NATIONAL UNIVERSITY OF SCIENCE AND TECHNOLOGY
FACULTY OF APPLIED SCIENCE
COMPUTER SCIENCE DEPARTMENT
MAY EXAMINATIONS 2002

SUBJECT: ADVANCED DATABASE DESIGN AND MANAGEMENT
CODE: SCS 4202

INSTRUCTION TO CANDIDATES

The question paper consists of 7 questions.
Answer any 5 questions.
All questions carry equal marks.

Time: 3 hours

QUESTION ONE

a) What are the characteristics that distinguish the database approach from the traditional file system. [10]

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

c) Explain the concept of Data Independence. Define 2 types of data independence. [5]

QUESTION TWO

a) With the aid of a well-labeled diagram describe the three schema architecture of the DBMS. [9]

b) Explain the purpose of the following DBMS component modules:

i) DDL compiler [1]
ii) Data manager [2]
iii) Communications system [1]
iv) Data dictionary [4]

c) What are the problems of a centralised database system? [3]

QUESTION THREE

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

b) Describe any 2 types of failures that may occur in transaction processing. [2]

c) Give a brief description of the properties of a transaction. [8]

d) Give a brief account of the techniques employed for concurrency control in transaction processing in a multi- access database. [7]

QUESTION FOUR

a) What is meant by the term Deadlock as applies to transaction processing? [3]

b) Describe techniques that can be employed for deadlock avoidance or prevention. [8]

c) What is meant by:
   i) defining a database [3]
   ii) constructing a database [3]
   iii) manipulating a database [3]

QUESTION FIVE

a) Define a distributed database and what are the reasons for distribution. [7]

b) Briefly describe the fundamental characteristics of Object Oriented Databases. [6]

c) State any 3 additional functions that a DDBMS software must be able to provide as compared to a centralized DBMS. [3]

d) Briefly explain the following terms:
   i) Location Independence [2]
   ii) Vertical fragmentation [2]

QUESTION SIX

a) Define the following terms:

i) Entity [1]
ii) E-R model [1]
iii) DB schema [1]
iv) Attribute [1]
v) Composite attribute [1]
vi) Domain [1]
vii) Weak entity [1]
viii) Relationship type [1]

b) With the aid of examples explain the following operations as relates to Relational Algebra.

i) Join operation [2]
ii) Project operation [2]
iii) Union [2]
iv) Difference [2]
v) Intersection [2]
vi) Select [2]

QUESTION SEVEN

Given the following table:

Student-Name	Year of Birth	Age	Courses	Student-ID
John	1982	19	Maths Physics	N000 1028F
James	1983	18	Geography Physics	N000 1018P

a) Explain what is a primary key, its desired properties and identify an appropriate one for the above table. [3]

b) Briefly explain the concept of normalization. [2]

c) Transform the above table so that it is in first normal form (1NF). [3]

d) Describe 2NF and 3NF [6]

e) Normalize the resulting relation from c) into 2NF. [6]

END OF QUESTION PAPER

GOOD LUCK!