NATIONAL UNIVERSITY OF SCIENCE AND TECHNOLOGY
FACULTY OF APPLIED SCIENCES
DEPARTMENT OF INFORMATICS AND ANALYTICS
Database Systems
SIA 1103

MAIN EXAMINATION PAPER
December 2024

This examination paper consists of 3 pages.

Time Allowed:	**3 hours**
Total Marks:	**100**
Examiner's Name:	**Mr S Ncube**
External Examiner:	**Dr L.C. Sakala**

INSTRUCTIONS

1. This examination paper consists of Five [5] questions.
2. All questions carry equal marks.
3. Answer any Four [4] questions.

MARK ALLOCATION

QUESTION	MARKS
1.	**25**
2.	**25**
3.	**25**
4.	**25**
5.	**25**

QUESTION ONE

a) Discuss the functions of a DBMS. [10]

b) Elaborate on the key factors to consider when choosing the implementation strategy for a distributed database by identifying the relevant strategy for each factor. [15]

QUESTION TWO

a) Explain the following terms in relation to database concepts.

i) Referential Integrity [2]
ii) Domain Integrity [2]
iii) Deadlock [2]
iv) Transaction [2]
v) Query [2]

b) What is ACID in relation to database concepts? [8]

c) Draw a complete relation to represent a WhatsApp group named **SIA_1103 Lectures** with a single message from the group admin saying "Test is tomorrow comrades". [7]

QUESTION THREE

a) Write an SQL statement to create a table named **Employees** with the following columns:

i) EmployeeID (Primary Key)
ii) Name (VARCHAR(50))
iii) Position (VARCHAR(50))
iv) Salary (DECIMAL)
v) DepartmentID (Foreign Key referencing a Departments table). [10]

b) With the aid of a diagram, explain the three primary phases of database design. [15]

QUESTION FOUR

a) Elucidate on the following concepts in relation to Enhanced ER Diagrams.
   i. Subclasses and Superclasses [5]
   ii. Specialization and Generalization [5]
   iii. Category or Union type [5]
   iv. Attribute and relationship inheritance [5]

b) You have been offered a Job as Database Administrator at Bulawayo City Council. Outline your duties in that position. [5]

QUESTION FIVE

a) Draw an ER-diagram to describe the following real world problem.
   i. A University is organized into faculties
   ii. Each faculty has a unique name, ID and a number of professors and a specific professor is chosen as the faculty head.
   iii. Each faculty provides a number of courses.
   iv. Each course has a unique name and courseid.
   v. Each professor has a name, EmpNumber, HomeAddress, salary, Gender,and courses by him/her
   vi. Each professor belongs to a faculty and can teach several courses.
   vii. Each faculty has several departments offering several programmes.
   viii. Each student has a name , ID, address and gender
   ix. Each student can choose one program from one department and several courses from other departments within the faculty.

[20]

b) Discuss the architecture of a typical NoSQL database giving examples of scenarios where a NoSQL database would be more appropriate. [5]

END OF QUESTION PAPER