



Kasarani Campus  
Off Thika Road  
Tel. 2042692 / 3  
P. O. Box 49274, 00100  
NAIROBI  
Westlands Campus  
Pamstech House  
Woodvale Grove  
Tel. 4442212  
Fax: 4444175

**KIRIRI WOMENS' UNIVERSITY OF SCIENCE AND TECHNOLOGY  
UNIVERSITY EXAMINATION, 2017/2018 ACADEMIC YEAR  
DIPLOMA IN BUSINESS INFORMATION TECHNOLOGY**

**DBT 026 - DATABASE MANAGEMENT SYSTEM**

Date:

Time:

**INSTRUCTIONS TO CANDIDATES**

**ANSWER QUESTION ONE (COMPULSORY) AND ANY OTHER TWO QUESTIONS**

**QUESTION ONE (30 MARKS)**

1. Define with an example the word database (2 Marks)
2. Give four purposes of database management systems (4 Marks)
3. Giving examples defines the following terms:
  - i. Entity
  - ii. Attributes
  - iii. Relationships (3 Marks)
4. Explain what a data model is and give two main examples of data models (3Marks)
5. Giving examples, state and explain the three commands used in data manipulation language in SQL. (3 Marks)
6. Identify the three main causes of database integrity problems (3 Marks)
7. Differentiate between data and information (8 Marks)
8. Draw an ER diagram that represents a database of a customer purchasing a product online. (4 Marks)

## **QUESTION TWO (20 MARKS)**

Discuss 1NF, 2NF, 3NF and BCNF with an example and state the normal forms.

(20 Marks)

## **QUESTION THREE (20 MARKS)**

The academic world is an interesting example of international cooperation and exchange. This problem is concerned with modeling of a database that contains information on researchers, academic institutions, and collaborations among researchers. A researcher can either be employed as a professor or a lab assistant. There are three kinds of professors: Assistant, associate, and full professors. The following should be stored:

- For each researcher, his/her name, year of birth, and current position (if any).
  - For each institution, its name, country, and inauguration year.
  - For each institution, the names of its schools (e.g. School of Law, School of Business, School of Computer Science, . . .). A school belongs to exactly one institution.
  - An employment history, including information on all employments (start and end date, position, and what school).
  - Information about co-authorships, i.e., which researchers have co-authored a research paper. The titles of common research papers should also be stored.
  - For each researcher, information on his/her highest degree (BSc, MSc or PhD), including who was the main supervisor, and at what school.
  - For each professor, information on what research projects (title, start date, and end date) he/she is involved in, and the total amount of grant money for which he/she was the main applicant.
- a. Draw an E/R diagram for the data set described above. Make sure to indicate all cardinality constraints specified above. The E/R diagram should not contain redundant entity sets, relationships, or attributes. Also, use relationships whenever appropriate. If you need to make any assumptions, include them in your answer.

(10 Marks)

- b. Convert your E/R diagram from question a) into relations, and write SQL statements to create the relations. You may make any reasonable choice of data types. Remember to include any constraints that follow from the description of the data set or your E/R diagram, including primary key and foreign key constraints.

(10 Marks)

**QUESTION FOUR (20 MARKS)**

- a. With the help of a diagram illustrate and explain the three levels of abstraction in Database management system. (8 Marks)
- b. Using examples differentiate between generalization and specialization. (4 Marks)
- c. Explain the four main functions of a database management system. (8 Marks)

**QUESTION FIVE (20 MARKS)**

- a. List five ways of maintaining data integrity (5Marks)
- b. State and explain the five advantages of database management system. (10 Marks)
- c. Consider the following relations for a database that keep track of student enrolment in the course and books adopted for each course.

Student (Sna, Name, Major, Bdate)

Course (Course#, Cname, Dept)

Enrol(Sna, Course#, Quarter, grade)

Book adoption(Course#,Quarter, Book\_isbn)

TEXT(book-isbn, book-title, publisher, author).

State any assumption made.

(5 Marks)