Name:_____ Index No:_____

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

Signature:_____

Date: 9/7

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 in the space provided.*
All questions carry equal marks.

For Examiner's Use Only

Question	1	2	3	4	5	6	7	8	Total Marks
Marks									

This paper consists of 15printed 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) (i) Explain each of the following transaction properties as used in database management systems:

I. isolation; (1 mark)

II. durability. (1 mark)

(ii) Describe **two** problems that could arise due to interference between concurrent transactions. (4marks)

(b) Describe **three** integrity constraints that could be appliedon a database management system during its design stage. (6 marks)

(c) The following are outputs from algebraic operations involving tables in a database management system.

(i) A table consisting of all rows appearing in both relations.

(ii) A table consisting of all possible rows appearing in the first and not in the second relations.

(iii) A table consisting of all rows appearing in either or both relations.

(iv) A table consisting of all rows from a specified relation that satisfy a specific condition.

Identify the algebraic operation in each case. (4 marks)

(d) Table 1 shows details of Bidii Self Help group members.Use it to answer the questions that follow.

MemberID	LastName	FirstName	Address	Town
B001	Amani	John	10-990099	Mombasa
B002	Umoja	Peter	23-770077	Kakamega
B003	Baraka	Mary	20-330033	Nairobi

Table 1

Given that the relation is named Member, write an SQL statement that could be used to display:

(i) *MemberID* and *FirstName* for all members whose town is Kakamega. (2 marks)

(ii) Member's details sorted in descending alphabetic order using the Town field. (2 marks)

2. (a) (i) Outline the function of each of the following SQL commands:

I. initcap; (1 mark)

II. sysdate; (1 mark)

III. distinct. (1 mark)

(ii) The statement *substring(firstname, n, m)* is an SQL function with three arguments. Outline the use of each argument. (3 marks)

(b) Explain each of the following terms as used in database systems:

(i) prototyping; (2 marks)

(ii) testing; (2 marks)

(iii) maintenance. (2 marks)

(c) Table 2 shows Safari Company trainees' details. Use it to answer the question that follows.

Trainee_ID	Trainee_Surname	Course_Code	Course_Name	Tutor_FName	Tutor_Office
T101	Brian	ACC 1	Principles of Accounting	Peter	ADM1
T102	William	MKT 1 MKT 2	Introduction to Marketing International Marketing	Cecil Mary	ADM3 ADM2
T103	Sospeter	MKT 1	Introduction to Marketing	Cecil	ADM3

Table 2

Normalise the table to 3 Normalform(3NF). (8 marks)

3. (a) Outline **two** update anomalies associated with poor database design. (2 marks)

(b) A property management company with branches across the country intends to install acentralized database management system. Explain **two** challenges that the company is likely to encounter when using the database management system. (4 marks)

(c) Jane is a newly recruited database administrator. Explain **three** roles that she would be expected to perform in her day to day work. (6 marks)

(d) (i) Using a diagram represent the Cartesian product of the attributes M and N given that M=(a, b) and N= (1,2). (2 marks)

(ii) Table 3 shows an extract of patient details in a certain dispensary. Use it to answer the questions that follow.

PatNumber	PatName	AppointmentDate
P453	Abraham	16-11-2012
P467	Joel	17-11-2012
P472	Ann	16-11-2012

Table 3

Given that the relation is named Patient, write a relational algebraic expression for each of the following statement:

I. display all patients' number and name; (2 marks)

II. display all patients'details whose appointment date is 17-11-2012; (2 marks)

III. display the patient name and appointment date for a patient whose number is P472. (2 marks)

4. (a) Explain each of the following database system objects:

(i) Form; (2 marks)

(ii) Report. (2 marks)

(b) Outline **four** functions of *database views* in database systems. (4 marks)

(c) A certain company intends to automate its records. It hired an ICT consultant to assist in the design and development of a database system. Explain **three** factors that the consultant would consider while designing the system. (6 marks).

(d) A certain organization has information stored in its database. Describe **three** computer based security control features that the organization could put in place to enhance the security of the information. (6 marks)

5. (a) ABC Company Ltd uses file based systems in its operations. Explain **two** challenges the company could be facing. (4 marks)

(b) Differentiate between *logical* and *physical* phases as used in database design life cycle. (4 marks)

(c) Table 4 shows details of rental houses in a certain town. Use it to answer the questions that follow.

