

UNIVERSITY OF SWAZILAND

FACULTY OF SCIENCE

DEPARTMENT OF COMPUTER SCIENCE

SUPPLEMENTARY EXAMINATION, JULY 2013

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 term metadata [2]
- (b) What is a DBMS and what are its functions? [2]
- (c) Explain why database design is important. [4]
- (d) Discuss the disadvantages of using a DBMS [8]
- (e) Discuss data independence and its importance [4]

Question 2

Considering a file structure of the form: JOB(Proj_Num, Proj_Name, Empl_num, Job_Code, Job_Chg_Hour, Proj_Hours, Empl_Phone); where each project is done by more than one employee and each employee works on more than one project; each employee has only one expertise.

- (a) Create a sample data to fit the constraints given for this file structure. [4]
- (b) Identify and discuss the serious data redundancy problems exhibited by a file structure of this form. [7]
- (c) What problems might you encounter if one of the projects were deleted? [4]
- (d) Considering your response to (a) above, what changes would you recommend, qualifying each recommendation? [5]

Question 3

- (a) What does each of the following acronyms represent and how is each one related to the birth of the data model?
 - i) CODASYL
 - ii) SPARC
 - iii) ANSI
 - iv) DBTG [8]
- (b) Describe the basic features of the relational data model and discuss their importance to the end user and the designer [5]
- (c) Explain how the ER model helped produce a more structured relational database design environment. [4]
- (d) What is the difference between an object and a class in the object oriented data model (OODM)? [3]

Question 4

- (a) What is a relationship within a relational database? Give an example of each of the three types. [3]
- (b) Discuss the advantages of the relational database and two disadvantages. [5]
- (c) Define a data model and state what designers use it for. [3]
- (d) Describe how, a network model that is not purely 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 the two integrity constraints in relational databases. [4]
- (b) Draw an E-R diagram (≥ 7 entities) for any work environment. [6]
- (c) 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.

- a) Use the knowledge of your High School (subjects, teachers, departments, etc) to describe the concept of aggregation in database systems. Illustrate this concept using an ER diagram of at least 7 entities. [10]
- b) Reduce the E-R diagram in (a) into tables. [10]