2920/206
DATABASE MANAGEMENT SYSTEM
July 2017
Time: 3 hours

THE KENYA NATIONAL EXAMINATIONS COUNCIL

DIPLOMA IN INFORMATION TECHNOLOGY

MODULE II

DATABASE MANAGEMENT SYSTEM

3 hours

INSTRUCTIONS TO CANDIDATES

You should have an answer booklet for this examination.
This paper consists of EIGHT questions.
Answer any FIVE 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.

© 2017 The Kenya National Examinations Council.   **Turn over**

1. (a) Define each of the following terms as used in databases (4 marks)

    (i) Normalization;

    (ii) Compound key.

  (b) Explain the term *database organization* as used in databases. (2 marks)

  (c) Distinguish between the role of a *database end user* and *database developer*. (4 marks)

  (d) (i) Table 1 is a structure of a table named *Department* in a database. Use it to answer the questions that follow.

Field	Description
DeptNo	Number(10)
DName	Varchar(20)
Location	Varchar(25)

Table 1

Write an SQL statement to perform each of the following: (8 marks)

    (I) Rename the field named *DeptNo* to *departmentName*;

    (II) Remove the field named *Location*;

    (III) Add a field named dateStarted having date type;

    (IV) Remove the table.

    (ii) Explain the data type varchar as used in the structure of the table (2 marks)

2. (a) Explain **two** reasons that may lead an organisation not to use a database management system. (4 marks)

  (b) Outline **two** roles of each of the following in a database management system environment: (4 marks)

    (i) Hardware;

    (ii) Data.

  (c) Interpret the following SQL statement: (3 marks)

```
SELECT deptNo, count(*)
FROM Employees
group by deptNo;
```

(d) Table 2 shows unnormalised table. State a step by step process of normalising to 3NF. (9 marks)

Salesperson Number	SalesPerson Name	Customer Number	Customer Name	storeNumber	storeLocation	SaleAmount
2368	Jane	0005	Andrew	3	Hailesalase	3000
					Hailesalase	1500
					Moi Avenue	3000
2456	Ben	0009	Steven	5	Kijabe street	4500
3456	Gladys	0007	Maggie	7	Pangani	2500

Table2

3. (a) Outline **two** reasons for considering database security. (2 marks)

(b) Explain **two** recovery techniques that can be used in case of a database failure. (4 marks)

(c) Explain each of the following terms as used during the creation of tables in a database. (6 marks)

   (i) cascade;

   (ii) restrict;

   (iii) set null.

(d) Study the following narrative and use it to answer the question that follows.

A student must be enrolled on only one course and a course must have students enrolled on it. Each course is identified by a deptId, courseId and course name. Each course must have a number of modules and a module must be part of at least one course. A module is identified by moduleId, module name and must have a lecturer as a subject leader but a lecturer may not necessarily be a subject leader or may lead more than one module.

Draw an entity relationship diagram showing cardinality and optionality. (8 marks)

4. (a) Distinguish between the *Grant* and *Revoke* commands as used in databases. (4 marks)

(b) With the aid of a diagram, distinguish between the output FROM the *union* and the *intersection* operators. (6 marks)

(c) Explain **two** characteristics of the *conceptual model* of a database design. (4 marks)

(d)   (i)   Write the algebraic expressions equivalent to the following SQL statements:

(3 marks)

```
SELECT Distinct Gender, Salary
FROM Employee;
```

(ii)   Write the SQL statement equivalent to the following algebraic expression.

(3 marks)

$$\sigma_{assetcategory=furniture}(Asset)$$

5.   (a)   Define the term *data abstraction* as used in database management systems.   (2 marks)

(b)   Explain **two** disadvantages of database approach.   (4 marks)

(c)   With the aid of an example, describe **two** categories of SQL statements as used in databases.   (5 marks)

(d)   Table 3 shows a table named *Employee* in a database used by employer to manage employees' salaries. Use it to answer the question that follows

EmpNo.	EmpName	Salary	Grade
E234567	Catherine	10000	A
E234568	Agnes	15000	A
E234569	Alex	25000	D
E234570	Peter	25000	D
E234571	Ted	30000	C
E234573	Esther	75000	A

Table 3

Write an SQL statement that would: (9 marks)

(i)   display the salary of all employees whose Grade value is D.

(ii)   change Alex's salary to 30000.

(iii)   display all employees with grade A and salaries with values between 10,000 and 15,000.

(iv)   display the minimum and maximum salary.

6.   (a)   Outline **three** types of *end users* in a database environment.   (3 marks)

(b)   Differentiate between the *prime attribute* and a *non-prime attribute* as used in databases.   (4 marks).

(c)   Describe **two** ways of classifying database management system.   (4 marks)

(d) Table 4 shows a database table named students. Use it to answer the questions that follow:

SID	SNAME	LNAME	MARKS
001	Jane	Luke	50
002	Agness	James	70
003	Josephine	Eliud	90
004	Catherine	Joseph	40
005	Susan	Clark	30

Table 4

Write a relational calculus statement that would:

(i) display the records for the fields SID, SNAME and LNAME of all students.

(3 marks)

(ii) display the records in the field *SNAME*, *LNAME* and MARKS for all students with MARKS values more than 60.

(3 marks)

(iii) display the MARKS values for a student with SNAME is "Catherine" and LNAME "Joseph".

(3 marks)

7. (a) Explain each of the following terms as used in databases. (4 marks)

(i) Two-tier client server architecture;

(ii) Candidate key.

(b) Susan a database administrator is working on a table named *Employee* with the following attributes:

Employee (EmployeeNumber, DepartmentNumber, hours, EmployeNumber, DepartmentName, DepartmentLocation)

(i) State **three** functional dependencies that can be derived from the table.

(3 marks)

(ii) Outline **three** challenges she would encounter when working with data on the table.

(3 marks)

(c) Explain **two** reasons that may lead to the migration from the file based to a database centred approach.

(4 marks)

(d) With the aid of a diagram outline the stages of the database design cycle. (6 marks)

8. (a) Explain **two** circumstances under which an organization would implement a centralized database system.

(4 marks)

(b) With the aid of a diagram, outline **two** paradigms the early models of databases were based on.

(4 marks)

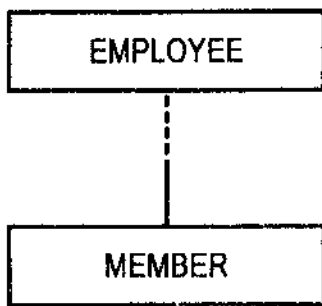(c)   Distinguish between the entity relationship diagrams in figure 1 and in figure 2.
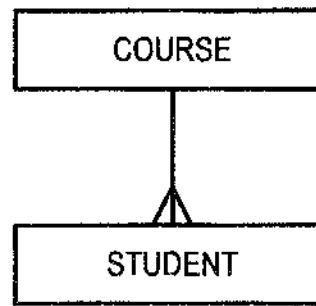
(4 marks)

Figure 1   Figure 2

(d)   Write SQL statements that would perform each of the following operations on the table table named *Department*:

(8 marks)

(i)   Make the field Dnumber, a primary key;

(ii)   Make the field *Dname VARCHAR(50)* not to accept a null value;

(iii)   Make the field named Dnumber to hold values greater than 10

THIS IS THE LAST PRINTED PAGE.