HouseNo	Type	Estate	Rent_Per_Month(KSH)
H16	One Bed room	Kahama	9000
H17	One Bed room	Barabara	8500
H18	Two Bed room	street	15000
H19	Two Bed room	Barabara	13500
H20	One Bed room	Street	1400
H21	Bed sitter	Kahama	9000

Table 4

(i) Anew tenant is required to pay the monthly rent, a deposit equivalent to one month's rent andwater deposit of Ksh 3000.
Write an SQL statment that would display the HouseNo and the amount to be paid by the new tenant as initial rent. Use House as the table name. (2 marks)

(ii) Write an SQL statement that would display details of one bed-roomed house whose rent per month is Ksh 9000. (2 marks)

(iii) If the rent per month for all houses is increased by 10%, write an SQL statement that could be used to display HouseNo, the original rent as old rent and the adjusted rent as new rent. (2 marks)

(d) John, a database designer wishes to collect information about his organization. Describe **three** information gathering methods that he could use. (6 marks)

6. (a) ABC Company Ltd has implemented its database management system using a client server architecture.

(i) Outline **four** functions of each of the following components of this architecture.

I. client (2 marks)

II. server (2 marks)

(ii) Explain **two** benefits that the company is likely to accrue from this move. (2 marks)

(b) Table 5 shows details of employees in a certain company. Use it to answer the questions that follow.

Employeel D	First_ Name	Surname	Branch_ NO	Brach_ Name	Basic_Salary
50043	John	Bahari	01	Central	40000
50123	Ruth	Ziwani	02	Eastern	35000
50145	Peter	Mwanzo	02	Eastern	38000
50167	Ali	Mwisho	01	Central	42000
50185	Ruth	Bakari	01	Cental	48000

Table 5

Write an SQL statement that could be used to:

(i) Change the name Ziwani to Zawadi. (2 marks)

(ii) Display the BranchName and the number of employees in each branch. (2 marks)

(iii) Remove the details of Ruth Bakari from the database. (2 marks)

(c) Describe **two** *relational calculus quantifiers* used in databases. (4 marks)

(d) With the aid of an example in each case, differentiate between *unary* and *binary* operations as used in relational algebra. (4 marks)

7. (a) Explain **two** roles of aphysical database designer. (4 marks)

(b) Explain each of the following terms as used in database management systems.

(i) Data mining; (2 marks)

(ii) Data warehousing. (2 marks)

(c) (i) Table 6 and 7, which are named student and subject respectively contain students' details.Use them to answer the questions that follow.

RegNo	Fname	Address	Town	PhoneNo
CIT001	Janet	122	Mombasa	079 999 888
DIT002	Timothy	322	Nairobi	079 888 999
DCS003	Emmily	444	Nairobi	079 666 777

Table 6: **Student**

Course tCode	CourseName	EntryGrade(KCSE)	RegNo
CIT	Certificate in IT	D+	CIT001
DIT	Diploma in IT	C (Plain)	DIT002
DCS	Diploma in Computer Studies	C-	DCS003

Table 7: **Subject**

I. Write anSQL statement that could be used to display the following fields; Fname, RegNo, PhoneNo and the CourseName for all the students. (2 marks)

II. Write an SQL statement that could be used to display all details of students from the Students table whoseFname do not start with T. (2 marks)

(ii) Explain the meaning of the word *subquery* as used in SQL. (2 marks)

(d) Table 8 shows the design of a table named Employee. Use it to answer the questions that follow.

	PROPERTIES				
FIELD NAME	**Data type**	**PK**	**FK**	**Not Null**	**Length**
Employee_ID	Number	Yes		Yes	
Last_Name	VarChar			Yes	20
First_Name	VarChar			Yes	20
Dept_ID	Number		Yes	Yes	

Table 8: Employee

(i) Write an SQL statement that could be used to create the Employee table. (4 marks)

(ii) A student typed the following SQL statement:

```
Insert into Employees
Values(Em001, Joan, Mwanzo, Administration,2011);
```

Identify **four** errors in the statement. (2 marks)

8. (a) With the aid of an example in each case, explain the function of each of the following database operators.

(i) AND; (2 marks)

(ii) OR. (2 marks)

(b) Explain **three** challenges of a distributed database systems. (6 marks)

(c) Differentiate between *shared* and *exclusive* locks as used in database concurrency controls. (4 marks)

(d) The following narrative depicts the situation in a certain library. Use it to answer the questions that follow.

In a library there are several books to be borrowed by registered library users. To register a user provides details of their names, national Id number after which he/she is assigned a library identification number. A book in the library is identified by an ISBN, Title and name of the author. A user can borrow up to a maximum of three books. A fine of Ksh 10.00 is charged for any book that is not returned within fourteen days.

(i) Identify the entities used in the scenario. (2 marks)

(ii) Draw an entity relationship diagram for the library. (4 marks)