



MERU UNIVERSITY COLLEGE OF SCIENCE & TECHNOLOGY

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University Examinations 2012/2013

SECOND YEAR, FIRST SEMESTER EXAMINATION FOR THE DEGREE OF BACHELOR OF
SCIENCE IN INFORMATION TECHNOLOGY

ICS 2206: DATABASE SYSTEMS

DATE: APRIL 2013

TIME: 2 HOURS

INSTRUCTIONS: Answer question *one* and any other *two* questions

QUESTION ONE – 30 MARKS

- a. Define the following terms as used in the context of database systems. (5 Marks)
- Data
 - Information
 - DBMS
 - Primary Key
 - Foreign Key
- b. Figure 1 depicts an ER diagram of the entity types of a hotel database. Study it and answer questions that follow:

- Identify the primary key of **each** of the entity types Menu and Cook. (1 Mark)
- State the primary key of an entity type which has a composite primary key. (2 Marks)
- Identify the names of **any** foreign-key(s) in the entity type Dish (2 Marks)
- In the context of databases, explain why the choice for the primary key of the entity type Menu is **appropriate** while that of the entity type Cook is **inappropriate**. (2 Marks)

- v. Justify why the attribute **age** of entity type cook is inappropriate for the database functionalities suggesting a suitable change to the attribute to make it appropriate. (3 Marks)
- c. With reference to the **figure above**, write SQL statements to accomplish each of the following tasks:
- Display the name, age and country of the cook whose dishes have the wine by the name old vintage. (2 Marks)
 - Display the name and the price of the most expensive ingredient (2 Marks)
 - Display the name of all the dishes with at least 2000 calories in a field/column named **highCaloryDishes** and the name and country of the cook who prepared the dish. (2 Marks)
 - Add a new record to the table **wine**. (2 Marks)
 - Remove and discard the entire record you added to table **Wine** in (iv) above. (2 Marks)
 - Display the following information about all the cooks: name, country, current salaries, **and** new salaries, given that the new salaries are a 12% increase to their current salaries and should be displayed in a field/column named **reviewedSalary**. (3 Marks)
 - Create the table **Dish** reinforcing the necessary constraints. (4 Marks)

QUESTION TWO – 20 MARKS

- Highlight five problems associated with traditional file processing systems. (5 Marks)
- With the aid of a diagram, **describe** the 3-schema architecture of a DBMS. (5 Marks)
- Determine giving a reasons about the database constraint to be violated when each of the stated changes are effected to the library database tables shown below:

BORROWER_TBL		
CardNo	Name	PhoneNo
B97022	Towet Salome	03-5123456
B97145	Katuku Purity	0912-123456
B97262	Lucy Gocho	0928-342512

BOOK_TBL	
BookID	Title
123688	Java Programming
111332	Database Design
168168	UNIX

BK_LOAN_TBL			
CardNo	BookID	DateOut	DueDate
B97022	123688	2012-06-06	2012-07-06
B97145	111332	2012-05-28	2012-06-28
B97262	168168	2012-05-20	2012-06-20

- The record ('B97145', 'Wachu Mbai', '03-5168168') is added into the table borrower. (2 Marks)
- The row ('B97145', 'Katuku Purity', '0912-123456') is remove from the table borrower. (2 Marks)
- The book ID of "Java Programming" in the table book is changed from '123688' to '123123' (2 Marks)
- The card No. In the table borrower is changed from 'B97262' to 'Java Fundamentals'.

(2 Marks)

QUESTION THREE – 20 MARKS

- a. In the context of databases explain the following terms. (4 Marks)
- i. Query
 - ii. Repository
- b. i. Draw a diagram to depict how the basic components of a DBMS environment are harmonized into a homogeneous system. (3 Marks)
- ii. Explain the following DBMS components depicted in (i) above (4 Marks)
- c. State the function of each of the field properties labelled A to E in the figure below: (5 Marks)

- d. Distinguish between the roles of a data administrator and database administrator. (4 Marks)

QUESTION FOUR – 20 MARKS

- a. i. Highlight four problems associated with traditional file processing systems. (2 Marks)
- ii. Explain how the database approach overcomes three of the problems you listed in (i) above. (6 Marks)
- b. The figure below shows one of the Ms Access QBE windows. State the function of each of the elements labelled **A** to **F**. (6 Marks)

- c. i. In the context of databases, explain the term ‘**computed field**’ (2 Marks)
- ii. With reference to the figure in (b) above, describe how you would specify a computed field named **reviewedCredit** whose content will be **5 more** than the content of the field **credits** in the under-laying database table. (2 Marks)
- iii. After the inclusion of the computed field in (ii) above, the dialog box shown below appeared upon execution of the query. Identify the cause of this, stating how it can be overcome. (2 Marks)

QUESTION FIVE – 20 MARKS

- a. Explain the following database design concept. (6 Marks)
- i. Normalization
 - ii. Functional dependency
 - iii. Transitive dependency
 - iv. Partial functional dependency
- b. Illustrate the normalization process by normalizing the following table up to the third normal form. (8 Marks)

SRegNO	Supervisor	Supv-Room	Group1	Group2	Group3
ICS 1022	Njeri	R412	G101-07	F143-01	G159-02
ICS 4123	Sammy	R216	G201-01	G211-02	G214-01
ICS 2123	Nkatha	R148	F202-03	G201-02	G204-06

- c. The following diagram shows relationship instances between occurrences of entity types A, B and C

Construct an E-R diagram that gives the degree and cardinality of these relationships. (4 Marks)