## NATIONAL UNIVERSITY OF SCIENCE AND TECHNOLOGY
### FACULTY OF APPLIED SCIENCES
### DEPARTMENT OF COMPUTER SCIENCE

### DATA CONCEPTS AND DATA PROCESSING
### SCS 1200

**Examination Paper**
**SEPTEMBER 2024**

This examination paper consists of 4 pages

| | |
|---|---|
| **Time Allowed:** | **3 hours** |
| **Total Marks:** | **100** |
| **Examiner's Name:** | **Mr. M. Ruzive** |
| **External Examiner:** | |

### INSTRUCTIONS

1. Answer any four (4) questions

2. Each question carries 25 marks

### MARK ALLOCATION

| QUESTION | MARKS |
|---|---|
| 1. | 25 |
| 2. | 25 |
| 3. | 25 |
| 4. | 25 |
| 5. | 25 |
| TOTAL FOR ANY FOUR QUESTION | 100 |

## QUESTION ONE

a.  State and briefly explain any three (3) groups of database end users.

(6)

b.  Discuss any three (3) issues associated with data redundancy in database systems. (6)

c.  Compare a Database, Data warehouse, Data mart and Data lake in terms of size, data structure and type of data processing. (12)

d.  How is a homogeneous database different from a heterogeneous database? (1)

## QUESTION TWO

a.  State any three (3) key functions of a DBMS. (3)

b.  With the aid of a diagram, explain the three schema database architecture, clearly outlining how the architecture achieves data abstraction and data independence. (12)

c.  State any four (4) elements described by a conceptual schema. (4)

d.  How do the buffer manager, file manager and transaction manager work to achieve efficient data storage in databases? (6)

## QUESTION THREE

a.  What is normalization in database design? (2)

b.  Using examples, explain how you get data into the Third Normal Form (3NF) (15)

c.  What are the ACID properties and how are they important in the processing of database transactions? (8)

## QUESTION FOUR

a. State and briefly explain the five (5) DBMS classifications. (10)

b. In which language subcategory does each of the following commands fall under(Choose from DDL, DML, TCL,DCL and DQL):

    i.    DELETE (1)

    ii.    UPDATE (1)

    iii.    DROP (1)

    iv.    GRANT (1)

    v.    COMMIT (1)

c. The CREATE command is used to create various database objects, list any five (5) such objects. (5)

d. Given the following **employees** table:

| EmployeeID | EmployeeName | PhoneNumber | Address | City |
|---|---|---|---|---|
| 01 | Munyaradzi | 09898765612 | 23 Oberoi Street | Gweru |
| 02 | Anna | 09432156783 | House No 23 Marevo | Mutare |
| 03 | Pretty | 09764234519 | 45 Queens Road | Bulawayo |
| 04 | Vusa | 09966442211 | 4 Block Road Chinotimba | Vic Falls |
| 05 | Munashe | 09543176246 | 12 Mayo Road | Harare |

    i.    Write an SQL statement that creates the above table. (2)

    ii.    Write an SQL statement that changes Munashe's address to "2314 Zengeza" (2)

    iii.    Write the appropriate SQL statement to delete this table. (1)

## QUESTION FIVE

a. An Entity Relationship Diagram (ERD) is an important tool used in database modelling. Give a detailed account of how an ERD is constructed. (10)

b. Use examples to explain the following ERD concepts:

| | | | |
|---|---|---|---|
| i) | Cardinality | | (2) |
| ii) | Relationship degree | | (2) |
| iii) | Composite attribute | | (2) |
| iv) | Min : max constraint | | (2) |
| v) | Participation constraint | | (2) |

c. A university wants to create a database to manage students' information, courses, and enrollment. The requirements are:

Each Student has a unique ID, name, and email. At the beginning of each semester, Students register and can enrol in multiple courses. Each course has a unique ID, name, and credits. Courses can have multiple students enrolled. Once students are registered a class is created with a class ID, list of student ID registered for common courses for the semester.

Draw an ERD from the information given above. (5)

**END OF QUESTION PAPER**