NATIONAL UNIVERSITY OF SCIENCE AND TECHNOLOGY
FACULTY OF APPLIED SCIENCE
COMPUTER SCIENCE DEPARTMENT
AUGUST SUPPLEMENTS EXAMINATIONS 2004

SUBJECT: ADVANCED DATABASE DESIGN & MANAGEMENT
CODE: SCS 4201

INSTRUCTION TO CANDIDATES

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This examination paper consists of seven (7) questions, all questions carry equal marks.
Answer ALL questions in Section A and any Three (3) questions from Section B.

3hours

Section A

QUESTION ONE

a)   What are the desired properties of a primary key?   [4]

b)   Why is it important to normalize data? Give brief descriptions of 1NF, 2NF and 3NF.   [8]

c) Consider the following relation:

Student_Name	Year_of_Birth	Courses	Student_ID
Taurai	1983	Databases, Project	N000 103X
Tinomuda	1982	Expert Systems, Data Structures	N000 128D

Is this relation in 2NF? If its not then transform it to 2NF.   [4]

d)   In what cases and for what reasons can null values be allowed in/ introduced into a Database?   [4]

QUESTION TWO

Given the following database with three relations, answer the questions that follow:

EMPLOYEE   EMPLOYEE_ EXTENSION

Emp_No	Id_No	E_Name	Dept_No
E1	R12	J.Smith	D1
E2	R16	J.Smith	D1
E3	R13	R.Brown	D2
E5	P10	C.Cloth	D3

Emp_No	Office	Extension
E1	0101	811
E1	0101	813
E2	013	111
E3	035	123
E5	035	123

DEPARTMENT

Dep#	D_Name	Manager
D1	Accounts	E1
D2	Stores	E2
D3	Sales	E5

Give the results of executing expressions in SQL on the above relations.

a) Select *
          From Employee
          Where E_Name<> "J.Smith" and Dept_No<> "D2"   [5]

b) Select *
    From Employee
    Where Employee.Emp_No in
          (Select Department. Manager
          From Department
          Where Department.D_Name = "Accounts")   [5]

c) Write an SQL statement to display all those employees working in the sales
    department.   [5]

d) Write an SQL statement to produce the names of employees using Office 035.   [5]

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Section B

QUESTION THREE

a) What are the fundamental operations in relational algebra? Describe each one of them with illustrations. [8]

b) Explain the differences between procedural and non-procedural DMLs? [8]

c) What problems can be encountered when using a centralized database system? [4]

QUESTION FOUR

a) Define a distributed database. State any 2 reasons for data distribution? Explain how this can be done. [8]

b) What is a data dictionary in database terms and explain its importance in a database system. [5]

c) Briefly describe the functions of attributes. [4]

d) Define the term transaction and explain the 2 basic operations of a transaction. [3]

QUESTION FIVE

a) Briefly describe the fundamental features of OODBs. What are the advantages of such types of database management systems? [15]

b) Why is the DBA considered to be the most important user of the database? [5]

QUESTION SIX

a) Discuss the possible advantages and disadvantages brought about by the introduction of a database system in an organization. [8]

b) Construct an E-R diagram for a car insurance company with a set of customers, each of whom owns a number of cars. Each car has a number of recorded accidents associated with it. Come up with the associated relational schemas. [12]

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QUESTION SEVEN

a) With the aid of examples, define the following terms:
  i)   Data model   [2]
  ii)   Database schema   [2]
  iii) Composite attribute   [2]
  iv)   Weak entity   [2]
  v)   Domain   [2]
  vi)   Data integrity   [2]
  vii) Specialization   [2]
  viii) Data abstraction   [2]
  ix)   Recursive relationship   [2]

b) Explain why a foreign key is important in the relational databases. [2]

END OF QUESTION PAPER
GOOD LUCK!