NATIONAL UNIVERSITY OF SCIENCE AND TECHNOLOGY
FACULTY OF APPLIED SCIENCES
DEPARTMENT OF INFORMATICS AND ANALYTICS
ENTERPRISE DATABASE SYSTEMS
SIIS 5102

MAIN EXAMINATION PAPER
First Semester 2024

This examination paper consists of 4 pages.

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

INSTRUCTIONS

1. This paper contains five (5) Questions.
2. Answer any four (4) questions.
3. Each question carries 25 marks.
4. Use of calculators is permissible.

MARK ALLOCATION

QUESTION	MARKS
1.	**25**
2.	**25**
3.	**25**
4.	**25**
5.	**25**
Total Possible Marks	**100**

QUESTION ONE

Use appropriate diagrams to demonstrate the following concepts as used with databases:

a) Multiple Inheritance. [5]

b) Incorrect summary problem. [5]

c) Disjoint specialization. [5]

d) Distributed network. [5]

e) Security inference problem. [5]

QUESTION TWO

a) Explain the CAP theorem and its implications for NoSQL database design. [10]

b) Use an appropriate diagram to discuss the architecture of the Hadoop File System (HDFS) showing how it supports the decoupling of metadata from data operations, and how it minimizes network traffic in the system. [15]

QUESTION THREE

a) How does an ER model differ from an EER model? [5]

b) Show how an ER model construct can be mapped to the relational model and discuss any alternative mappings. [10]

c) How can an EER model construct be mapped to relations, and what are the conditions under which each option could be used? [10]

QUESTION FOUR

a) Compare the primary site method with the primary copy method for distributed concurrency control. [10]

b) Defend the use of the three-phase commit protocol for transaction management in a DDBMS as opposed to the two-phase commit protocol. [15]

QUESTION FIVE

a) Describe the wait-die and wound-wait protocols for deadlock prevention. [10]

b) Defend fragmentation as used in distributed database design showing the main types of fragmentation. [[15]

END OF QUESTION PAPER

