UNIVERSITY OF SWAZILAND

FACULTY OF SCIENCE

DEPARTMENT OF COMPUTER SCIENCE

SUPPLEMENTARY EXAMINATION, JULY 2008

Title of Paper	:	Databases and their Design I
Course Number	:	CS 345
Time Allowed	:	Three (3) Hours
Instruction	:	Answer any **FIVE** questions

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

Question 1

(a) Define the following terms:

(i) Data [2]

(ii) Database [3]

(iii) DBMS [3]

(b) The advantages of a DBMS include: increased productivity, data independence, data abstraction, and controlled redundancy.

(i) What is meant by data abstraction and how is it an advantage? [4]

(ii) How is productivity increased? [3]

(iii) How is data independence an advantage? [2]

(c) Differentiate between a single-user DBMS and a centralised DBMS. [3]

Question 2

Users involved in a database include a DBA, database designers and end users.

(a) Differentiate between a DBA and a database designer. [4]

(b) End users include naive (parametric) end users

(i) Describe a naive end user with the aid of an example. [4]

(ii) Compare and contrast the other two categories of end users. [5]

(c) In a DBMS environment:

(i) What would be your job be if you were hired as a systems analyst? [3]

(ii) How about if you were an application programmer? [4]

Question 3

(a) Data abstraction can be done at three main levels and the number of main groups of data models is three. Choose any one of these two groups of three and discussed them. (No more than a page). [9]

(b) Define a relational database and an un-normalised relation. [5]

(c) Give the formal names of a record, file, and a field. [3]

(d) Describe the shorthand representation of the structure of a relational database. [3]

Question 4

(a) What does it mean to qualify a name of an attribute? How is this done? [3]

(b) Give three advantages of the relational database and two disadvantages. [5]

(c) What is the relationship between the network model and the CODASYL model? [3]

(d) Describe how, a network model that is not pure hierarchical, can be implemented as a hierarchical model. [5]

(e) What are the advantages of the hierarchical model as compared to the other two record-based logical models? What are the disadvantages? [4]

Question 5

(a) Name and define two integrity constraints. [4]

(b) Draw an E-R diagram for a banking enterprise with two entity sets, CUSTOMER and ACCOUNT: where each customer has a name, graded tax number and an address; an account can either be a current account or a savings account, and has a balance and account number. Find and place a meaningful relationship between these two entity sets. [6]

(c) Define a primary key and, with the aid of a diagram, define existence dependance. [4]

(d) Describe generalisation with the aid of a diagram (NOT using a banking enterprise example). [6]

Question 6.

Consider an ordinary university setting (that will have lecturers, courses, programs, etc).

a) Describe aggregation using an academic setting where a course taught by a lecturer will be offered in a particular semester (term), hence the concept of *taught* and *offered* are addressing the same issue. Draw an E-R diagram to illustrate your description (with at least five entities). [10]

b) Reduce the E-R diagram in (a) into tables. [10]