Candidate's Signature:_____ Date of Examination:_____

2920/206
DATABASE MANAGEMENT SYSTEMS
July 2012
Time: 3 hours

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.*

All questions carry equal marks.

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Question No.	1	2	3	4	5	6	7	8	Total Marks
Marks									

This paper consist of 13 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) Define the term *data model* as used in databases. (2 marks)

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(b) Outline **four** disadvantages of a *hierarchical database*. (4 marks)

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(c) Describe **four** steps involved in the *design phase* of a database system. (8 marks)

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(d) An entity named student has the following attributes; *studentid, name, dateofbirth, address and age*. The name is made up of the middle, last and firstsname, while the address is made up of the street, city and code.
Draw an *entity type* diagram to represent this information. (6 marks)

2. (a) Outline **three** disadvantages of a *database management system.* (3 marks)

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(b) Nancy intends to install a centralized database server system to manage the company's data. Explain **three** benefits he would achieve from this approach. (6 marks)

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(c) Distinguish between *distributed database* and *client/server database.* (4 marks)

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(d) In a hospital, a doctor can be assigned to many patients. A doctor is assigned a nurse to assist when attending to a patient. Each patient is assigned three nurses .A patient may be required to take drugs a certain number of times per day.
Draw an *Entity relationship* diagram to show the cardinality, optionality and mandatory where applicable. (7 marks)

3. (a) Outline **four** benefits of *usability testing* during development of a database system. (4 marks)

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(b) Describe **three** components of a *database management system.* (6 marks)

.....Hardware.....

.....Software.....

.....Data.....

.....Users.....

(c) Table 1 shows records of employees stored in a database. Use it to answer the question that follows. (10 marks)

EmployeeNo	Firstname	Lastname	Dateemployed	Salary	Grade
1010	Walter	Wiliams	11/11/2009	10000.09	Lower
1011	Jane	Antony	09/11/2007	20000.56	Higher
1012	Nicholas	Kings	06/06/2008	25000.67	Higher
1013	Mary	Anne	05/10/2008	15000.45	Middle
1014	Johnstone	Pielly	12/12/2009	11000.99	Lower

Table 1: Employee

Write SQL statements that would:

(i) extract the firstnames in uppercase and lastnames ;

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(ii) extract the first three characters of the *Grade* and store them in a field named *grade1*;

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(iii) determine the number of characters in the *lastname* and store them in the field named *lastnamesize*;

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(iv) round off the values in the salary field to 0 decimal places and store them in the field named *sal*.

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(v) set the date values to the format 'yyyy/mm/dd' and store them in the field named *dateemployed1*.

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4. (a) Describe the circumstance under which an *integrity constraint* would be used during database design. (2 marks)

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(b) Explain **two** advantages that a business enterprise would derive from an *online database* system. (4 marks)

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(c) Distinguish between *authentication* and *authorization* as used in database systems. (4 marks)

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(d) (i) State **two** objectives of performing *normalization* in databases. (3 marks)

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(ii) The following are details of a student stored in a table; *studentno, studentname, dateofbirth, subject, subjectcode and grade*.

I. Justify that the table is not in its 1NF. (2 marks)

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II. Outline **two** advantages of denormalizing a table (2 marks)

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(iii) Distinguish between *functional dependency* and *transitive dependency* giving an example in each case 4 marks)

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5. (a) Outline **six** features of a *database management system*. (6 marks)

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(b) Distinguish between a *logical database designer* and a *physical database designer*. (4 marks)

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(c) Table 2 shows details of furniture stored in a database. Use it to answer the questions that follows. (10 marks)

ITEM CODE	ITEMNAME	QUANTITY	ITEMPRICE	STATUS
F0001	Beds	300	12000	EXCESS
F0010	Tables	200	7000	EXCESS
F0003	Sofa sets	100	35000	EXCESS
F0011	Ward robe	50	18000	REORDER
F0014	Computer desks	145	3000	EXCESS
F0002	Chairs	45	1600	REORDER

Table2: Furniture

Write a SQL statement that would:

(i) extract details of items whose *itemname* starts with letter e;

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(ii) determine the cost of each item and store them in a field named *totalcost;*

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(iii) extract all details of items whose *itemprice* is greater than 15000 and the *itemname* ends with s;

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(iv) sort the items according to the *itemcode* in ascending order;

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(v) delete the item whose *itemcode* is F0014 from the table.

