2920/206
DATABASE MANAGEMENT SYSTEM
July 2018
Time: 3 hours

THE KENYA NATIONAL EXAMINATIONS COUNCIL

DIPLOMA IN INFORMATION COMMUNICATION TECHNOLOGY

MODULE II

DATABASE MANAGEMENT SYSTEM

3 hours

INSTRUCTION TO CANDIDATES

*This paper consists of **EIGHT** questions.*
*Answer any **FIVE** of the following **EIGHT** questions in the answer booklet provided.*
All questions carry equal marks.
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) Explain how a Database Management Systems accomplishes each of the following: (6 marks)

(i) Security management;

(ii) Multi-User Access Control;

(iii) Data Integrate Management.

(b) The earliest business computer systems used to store groups of records in a single file. Explain **three** challenges of this type of approach. (6 marks)

(c) Figure 1 shows a database tier architecture. Use it to answer the questions that follow.

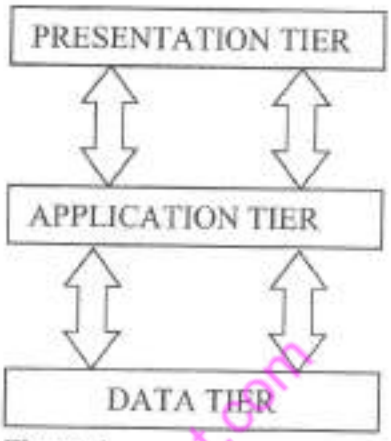

Figure 1

(i) Identify the architecture. (2 marks)

(ii) Explain **three** benefits of this type of tier architecture in a database. (6 marks)

2 (a) Describe the classification of databases based on each of the following criteria: (6 marks)

(i) number of users;

(ii) location.

(b) Distinguish between *internal* and *external* schema as used in database design. (4 marks)

(c) The following is a table named hostelworkers in a database. Use it to answer the questions that follow. (10 marks)

ID	NAME	HOSTEL	AGE	SALARY	YEARS OF SERVICE
500	Patrick	Red	44	22000	7
510	Dolly	Blue	30	45000	15
520	Sindy	Orange	35	26000	10
530	Lucy	Green	20	44000	12

Write an SQL statement that would:

(i) Sort the hostel table by the name and salary in descending order;

(ii) Find the average salary for all employees;

(iii) Find salary more than twenty one thousand and less than thirty thousand and in red hostel;

(iv) Display all the records having names with letters "dy";

(v) Increase salary for all employees by 5%.

3 (a) Outline the function of each of the following SQL commands: (4 marks)

(i) IN operator;

(ii) Exists;

(iii) Unique;

(iv) Not.

(b) Explain **three** routine maintenance jobs that can be carried by a database administrator in an organisation. (6 marks)

(c) Distinguish between *system privileges* and *object privileges* as used in SQL. (4 marks)

(d) Describe each of the following modules that operate in a database system: (6 marks)

(i) Transaction manager;

(ii) Recovery manager:

(iii) Cache manager:

4 (a) Outline **three** rules to be observed when creating sub queries in SQL. (3 marks)

(b) Distinguish between a *schema* and an *instance* as used in databases. (4 marks)

(c) The goal of abstraction in the DBMS is to separate the user's request and the physical storage of data in the database. Describe **three** levels of abstraction that can perform these goals in a database. (6 marks)

(d) A car company dealing with importation of cars on behalf of clients is based in Mombasa. Shipped vehicles are characterized by; unique car identification number, car weight, car type, destination, and delivery date.

Shipped vehicles are received at the company go-downs. Each go-down is characterized by; a unique go-down id, location and telephone number. Shipped vehicles make their way to their clients via standard gauge railways or by road.

Each client is characterised by; a unique client id, clients name, address and the types of transport used to deliver the cargo.

Draw an entity relationship diagram for the above information. (7 marks)

5 (a) (i) Explain the function of each of the following components of a database management system: (4 marks)

(I) Procedures;

(II) Database Engine.

(ii) Write the SQL statements equivalent to each of the following relational algebra statements. (4 marks)

(I) $\cdot a, b \cdot (d > e) \wedge (f = g)^{(p,q)}$

(II) $a \cap b$

(b) Outline **four** types of procedures that one would require to help operate and manage a DBMS. (4 marks)

(c) State **two** differences between *relational algebra* and *relational calculus*. (4 marks)

(d) Describe **two** query languages that can be used by an application developer in a database. (4 marks)

6 (a) State **two** wildcard operators that can be used in conjunction with a Like statement in SQL. (2 marks)

(b) Outline **four** SQL statements that can be used to define a database structure. (4 marks)

(c) Describe each of the following terms as used in SQL: (6 marks)

(i) Primary key;

(ii) View;

(iii) Nested query.

(d) The following are tables created in a database. Use them to answer the questions that follow:

Table A

id	common	name
1	AMERICA	NAME 1
2	BARATON	NAME 2

TABLE B

ID	COMMON	TITLE
1	BARRY	TITLE 1
2	CALI	TITLE 2

State the fields that would be generated when each of the following relational algebra operations are performed on the tables. (8 marks)

(i) Inner join A and B;

(ii) Left outer Join A and B;

(iii) Right outer Join A and B;

(iv) Full outer Join A and B.

7 (a) Describe *denormalisation* as used in databases. (2 marks)

(b) A database administrator experienced a system failure as he was using a database management system. Explain **three** likely causes of this failure. (6 marks)

(c) With the aid of an example, distinguish between a *composite attribute* and a *derived attribute* as used in ER diagrams. (6 marks)

(d) Anne would like to model some database operations using laws in relational algebra. Describe **two** laws that would enable her meet her goals giving an example in each case. (6 marks)

8 (a) Outline **four** advantages of client server architecture as used in databases. (4 marks)

(b) (i) Explain the term concurrency control as used in databases. (2 marks)

(ii) Distinguish between *read phase* and *write phase* as used in concurrency control phase validation in a database. (4 marks)

(c) A learning institution maintains details of its lecturers who are teaching various units as follows:

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Lecturer no, lecturer name, grade, code, department name,
subject code, subject name, subject level.
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Each lecturer may teach many subjects but may not belong to more than one department.

Normalise this data to 3rd normal form. (10 marks)

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