2920/206
DATABASE MANAGEMENT SYSTEMS
March/April 2023
Time: 3 hours

THE KENYA NATIONAL EXAMINATIONS COUNCIL

DIPLOMA IN INFORMATION COMMUNICATION TECHNOLOGY

MODULE II

DATABASE MANAGEMENT SYSTEMS

3 hours

INSTRUCTIONS TO CANDIDATES

*This paper consists of **EIGHT** questions.*
*Answer **FIVE** of the **EIGHT** questions on answer booklet provided.*
Candidates should answer the questions in English.

This paper consists of 6 printed pages.

Candidates should check the question paper to ascertain that all the pages are printed as indicated and that no questions are missing.

1. (a) Outline **four** *transaction control language* commands used in a Structured Query Language (SQL). (4 marks)

(b) Explain the function of each of the following in a database:

(i) foreign keys;

(ii) stored procedure. (4 marks)

(c) Table 1 shows a relation named *workers* in a database. Use it to answer the questions that follow.

Id	Name	Age	Department	Salary
1	Ronny	32	IT	24000.00
2	Kahalif	25	Support	18000.00
3	Ken	23	HR	24000.00
4	Charity	25	Finance	78000.00
5	Mebe	22	IT	54000.00
6	George	24	Finance	72000.00

Table 1

Write a Structured Query Language statement:

(i) which was used to create the *workers* relation having the field *Id* with unique values. (3 marks)

(ii) that would change all the values to read 20000 in the *Salary* column for workers in support *Department*. (2 marks)

(iii) that would delete the record for the worker named Mebe. (2 marks)

(iv) that would display the column *Name* and *Department* for workers whose age is between 25 and 30, sorted in descending order by Department. (2 marks)

(v) that would display the columns *Department* and the sum of *salary* for each department displayed as 'TOTAL SALARY'. (3 marks)

2. (a) Explain each of the following terms as used in database management systems:

(i) indexes;

(ii) constraints. (4 marks)

(b) The following are tables named *First* and *Second* in a database. Use it to answer the questions that follow:

First

ID	Name
1	Abdi
2	Adam

Second

ID	Name
2	Adam
3	Cale

Determine the output for each of the following algebraic expression operation:

(i) First ∪ Second

(ii) First ∩ Second (4 marks)

(c) Outline a circumstance under which each of the following SQL aggregate functions would be used in SQL:

(i) AVG()

(ii) COUNT()

(iii) LAST() (3 marks)

(d) Read the following passage and use it to answer the question that follows.

An insurance company needs to store information about car accident claims in its database. Each insured vehicle is identified by vehicle registration number, the vehicle model, the year of manufacture. The owner of the vehicle is identified by ID number, name and contact. A car owner may have more than one vehicle insured. When a vehicle is involved in an accident, the driver is expected to report to the nearest police station where a report number, the location of the accident and the date/time when the accident took place is recorded. When an accident occurs, the driver's details including ID number, name and driving license number are recorded.

Represent the information using an entity relationship diagram. (9 marks)

3. (a) Explain a circumstance that would necessitate the use of each of the following data types in SQL.

(i) char;

(ii) varchar. (4 marks)

(b) Distinguish between *TRUNCATE* and *DROP* commands as used in SQL. (4 marks)

(c) Explain the function of each of the following users in a database management system environment:

(i) database designers;

(ii) system analyst;

(iii) naive users. (6 marks)

(d) The following are relations named Table2 and Table3. Use them to answer the questions that follow.

1) 20
2) 18
4) 20

Table2

col1	col2
1	m
2	n
4	o

Table3

col1	col3
2	P
3	q
5	r

Write SQL statement that would display:

(i) all records from Table2, and the matching records from Table3. (2 marks)

(ii) all the records that have matching values in both tables. (2 marks)

(iii) all the matched or unmatched records from both tables. (2 marks)

4. (a) (i) Explain the meaning of *subquery* as used in SQL. (2 marks)

(ii) Explain a circumstance when subqueries are used in SQL. (2 marks)

(b) Distinguish between *data manipulation language* and *data query language* as used in database management systems. (4 marks)

(c) Write the *algebraic expression* that would perform each of the following in a database:

(i) display vehicles whose brand is Toyota and price is less than Ksh1,000,0000 from vehicles table. (4 marks)

(ii) display brand and colour of vehicles for all vehicles whose brand is Toyota . (4 marks)

(iii) display all the Toyota brand vehicles whose drive mode is 4WD (4 marks)

5. (a) Outline the function of each of the following logical operators in SQL:

(i) EXISTS;

(ii) AND;

(iii) IS NULL. (3 marks)

(b) Explain the term *identity column* as used in SQL. (2 marks)

(c) (i) Explain the term *data warehousing* as used in databases. (2 marks)

(ii) Explain the application of data warehousing in each of the following areas:

I. supermarket chains;

II. telecommunication. (4 marks)

(d) The following relational schema is obtained from a database used by a lecturer to manage scores in tests for different units.

Student(sid: `integer`, sname: `string`)
Unit(uid: `integer`, uname: `string`)
Test(sid: `integer`, uid: `integer`, cat: `integer`, endterm: `integer`)

Write the SQL code that would:

(i) create the *Test table* having relevant fields; (2 marks)

(ii) modify the test table by adding the foreign key constraints and another constraint that would limit the scores entered in cat and endterm columns to be less than or equal to100. (4 marks)

(iii) display the column named *sname* as 'STUDENT NAME' and column *uname* displayed as 'UNIT NAME' for each student whose uid equal to 100. (3 marks)

6. (a) Explain each of the following terms as used in database management systems:

(i) trigger;

(ii) cardinality. (4 marks)

(b) Jane a database administrator in a company has been tasked to consider migrating data from an old DBMS to a new one installed in the premises.

(i) Outline **four** factors that she should consider while planning and executing data migration. (4 marks)

(ii) Outline **four** reasons for preparing a plan during the database migration. (4 marks)

(c) Explain the requirement for each of the following conditions to occur in a database:

(i) a table to be in *Third Normal Form*; (2 marks)

(ii) a referential integrity. (2 marks)

(d) A database designer intends to restrict some users from accessing some portions of data in a database system. Explain **two** methods that would be used by the designer to achieve this goal. (4 marks)

7. (a) Outline the importance of each of the following transaction properties in a databases:

(i) consistency;

(ii) isolation;

(iii) durability. (3 marks)

(b) Outline the function of each of the following logical operators used in SQL:

(i) BETWEEN;

(ii) IN;

(iii) ANY. (3 marks)

(c) Distinguish between *conceptual schema* and *external schema* views in a database management systems. (4 marks)

(d) Table 4 shows an extract of assessment schedule for students in a college. Normalise the table to 3NF, showing the steps. (10 marks)

No	Name	AdNo	Lecturer	Lecturer Code	UnitID	Assessor Code	Assessor name	Date Assessed
1	Beatrice	444	Bilah	L21	U02	A01	Daniel	07/10/21
					U14	A02	Wendo	03/12/21
					U12	A04	Omanga	23/02/22
2	James	445	MWangi	L22	U13	A04	Engren	25/10/21
					U07	A04	Omanga	06/03/22

Table 4

8. (a) (i) Explain the term *database management systems*. (2 marks)

(ii) Outline **four** advantages of database management systems. (4 marks)

(b) Distinguish between each of the following pairs of terms as used in database management systems:

(i) backup and recovery; (4 marks)

(ii) Integrity constraints and encryption. (4 marks)

(c) With the aid of a diagram in each case, describe the following database models:

(i) hierarchical;

(ii) network. (6 marks)

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