NATIONAL UNIVERSITY OF SCIENCE AND TECHNOLOGY

FACULTY OF APPLIED SCIENCE
DEPARTMENT OF COMPUTER SCIENCE
JULY SUPPLEMENTARY EXAMINATIONS 2005

SUBJECT: DATABASE CONCEPTS AND DATA PROCESSING
CODE: SCS1202

INSTRUCTIONS TO CANDIDATES:

This Examination paper consists of seven questions (7)
All questions carry equal marks
Answer **any FIVE (5)** questions

TIME: 3 HOURS

QUESTION ONE

a) Briefly explain the concept of deadlock as applies to transaction processing. Hence give a brief outline of the techniques that can be used to avoid deadlocks. [8]
b) List three types of threats that could affect a database system and for each describe the controls that you would use to counteract each one of them. [6]
c) Give a brief description of any two representational data models. [6]

QUESTION TWO

A certain company database keeps track of a company's employees, departments and projects. The database designers stated the following description of the company to be represented in the database:

1) The company is organized into departments. Each department has a unique name, a unique number and a particular employee who manages the department. We keep track of the start when that employee began managing the department. A department can have several locations.
2) A department controls a number of projects, each of which has a unique name, a unique number and a single location.
3) We store each employee's name, social security number, address, salary, sex, to one department but may work on several projects, which are not necessarily controlled by the same department. We keep track of the number of hours per week that an employee works on each project.
4) We want to keep track of the dependants of each employee for insurance purposes. We keep each dependant's name, sex, birthdate and relationship to the employee.

a. Draw an Entity-Relationship Schema diagram for the above Company database. [15]

b. What are the responsibilities of the Database Administrator (DBA) and the database designers? [5]

QUESTION THREE

a) Discuss implementation problems or disadvantages that may be caused by Encryption. [5]
b) What are the goals of database design? [3]
c) Define a time stamp and discuss how it is generated. [5]
d) Briefly describe the types of failure that may occur in a database environment. Explain why it is important to provide a recovery mechanism. [7]

QUESTION FOUR

a) State the six phases of Database Design. Which of the six phases are considered the main activities of the database design process itself and why? [10]

b) Discuss the differences between pessimistic and optimistic concurrency control. [4]

c) Explain what is meant by a transaction. Why are transactions important units of operation in a DBMS? [4]

d) What do you understand by the term; ***attribute***? [2]

QUESTION FIVE

a) Give a brief description of the properties of a transaction. [8]
b) Discuss the main characteristics of the database approach and how it differs from the traditional file systems. [12]

QUESTION SIX

a) Outline the difference between primary and secondary storage. [4]
b) Discuss the Relational model constraints. [3]
c) Why are tuples in a relation not ordered? [3]
d) Discuss the factors that influence the choice of a DBMS package for the information system of an organization. [10]

QUESTION SEVEN

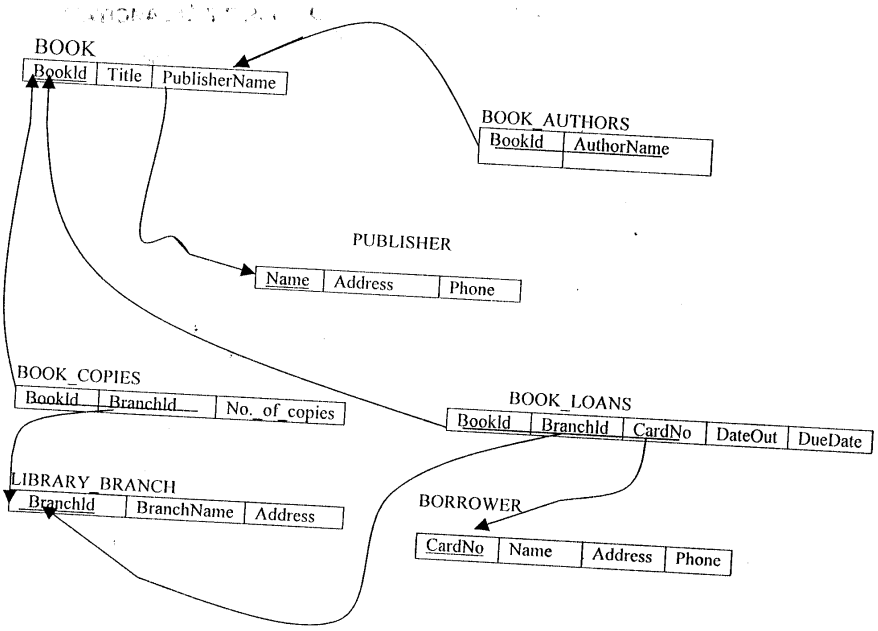

Figure 3.1

a) Map the relational schema of figure 3.1 into an ER schema. [15]

b) Outline five characteristics that a good design tool should possess. [5]

END OF QUESTION PAPER