UNIVERSITY OF SWAZILAND

FACULTY OF SCIENCE

DEPARTMENT OF COMPUTER SCIENCE

MAIN EXAMINATION, DECEMBER 2017

Title of Paper	:	**Databases and their Design I**
Course Number	:	**CSC 272/CS 345/**
Time Allowed	:	**Three (3) Hours**
Instruction	:	**Answer <u>all questions</u> in SECTION A and;** **<u>Any three (3)</u> questions in SECTION B**

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

SECTION A

1. a) Define the following terms related to database systems:
        i)   Data   [2]
        ii) Metadata   [1]
        iii) Data Model   [2]
        iv) DBMS   [3]

    b) Define a relationship type, a relation and a data domain.   [6]

    c) Why is data independence important for DBMSs?   [4]

    d) Name and describe any database end user.   [2]

2. a) Discuss three advantages and two disadvantages of a relational database.   [7]

    b) Draw an ER diagram to illustrate a portion a Lewis Furniture Shop. Allocate appropriate attributes and relationships to entities of this enterprise and draw the ER diagram with a minimum of 7 entity types).   [7]

    c) A database is being constructed to keep track of vehicles of Inyatsi Construction Company. Design an ER diagram for a data base of this company.   [6]

SECTION B

3. a) Describe the importance integrity rules in DBMS.   [3]
    b) Discuss three disadvantages of a DBMS over a traditional file system.   [6]
    c) How does a DBMS increase productivity in an enterprise?   [4]
    d) Discuss the importance of data abstraction in databases.   [5]
    e) Why is metadata important in databases?   [2]

4. a) What is the common name for tuple and how is it used?   [3]
    b) Define an entity type.   [3]
    c) Compare and contrast a normalized and an un-normalized relation   [3]
    d) Describe how a network, that is not a hierarchy, can be implemented by means of a hierarchical model DBMS.   [6]
    e) What are the advantages of the network model as compared to the other two models (in the Object Oriented category)? What are the disadvantages?   [5]

5.

    a)   Discuss the importance of data modeling. [3]

    b)   How does an ER model help produce a structured relational database design.[4]

    c)   What is structural independence, and why is it important? [3]

    d)   Discuss the lack of data independence in traditional file systems. [3]

    e)   The MTS company wants to track each part used in each piece of equipment; each part is bought from a specific supplier. Draw ER diagram for the MTS database. (Note: A piece of equipment is composed of many parts but each part is used in only one specific equipment. A supplier can supply many parts but each part is supplied by one supplier) [7]

6.

    a)   Draw an E-R diagram for the following clubs' database. Each student has a unique student id, a name, and an email; each club has a unique club id, a name, a contact telephone number, and has exactly one student as its president. Clubs organize activities and students can participate in any of them. Each activity is described by a unique activity id, a place, a date, time and those clubs that organize it. If an activity is organized by more than one club, different clubs might contribute different activity fees. [10]

    b)   Decompose the above E-R diagram onto its relations [10]