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6 (a) Outline the function of each of the following terms as used in *relational algebra*. (4 marks)

(i) project operation

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(ii) cross product

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(iii) natural join;

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(iv) cartesian product

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(b) Distinguish between *index* and *unique index* as used in SQL. (4 marks)

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(c) Table 3 shows details of students stored in a database. Use it to answer the question that follows.

STUDENTNO	STUDENTNAME	UNITCODE	MARKS
K001	Kelly	ICT	70
K002	Rose	HR	30
K003	Bronz	SECRETARIAL	50
K004	Emelda	MECHANICAL	30
K001	Kelly	HR	65
K003	Bronz	ICT	95

Table 3: Kemkem

Write an SQL statement that will display each of the following tables as an output. (12 marks)

STUDENTNO	STUDENTNAME	UNITCODE	MARKS
K001	Kelly	ICT	70
K003	Bronz	ICT	95

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(ii)

STUDENTNO
K001
K002
K003
K004

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(iii)

MARKS
70
50
65
95

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(iv)

STUDENTNO	STUDENTNAME	UNITCODE	MARKS
K003	Bronz	ICT	95

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7 (a) Mutumishi Business Enterprise has been using the *traditional database* to maintain their records. Explain **three** disadvantages that they are likely to face by using this approach.

(6 marks)

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(b) The following is a structure of a table names *patient_rec*. Use it to answer the question that follows.

Fieldname	**Datatype**	**Constraint**
PatientNo	Number(10)	primary key
Firstname	Varchar(25)	Not Null
Lastname	Varchar(25)	Not Null
Totalcost	Currency	Not Null

Write a SQL statement that will create the table with its associated fields. (4 marks)

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(c) The following tables shows a database schema that a college used to assign teaching units to lecturers. Use it to answer the question that follows. (10 marks)

Lecturer table

Lecturercode	**Lecturername**
L001	ALI
L002	FRED
L003	ANTONY
L004	ANITA

Unit Table

Unitcode	**Coursename**
Csc4420	ICT
Csc4430	HUMAN RESOURCE
Csc7740	MECHANICAL ENGINEERING
Csc7820	BUSINESS ADMINISTRATION
Csc8800	ELECTRICAL ENGINEERING

Lecturerunit table

Lecturercode	**Unit code**
L001	Csc4430
L001	Csc4420
L003	Csc4430
L003	Csc7740
L004	Csc7820

Write relational algebra to:

(i) display those lecturercodes who have taught the course whose code is 'csc4430' and not 'csc7740';

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(ii) display those lecturercodes who have taught courses whose codes are 'csc4430' and 'csc7740';

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(iii) display those lecturerodes who have not taught a course whose code is 'csc7740';.

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(iv) display courses that have never been taught;

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8. (a) Distinguish between the terms *tuple* and *domain* as used in relational calculus. (4 marks)

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(b) Explain the function of each of the following notations as used in relational algebra; (6 marks)

(i) ∂

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(ii) π

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(iii) $\bowtie$

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(c) The following data is to be stored in a video database. Use it to answer the question that follows.

CustNo	Custname	VideoNo	VideoTitle	SupplierNo	Supplier name	Date loaned	Date due	Video cost
C004	ALI	VCT001	Ben 5	VD001	VIDCO	22/01/12	26/01/12	200.00
C001	PETER	VXT004	A fall from the cliff	VD001	VIDCO	25/01/12	28/01/12	200.00
C003	SUSAN	VXT016	The big dad	VD002	HIZON	02/02/12	05/02/12	350.00
C004	ALI	VCT002	The dear girl	VD003	VMAP	04/02/12	07/02/12	300.00

Normalize the data to 3NF. (10 marks)