NATIONAL UNIVERSITY OF SCIENCE AND TECHNOLOGY
FACULTY OF APPLIED SCIENCE
COMPUTER SCIENCE DEPARTMENT
DECEMBER EXAMINATIONS 2005

SUBJECT: DATABASE CONCEPTS
CODE: SCS1202

INSTRUCTIONS TO ALL CANDIDATES

This Examination paper consists of <u>SIX</u> questions (6)
Answer **ALL** questions in **SECTION A** and ANY **THREE** from **SECTION B**

TIME: 3 Hours

SECTION A

QUESTION ONE

a) What are data models?   [2]
b) Name three different data models.   [3]
c) What is the difference between the Entity-Relationship model and the Relational
model?   [2]
d) What do an instance and scheme of a database system mean?   · [2]
e) Give an E-R diagram for the data below:
    In a bank there are customers. For a customer to open an account he must supply his
name, I.D. number and address. When a customer is given an account he is given an
account number. An account contains details of balance, credits and debits. Also there
are the bank employees. Each employee has an employee number and the bank keeps a
record of his date of birth and address.
    Show all relationships and attributes clearly.   [10]
f) In question e please give a superkey and primary key for the data concerning the
customers.   [2]
g) Draw relational tables for the data given in question e. Clearly show all
relationships. State the primary and foreign keys.   [8]
h) What is a data definition language?   [1]
i) What is a data manipulation language?   [1]
j) What is the difference between a procedural and nonprocedural query language? [2]
k) What are the three levels of abstraction in a database?   [3]

l) What is meant by locking in a database system? [2]

m) What is the SQL and what is it used for? [2]

SECTION B

QUESTION TWO

a) What is meant by a timestamp? [2]
b) What is a deadlock and give an example of when it occurs [4]
c) What are protocols and how do they help in the design of a database? [2]
d) What is a transaction manager and what are its functions? [4]
e) What is data encryption and what are the problems of data encryption? [4]
f) What is to 'rollback' in database terms? [2]
g) What is the difference between a write lock and read lock? [2]

QUESTION THREE

a) What are the problems and failures that occur in a database environment? Explain why it is necessary to have a back system and recovery mechanism. [7]
b) What are object-based logical models give their characteristics and two examples of these models that are used. [4]
c) Give the details and explain the characteristics of the Object-Oriented Model. Give reference to classes, methods instance variables. [9]

QUESTION FOUR

a) What type of data model does Microsoft Access fall under? [1]
b) What is meant by a query in database terminology? [2]
c) A travel agent would like to build a database for all the resorts he has. In this database he will list the type of accommodation, the location of the resort and the cost of the resort per day. He wants to also include the contact details of the resorts in his database.
Show how you would construct a database using Microsoft Access to store all the above data. Clearly state the tables you would construct and all the relationships that exist between the various tables. In addition construct a query that will give all the resorts in a given location. That is when the user inserts a location he is given a list of resorts within that location. Give a query that will find the cheapest resort in a given location. State all primary keys [17]

QUESTION FIVE

a) What are the differences between optimistic and pessimistic concurrency control.
[4]

b) What is concurrency control?
[2]

c) What is data redundancy and how is it avoided in a relational database model? [4]

d) What are data inconsistency and what problems can arise from it? [4]

e) What are integrity constraints?
[2]

f) Why is security so important in database design? What effects has the creation of the Internet (World Wide Web) had on database systems?
[4]

QUESTION SIX

a) In Microsoft Access list and state the meaning of each of the following:
1) Field Name
2) Data Type
3) Number
4) Date/time

[4]

b) What are parameter queries used for in Microsoft Access?
[2]

c) What are physical data models and how do they differ from Record Based Logical Models?
[3]

d) Explain in detail the following terms select query, crosstab query and action query. How many types of action queries are in Microsoft Access?
[6]

e) What are SQL queries? Name four SQL queries that Microsoft Access supports.
[5]