

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

**SUBJECT:** ADVANCED DATABASES  
**CODE:** SCS5106

**INSTRUCTIONS TO CANDIDATES**

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

**3 hours**

**Section A**

**QUESTION ONE**

- a) 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 relation schemas. [10]
- b) Briefly describe the fundamental features of OODBs. What are the advantages of such types of database management systems? [10]

**QUESTION TWO**

- a) Concurrency problems arise when several transactions operate on the same data or interdependent data. Give a detailed analysis of such problems and how they can be resolved. [14]
- b) Imagine an online store that maintains customer information in a database. Their Customers table might look something like the one presented below. Analyze this relation and check if it is in 2NF. If its not then transform it into 2NF. [6]

Cust#	FirstName	LastName	Address	City	Country	ZIP
1	John	Dube	12 Main Street	Bulawayo	Zimbabwe	263
2	Alan	Nkomo	82 Fort Street	Bulawayo	Zimbabwe	263
3	Beth	Thompson	1912 NE 1st St	J' Burg	South.Africa	027
4	Jacob	Wareng	142 Irish Way, G. West	Gaborone	Botswana	267
5	Samuel	Tsadie.M	412 NE 1st St	Accra	Ghana	233

**Section B**

**QUESTION THREE**

- a) With the aid of examples, define the following terms:
- i) Data model
  - ii) Composite attribute
  - iii) Domain
  - iv) Data integrity
  - v) Specialization
  - vi) Data abstraction
  - vii) Recursive relationship [2]
- b) Define the term transaction and explain the 2 basic operations of a transaction. [2]
- c) Distinguish between a database and a data warehouse. [4]

**QUESTION FOUR**

- a) Every weak entity set can be converted to a strong entity set by adding appropriate attributes. Why, then, do we have weak entity sets? [4]
- b) List the main differences between:
- i) A file processing system and a Database Management System
  - ii) Physical and logical data independence [12]
- c) Discuss the difference between pessimistic and optimistic concurrency control. [4]

**QUESTION FIVE**

- a) Define a distributed database. State any 2 reasons for data distribution? Explain how data distribution can be done. [8]
- b) With reference to database languages explain the difference between a procedural and a non-procedural DMLs. [6]
- c) What is meant by:
- i) Defining a database [3]
  - iii) Constructing a database [3]

**QUESTION SIX**

- a) Explain the role of the following DBMS component modules:
- i) Data manager [3]
  - ii) Query processor [3]
  - iii) File manager [3]
  - iv) DDL compiler [3]
- b) Give a brief description of any two representational data models. [8]

**QUESTION SEVEN**

- a) What considerations would you make when choosing a DBMS for your organization? [10]
- b) Define the term data dictionary and explain why its importance in a database system. [4]
- c) State and give a brief description of any 3 additional functions that a DDBMS has over a centralized DBMS? [6]

**END OF QUESTION PAPER**

**GOOD LUCK!**