

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

**SUBJECT:** DATABASE CONCEPTS AND DATA PROCESSING  
(BIO, CHEM, COMP.SCI, SPORTS.SCI)

**CODE:** SCS1200/1202

**INSTRUCTION TO CANDIDATES**

This question paper consists of seven (7) questions; answer any five (5).  
Each question carries 20 marks  
Total marks 100

**Time: 3 hours**

**QUESTION ONE**

- (a) Define the following terms:
- (i) Tuple
  - (ii) Foreign key
  - (iii) Schema
  - (iv) Data redundancy [4]
- (b) What are the 3 main types of actions involving databases? Briefly discuss each. [6]
- (c) Discuss the reasons that lead to the use of null values in relations? [4]
- (d) What is a Computer database? What are its advantages over a file system? [3]
- (e) What is a view in SQL and how is it defined? Discuss the problems that may arise when attempting to update a view. [3]

**QUESTION TWO**

- a) Discuss in detail the capabilities that should be provided by a DBMS. [10]
- b) With the aid of a clearly labeled diagram, describe the three-schema architecture of the DBMS. [6]
- c) Write brief notes on data independence. [4]

### QUESTION THREE

- a) Distinguish between centralized and distributed databases. [6]
- b) Define the term data model. [1]
- c) Describe the following data models:
  - i) Network data model [3]
  - ii) Hierarchical data model [3]
  - iii) Relational data model [3]
- d) In database modeling, what is meant by:
  - i) Entity [1]
  - ii) Attribute [1]
  - iii) Relationship [1]
  - iv) Primary key [1]

### QUESTION FOUR

The table below shows a relational database table.

CUSTOMER

ACCOUNT_NO	NAME	ADDRESS	CREDIT_LIMIT	CREDIT
13245	John Moyo	9 Maison Flats	100 000	25 000
13495	Bob Duri	21 Police Rd	100 000	12 000
13554	Anna Ncube	14 L.Takawira St	150 000	50 000
13782	Mary Tororo	8 Fife Avenue	180 000	67 000
14854	John Moyo	10 Long Rd	200 000	25 000

- a) Write a statement in SQL that could have been used to create this table. [2]
- b) Write a query to display the account number, name and the credit. The credit limit must be between 30 000 and 60 000. [2]
- c) In this relation, what would you choose as your primary key? Explain your answer. [2]

- d) Write statements in SQL that you could use to perform the following tasks:
- (i) Add a new customer details to the above relation where the account number is 15000, the name of the customer is Ian Toro, the address is 34 Masiyepambili Rd and the credit limit and the credit are yet to be determined. [2]
  - (ii) Increase Bob Duri's credit limit to 130 000. [2]
  - (iii) Remove from this table Mary Tororo's details [3]
  - (iv) Change Anna Ncube's address to 11 Khumalo flats. [3]
  - (v) Add a new column to the table for the customer's age. [2]
- e) How does SQL allow the implementation of the entity integrity constraint? [2]

#### QUESTION FIVE

- a) Outline the responsibilities of the DBA and Database Designers [5]
- b) What are the 3 main types of actions involving databases? Briefly discuss each. [5]
- c) Discuss the capabilities that should be provided by the DBMS. [10]

#### QUESTION SIX

- a) What are the advantages of distributed databases over centralized databases? [2]
- b) Write brief notes on multimedia databases [3]
- c) What measures would you take to ensure that your database is well protected and secure. [3]
- d) Discuss the different types of transaction failures. What is meant by catastrophic failure? [12]

#### QUESTION SEVEN

- a) Draw an ER diagram for an organization with following information.

An employee in the organization has an employee number, a salary, an address, sex, a date of birth and a name, which is made up of a first name, an initial, and a last name. An employee works for a single department. A department has a name, a number and several locations. A department controls a particular project and an employee can work on several projects. It is also known that a project has a name, a number and a location. [6]

- b) By clearly showing your steps, normalize the following table into 1NF and 2NF [6].

STUDENT #	LECTURER	ROOM	COURSE1	COURSE2	COURSE3
N003 111X	MR MOYO	SLT1	ABB 1101	ABB 1102	ABB 1103
N003 222P	MR DURU	FD55	SCS 1101	SCS 1102	SCS 1103

- c) (i) Explain with an example the lost update problem [4]  
(ii) Describe four reasons that may cause transactions to fail in the middle of execution. [4]

**END OF QUESTION PAPER**

**GOOD LUCK!**