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Name_____ Index No._____/_____

2920/206
DATABASE MANAGEMENT SYSTEM
July 2013
Time: 3 hours

Candidate's Signature _____

Date_____

THE KENYA NATIONAL EXAMINATIONS COUNCIL

DIPLOMA IN INFORMATION COMMUNICATION TECHNOLOGY

MODULE II

DATABASE MANAGEMENT SYSTEM

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 **EIGHT** questions in the spaces provided.*
ALL questions carry equal marks.

For Examiner's Use Only

Question	1	2	3	4	5	6	7	8	Total
Marks									

This paper consists of 17 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) State **four** characteristics of *data* in a relational database. (4 marks)

(b) Distinguish between *logical data independence* and *physical data independence* as used in databases. (4 marks)

(c) Explain **two** categories of *data security* that would be considered when protecting a database from intrusion. (4 marks)

(d) Peter created a table named *sal* in a database program. Write SQL statement for each of the following relational algebraic statement about the table. (8 marks)

(i) $\pi_{salary}(SAL)$

(ii) $\pi_{name, salary}(\partial_{salary<5000}(SAL))$

(iii) $\pi_{Id, Name}(\partial_{depart='ICT' \vee depart='SECRETARIAL'}(SAL))$

(iv) $\pi_{Name}(\partial_{City} \neq Kisumu \text{ and } _{City} \neq Nairobi^{(SAL)})$

2. (a) Outline **three** elements that constitute a database. (3 marks)

(b) Describe each of the following terms as applied in traditional databases.

(i) data redundancy; (2 marks)

(ii) data isolation; (2 marks)

(iii) data integrity. (2 marks)

(c) Distinguish between *preventive* and *adaptive* maintenance as used in database design life cycle (DDLC). (4 marks)

(d) Figure 1 shows the phases of a database design life cycle. Use it to answer the questions that follow.

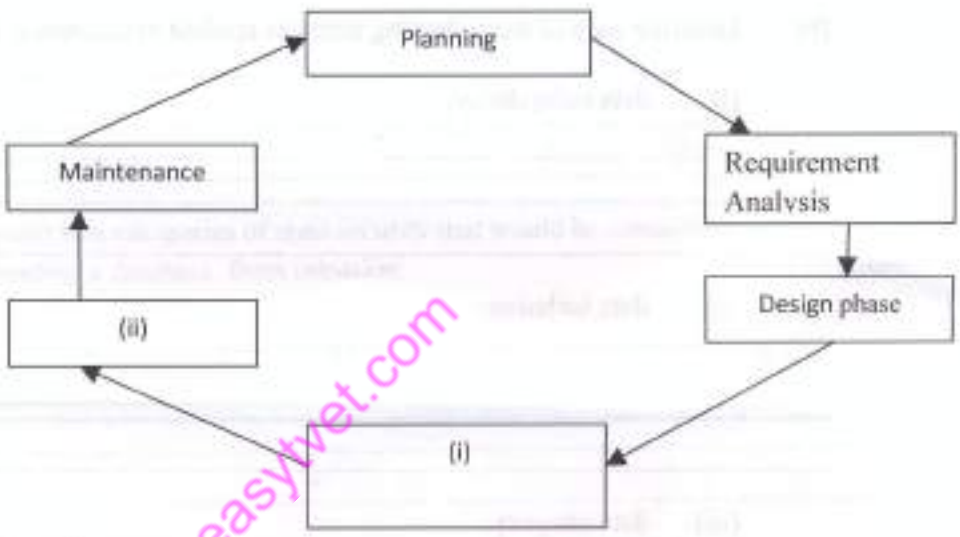

Figure 1.

(i) Identify the phases labelled (i) and (ii). (1 mark)

(ii) Explain **three** tasks performed in each of the phases identified in (i). (6 marks)

3. (a) State **four** causes of *accidental loss* of data in a database. (4 marks)

(b) Distinguish between a *data control language* and a *data query language* as used in database programs. (4 marks)

(c) With the aid of an example in each case, outline **three** examples of *data definition language* commands. (6 marks)

(d) Use the following database tables to answer the questions that follow.

