MURANG'A UNIVERSITY OF TECHNOLOGY

SCHOOL OF EDUCATION

DEPARTMENT OF HUMANITIES

UNIVERSITY ORDINARY EXAMINATION

2023/2024 ACADEMIC YEAR

FIRST YEAR **SECOND SEMESTER** EXAMINATION FOR DIPLOMA

ICT/OS/CS/CR/05/6/A: DATABASE MANAGEMENT SYSTEM

DURATION: 2 HOURS

INSTRUCTIONS TO CANDIDATES:

1. Answer question one and any other two questions.
2. Mobile phones are not allowed in the examination room.
3. You are not allowed to write on this examination question paper.

SECTION A: ANSWER ALL QUESTIONS IN THIS SECTION

QUESTION ONE (30 MARKS)

a. Define the following terms as used in database systems. (10 marks)
   i. Data base
   ii. Data redundancy
   iii. Field
   iv. Relational database
   v. Records
b. Explain and evaluate the various benefits and advantage of using database system compared to traditional file-based data storage methods. (4 marks)
c. Distinguish between a scheme and an instance. (2 marks)
d. Differentiate between client /server database system and centralized database systems giving an advantage for each. (4 marks)
e. Briefly explain the two key concepts used in relational modelling (entities and relationship) describing how they are represented in a relational database schema. (4 marks)
f. Identify and briefly explain two key properties of Microsoft SQL server database that contribute to data integrity and security. (4 marks)
g. Differentiate between a primary key and candidate key. (4 marks)
h. Explain the following database design concept
   i. Functional dependency. (2 marks)
   ii. Transitive dependency (2 marks)
i. Explain any four types of joins used in database. (4 marks)

SECTION B – ANSWER ANY TWO QUESTIONS IN THIS SECTION

QUESTION TWO (20 MARKS)

a. What is normalization? (2 marks)

b. Explain the first three normal form. (6 marks)

c. Design a comprehensive entity relationship (ER) diagram to represent the following science for a student at Murang'a

- Murang'a university various diploma programs each with a unique program code, name, start date and end date
- Each program consists of multiple courses identified by a course code name description and credit hours
- Student enrol in one or more programs and can take multiple courses within each program they are enrolled in
- Each student has a unique ID first name, last name address, phone number and email address
- Student earn grades (A, B, C, D OR F) for each course they take. Your ER diagram should indole
  - i. Entities and their attributes
  - ii. Relationship between entities with cardinalities
  - iii. Primary and foreign keys
  - iv. Any relevant inheritances hierarchies (if applicable). (12 marks)

QUESTION THREE (20 MARKS)

a. Consider a scenario where you are tasked with designing a new database for Murang'a university management system. Develop as series of SQL statements that incorporate the following actions

i. Create a new table named "student" with columns for student ID, name date of birth and course. Ensure appropriate data type and constrain are applied. (4 marks)

ii. Devise a SQL statement to add a new column "GPA" to the create table "student". Ensure that the alteration is executed without causing data loss or integrity issues.

(4 marks)

iii. Imagine a requirement to eliminate a previously created table named "old-students" that is no longer needed. Formulate a SQL statement to drop his table taking in to account potential dependencies. (2 marks)

b. Carefully explain the database system life cycle. (4 marks)

c. Explain any four DBMS utilities. (4 marks)

d. Differentiate between logical and physical view as applied in database management system. (2 marks)

QUESTION FOUR (20 MARKS)

a. Define what a SQL join is and explain its 3 significances in data retrieval. (8 marks)

b. State and explain the main types of data manipulation query statement DML in SQL. (8 marks)

c. State the general steps involved in importing a database. (4 marks)

SECTION C: ANSWER ONE QUESTION

QUESTION FIVE (20 MARKS)

a. State and explain the benefits and drawbacks of shrinking a database. (10 marks)

b. State and explain reasons why you could need to increase the size of a database and what are the potential consideration would you take in to account before doing so. (10 marks)

QUESTION SIX (20 MARKS)

a. Describe the process of renaming a database using appropriate tools or commands, ensuring data integrity and minimal down time. (6 marks)

b. State and explain five types of constrains used in a database. (10 marks)

c. Explain how inheritance and polymorphism would be implemented in object-oriented database. (4 marks)