system compared to a hierarchical one [10]

Question 3

Using entities found in a University, like UNISWA, create an example of a table that is in 0NF but not in 1NF, a relation 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 0NF table is not in 1NF, and why your 1NF table is not in 2NF, etc. Normalise all your tables to 3NF relations. [20]

Question 4

Draw an ER diagram based on account holders (clients) and their accounts in some bank. Your ER diagram should emphasize and illustrate the two bank account types, **cheque** and **savings** accounts, to have a lot in common save for the bank charges, overdrafts, etc (associated with the cheque accounts); and savings accounts (associated with interests). Break down the ER diagram in to a set of relations. [20]

Question 5

Design (Information level) 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 it. 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 the books 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.. [20]

Question 6

(a) Describe a table in 2NF and describe the types of problems encountered in tables that are not in 2NF with examples. [10]

(b) List the functional dependencies and illustrate them in a dependancy diagram based on 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. [10]