BOOKS TABLE

BOOKID	TITLE	AUTHORS	YEAR
BK001	COMPUTER APPLICATION	KELLY TOM	2001
BK002	PROGRAMMING C++	TONNY BEN	1993
BK003	STATISTICS	RIDGE HURRY	2009
BK004	DATA COMMUNICATION	KELLY ANDREW	2006
BK005	VISUAL BASIC	TONNY BEN	2009

STUDENT TABLE

STID	STNAME	COURSE	BOOKID	AGE
MS001	CHRISTINE	INFORMATION TECHNOLOGY	BK002	35
MS002	ABIGI	MECHANICAL ENGINEERING	BK001	33
MS003	HUDSON	SECRETARIAL	BK003	26
MS004	GODFREY	BUSINESS ADMINISTRATION	BK004	30
MS005	PETERSON	INFORMATION TECHNOLOGY	BK002	22

Write relational algebra statement to perform each of the following

(i) Rename the field *Bookid* to *Bookidno* (2 marks)

(ii) display all fields from both tables. (2 marks)

(iii) display the authors having the name Kelly. (2 marks)

4 (a) Outline **three** types of *outer joins* that can be applied on a table. (3 marks)

(b) Explain **two** disadvantages of using object oriented database model. (4 marks)

(c) Distinguish between *procedural* and *non procedural* data manipulation Languages. (4 marks)

(d) Table 1 shows records of employees in an organisation. Use it to answer the question that follows.

Employee table

EMPNO	EMPLOYEE NAME	DEPTID	BASIC PAY	ALLOW	DED	TAX
2001	JANE ERIC	DEPT1	8000	3000	1500	1500
2002	MICHAEL SIDNEY	DEPT2	9000	3500	2000	2000
2003	LILIAN ROBERT	DEPT3	7000	4000	1500	1700
2004	JACK SIDNEY	DEPT1	10000	4500	2000	2400
2005	CLIFF CUSSLER	DEPT3	12000	5000	3000	3000
2006	GEOFREY TOM	DEPT3	8000	3000	4000	1500

Table 1

Write SQL statements that would be used to display each of the following:

(i) total basic pay for employees whose DEPTID is DEPT1; (1 mark)

(ii) gross pay for all the employees in DEPT3; (2 marks)

Hint: Gross pay=Basicpay +Allow -Ded-Tax

(iii) name of employee who gets the maximum basic pay; (3 marks)

(iv) the DEPTID and the average, maximum and minimum of basic pay for all departments with more than two employees. (3 marks)

5. (a) Kennedy a computer student would like to join two tables. Explain **two** conditions that the tables he created should meet inorder to achieve his objective. (4 marks)

(b) Distinguish between a *weak entity set* and *strong entity set* as used in relationship diagrams. (4 marks)

(c) Henry a computer programmer intends to use SQL while developing a database system. Explain **three** benefits he would derive from the use of this language. (6 marks)

(d) Andrew a computer student realized that the tables in a database he was using were not normalized. Explain **three** problems he would experience while using the database. (6 marks)

6. (a) Outline **two** rules applied on tables in their *First Normal Form* (INF) tables. (2 marks)

(b) Describe each of the following types of attributes as used in Entity Relationship models.

(i) simple; (2 marks)

(ii) derived. (2 marks)

(c) In an organisation a consultant cannot exist without an employee, while an employee can exist without a consultant. An employee can be identified with the following employeeno, name, age, gender and salary while the consultant can be identified with the consultantno and designation. Represent this information in an ER diagram. (6 marks)

(d) Figure 2 shows a diagram representing a database organisation approach. Use it to answer the questions that follow.

