Name: _____ Index No. _____/_____

2920/206
DATABASE MANAGEMENT SYSTEMS
November 2015
Time: 3 hours

Candidate's Signature _____

Date: _____

THE KENYA NATIONAL EXAMINATIONS COUNCIL

DIPLOMA IN INFORMATION COMMUNICATION TECHNOLOGY

MODULE II

DATABASE MANAGEMENT SYSTEMS

3 hours

INSTRUCTIONS TO CANDIDATES:

*Write your **name** and **index number** in the spaces provided above.*
***Sign** and write the **date of examination** in the spaces provided above.*
*Answer any **FIVE** of the following **EIGHT** questions.*
Candidates should answer the questions in English.

For Official Use Only.

Question Number	1	2	3	4	5	6	7	8	TOTAL SCORE
Candidate's Score									

This paper consists of 16 printed pages.

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

Turn over

1. (a) (i) List **six** examples of Database Management Systems available in the market. (3 marks)

(ii) Describe a relational database management system. (2 marks)

(b) Describe each of the following components of a database:

(i) stored procedures; (2 marks)

(ii) tables; (2 marks)

(iii) triggers. (2 marks)

(c) With the aid of a diagram, describe the **three** schema database architectures. (9 marks)

2 (a) Outline **three** characteristics of an entity in a database. (3 marks)

(b) Describe each of the following criteria for classification of database management systems:

(i) based on data models; (2 marks)

(ii) based on the number of users; (2 marks)

(iii) based on database distribution. (2 marks)

(c) With the aid of an example, distinguish between *integrity* and *domain* constraints as used in databases. (5 marks)

(d) With the aid of an example in each case, describe each of the following attributes as used in databases:

(i) simple; (2 marks)

(ii) composite; (2 marks)

(iii) derived. (2 marks)

3 (a) Outline **four** advantages of using indexes in Structured Query Language. (4 marks)

(b) Write a Structured Query language statements equivalent for each of the following relational algebra operations:

(i) projection; (2 marks)

(ii) difference; (2 marks)

(iii) union. (2 marks)

(c) Distinguish between a *data administrator* and a *database administrator* as used in databases. (4 marks)

(d) Alex is in the process of designing a database. Explain **three** phases that he should consider during design. (6 marks)

4. (a) With the aid of an example describe a hypermedia database. (3 marks)

(b) Explain why each of the following is a threat to databases:

(i) loss of integrity; (2 marks)

(ii) loss of availability; (2 marks)

(iii) loss of confidentiality. (2 marks)

(c) In a college, a lecturer may teach many subjects but may not belong to more than one department. The college maintains information of its lecturers' subject area as follows;

Lecturer Number, Lecturer Name, Lecturer Grade, Department Code, Department Name, Subject Code, Subject Name and Subject Level

Represent this information to 3rd Normal Form. (11 marks)

5 (a) (i) Describe the term *repeating group* as used in normalization. (2 marks)

(ii) Outline **three** goals that would be achieved from using a normalized table. (3 marks)

(b) Describe each of the following terms as used in database management:

(i) domain relational calculus; (2 marks)

(ii) query optimizer; (2 marks)

(iii) relational algebra. (2 marks)

```
ON A.Key = B.Key
WHERE A.Key IS NULL OR B.Key IS NULL
```

(ii)
```
SELECT *
FROM Table_A A
RIGHT JOIN Table_B B
ON A.Key = B.Key
WHERE A.Key IS NULL
```
(3 marks)

(iii)
```
SELECT *
FROM Table_A A
FULL OUTER JOIN Table_B B
ON A.Key = B.Key
```
(3 marks)

6 (a) Describe each of the following approaches used in the design of a database.

(i) top down; (2 marks)

(ii) bottom up. (2 marks)

(b) Write a Structured Query Language statement that would:

(i) display first 3 characters of the field first_name from a table named employee; (2 marks)

(ii) display names that begin with letters in the range of D through G from the first _name field from the employee table; (3 marks)

(iii) create a table named *employeedata* with the following properties; (5 marks)

Fieldname	Size	Data type	Other properties
Employee_id	6	decimal	Primary key
Start_date		date	Not accept blank
Job_id	10	Var Char	Not accept blank
Department_id	4	decimal	Not accept blank

(iv) change the email and commission field values of employees table with *'not available'* and 0.10 respectively for those employees whose department_id is 150; (3 marks)

(v) add a field named region_id after start_date to the table employeedata table. (3 marks)

7. (a) Outline **four** types of states that a transaction may be in during processing in a database management system. (4 marks)

(b) Distinguish between *direct* and *indirect end users* as used in DBMS. (4 marks)

(c) Aristocrafty, encountered some challenges when they introduced a distributed database management system. Explain **three** technical challenges that the company may have faced. (6 marks)

(d) Write equivalent relational algebra statements for each of thc following Structured Query Language statements; (6 marks)

(i)
```
SELECT ActionTitle
FROM  Stars,  Actionmovie
WHERE starName = Andrew AND birthdate = 1956
```

(ii)
```
Select a,b
From table 1,table2
Where d>e and f=g;
```

(iii)
```
Select  sum(salary)
from employee
WHERE DEPARTMENT='COMPUTER'
```

8 (a) Outline **four** functions of views as used in Structured Query Language. (4 marks)

(b) Under what circumstance would each of the following joins be used in relational algebra; (2 marks)

(i) left join;

(ii) equi join; (2 marks)

(iii) cross join. (2 marks)

(c) Distinguish between *data manipulation language* and *transaction control language* as used in Structured Query Language. (4 marks)

(d) Mwanziri intends to design an Entity Relationship Diagram for a proposed database system. Outline **six** procedures guidelines that will enable him meet his objective. (6 marks)