



(Knowledge for Development)

**KIBABII UNIVERSITY
(KIBU)**

**UNIVERSITY EXAMINATIONS
2021 / 2022 ACADEMIC YEAR**

**END OF SEMESTER EXAMINATIONS
FIRST YEAR FIRST SEMESTER**

**FOR MASTER OF SCIENCE DEGREE IN
(COMPUTER SCIENCE)**

COURSE CODE: MIT 810

**COURSE TITLE: DATABASE MANAGEMENT
SYSTEM AND INFORMATION MODELLING**

DATE: 30/09/2022

TIME: 02.00 – 05.00 P.M

INSTRUCTIONS

ANSWER QUESTIONS ONE AND ANY OTHER TWO.

QUESTION ONE [20 MARKS]

- a. Differentiate between a database system and a database management system [2 Marks]
- b. Explain five components of database system environment [5 Marks]
- c. Discuss the concept behind data independence and explain its importance in a database environment [3 Marks]
- d. Describe the major integrity constraints that must be considered when developing a database. [4 Marks]
- e. Data quality is so important in a data warehouse environment. Explain. [2 marks]
- f. Mr. Smith (a business man) was withdrawing Ksh. 50,000.00 using an ATM. After keying in all the information and instructing the machine on the amount he needed to withdraw, the machine proceeded and prompted him to take his card and immediately the power went off and so the machine without him getting the money. Suppose the condition was to prevail for the next one week, what advice will you give to Smith concerning transactions [4 Marks]

QUESTION TWO [20 MARKS]

- a. Differentiate between object-based data model and record-based data model [4 Marks]
- b. Describe eight security measures intended to counter database security threats [8 Marks]
- c. Transaction management deals with the problem of always keeping the database in a consistent state. In doing so, a transaction must always maintain four properties. Describe the properties of a transaction. [8 Marks]

QUESTION THREE [20 MARKS]

- a. Provided below is an order form for goods. Normalize it to third normal form. [8 Marks]

Order Form			
Order Number: 22		Date: 22/05/2012	
Customer Number: 87			
Customer Name: Janet			
Customer Address: 200 Nakuru			
City : Nairobi			
Product No.	Description	Quantity	Unit Price
A007	Book	100	Kshs 1000.00
B003	Sugar	50	Kshs 150.00
C005	Salt	20	Kshs 100.00

- b. Distributed databases present advantages of distributed computing which consists of huge number of processing elements that may be heterogeneous. Describe Date's Twelve rules of distribution [12 Marks]

QUESTION FOUR [20 MARKS]

- a. Consider the CUSTOMER relation with the following attributes:

- CustomerId
- Name
- Address
- City
- Age

Write SQL statements to perform the following transactions;

- i) Create the relation [2 Marks]
- ii) Return details of all customers aged below 30 years who reside in Nairobi city [2 Marks]
- iii) Insert the data (5001, Mary, Box 56 Machakos, Machakos and 34 years) into the respective columns [2 Marks]

- iv) Amend the city data from 'Machakos' to 'Mombasa' for a Customer Id '5001' [2 Marks]
- v) Empty the CUSTOMER relation of all data [2 Marks]
- b. A data warehouse in an environment, not a product. Discuss. [2 marks]
- c. Extracting interesting knowledge from large amounts of data stored in data warehouse has proved to be beneficial to several organizations. describe four fields where data mining can be applied [8 marks]

QUESTION FIVE [20 MARKS]

- a. Explain the difference between a candidate key and the primary key for a given relation [2 Marks]
- b. The university wants to develop a database to manage the examinations. The database need to capture the following information: Student details including: Registration number, name, year of study, programme. Each student is identified by Registration number. Programme details including: programme Code, period the programme takes, amount of fee payable every semester. Each programme is identified by programme Code. Each programme has a collection of course units each student enrolled in need to take. Course details to be captured include: course code, course Title, number of credit hours and the programme in which the course belongs. Programmes are created by departments. Department details include: department Code, name and the Faculty in which the department belongs. Course units are classified in semesters. Semester details including: semester ID and semester name. Upon setting an exam, the following exam details are captured: Registration number, course Code, scores. You are hired do design the database for the university:
 - i. Identify all possible concepts that will form entities [6 marks]
 - ii. Using appropriate notation, design an Entity-Relationship diagram for the scenario, specifying the multiplicity for each relationship [12 marks]