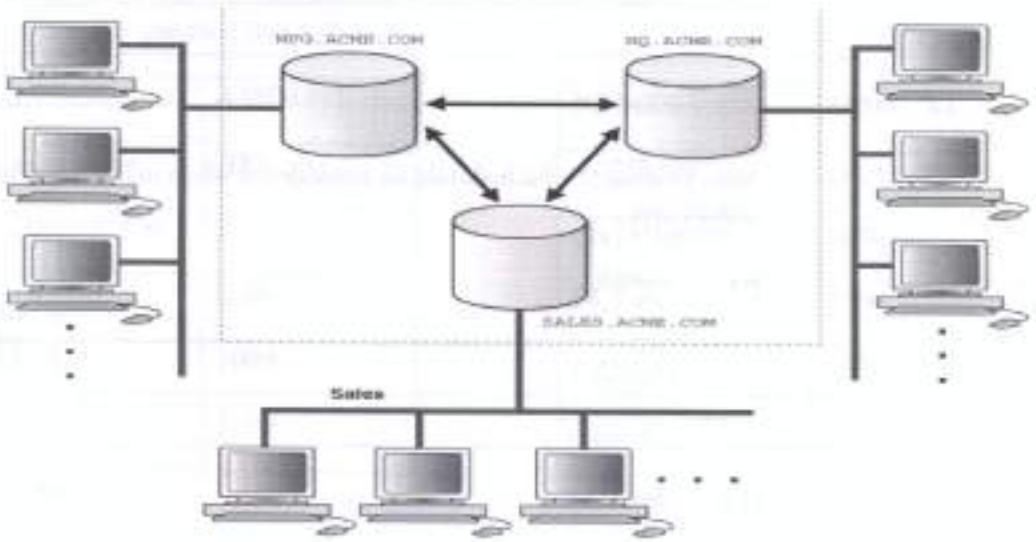

Figure 2.

(i) Identify the type of database organisation approach used in the figure giving a reason for your answer. (2 marks)

(ii) Explain **three** benefits an organisation would achieve when using this approach. (6 marks)

7. (a) State **two** rules which should be considered when using the following SQL statements.

(i) sum(); (2 marks)

(ii) null. (2 marks)

(b) Maurice would like to denormalise the tables he created in a database. Explain **two** reasons that may have led him to perform denormalisation. (4 marks)

(c) Write an SQL statement in each case that would be used to extract all the records in a table that meet each of the following criteria:

(i) whose field name starts with letter a; (2 marks)

(ii) whose field name has a pattern of letters la; (2 marks)

(iii) whose last letter of the field name is m. (2 marks)

(d) Table 2 and table 3 were created in two different databases. Use them to answer the question that follows.

NAMES	AMOUNT
ANDREW	3000
BEATRICE	4000
DORIS	2000
FELIX	1000
ERNEST	1500

Table 2

NAMES	AMOUNT
ANDREW	3000
CATHERINE	5000
DORIS	2000
ERNEST	4000

Table 3

State the algebraic operation that would be used to generate each of the following output from the tables .Justify your answer.

(i) (2 marks)

NAMES	AMOUNT
ANDREW	3000
DORIS	2000

(ii) (2 marks)

NAMES	AMOUNT
BEATRICE	4000
FELIX	1000
ERNEST	1500

(iii) (2 marks)

NAMES	AMOUNT
ANDREW	3000
BEATRICE	4000
DORIS	2000
CATHERINE	5000
FELIX	1000
ERNEST	1500
FELIX	1000
ERNEST	4000
ERNEST	1500

8. (a) With the aid of a diagram, describe **three** levels of *data abstraction* relational databases. (8 marks)

(b) Distinguish between *Boyce code normal form* (BCNF) and *third normal form* (3^{rd} NF) in relation to normalization. (4 marks)

(c) Figure 4 and Figure 5 shows invoices send by the accountant at Nairobi hardware Company Ltd to their customers. Use them to answer the question that follows. (8 marks)

Nairobi Hardware
P.o. box 334
Nairobi

INVOICE

Customer no: 557
DATE: 12/04/13

INV NO 456

Customer name: John Hurry
Address: Box 333 Malindi

Item Code	Quantity	Description	Unit Price	Amount
6670	245	Cement	900	220500.00
7720	780	Iron sheets	1500	1170000.00
3320	100	Doors	5000	50000.00
8945	345	Wheel barrow	200	69000.00

Figure 4

Nairobi Hardware
P.o. box 334
Nairobi

INVOICE

Customer no: 800
DATE: 07/02/13

INV NO 784

Customer name: Martin Thuku
Address: Box 678 Bungoma

Item Code	Quantity	Description	Unit Price	Amount
5577	100	Sink	700	70000.00
2077	200	Tiles	1000	200000.00
3230	100	Window	3000	30000.00

Figure 5

Represent the invoices in un-normalized table.