



**KIBABII UNIVERSITY**

**UNIVERSITY EXAMINATIONS  
2020/2021 ACADEMIC YEAR**

**SPECIAL/SUPPLEMENTARY EXAMINATION  
YEAR TWO SEMESTER TWO EXAMINATIONS**

**FOR THE DEGREE IN  
INFORMATION TECHNOLOGY**

**COURSE CODE : BIT 227  
COURSE TITLE : DATABASE SYSTEM DESIGN  
AND DEVELOPMENT**

**DATE: 12/01/2022**

**TIME: 11.00 A.M. – 1.00 P.M.**

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**INSTRUCTIONS TO CANDIDATES**

**ANSWER QUESTIONS ONE AND ANY OTHER TWO.**

### QUESTION ONE (30 MARKS)

- a) Differentiate conceptual database model and physical Model. (4 marks)
- b) Differentiate entity integrity and referential integrity explaining how each is enforced in a relational database management system. (4 marks)
- c) Silas would like to create a database system. Explain three stages in the database design development where the ER diagram will be the most appropriate [ 6 Marks]
- d) Explain the importance of normalization. (3 marks)
- e) Differentiate between a primary key and a candidate key. [2 marks]
- f) Distinguish between active data dictionary and passive data dictionary as used in databases (2 Marks)
- g) Explain 3 problems of a file system that led to development of relational database management system. (3 marks)
- h) Your project supervisor has noted that your database has data redundancy. Outline three problems that this may cause [6 Marks]

### QUESTION TWO (20 MARKS)

- a) A customer can make many payments, but each payment is made by only one customer. A customer can make many orders and can be served by different salespersons. Salespersons are attached to a specific region.
  - i) Use the above business rules to design an entity relation model indicating probable attributes for each entity and relationship between entities. (4 marks)
  - ii) Use SQL statement to implement the ERD in question 4 ii) above. (4 marks)
- b) Easy coach is a bus company that offers transport services to the public. The company has decided to keep a database record of the employees. The database contains a table employee with the following details of employees: name, Date\_of\_birth, IDno and area\_of\_residence. Write SQL expression to.
  - (i) Create the above table and include a primary key. (2 marks)
  - (ii) Insert the following details into the table employee.name=John Smith, Date\_of\_birth=22/7/1977, IDno=202584, area of residence=Kaithe. (2 marks)

- (iii) Change the change area of residence from "Kaithe" to "Nchiru" (2 marks)
- (iv) Insert a column called address. (1 mark)
- (v) Write an expression that would extract only those employees whose name start with letter "J". (1 mark)
- c) Outline characteristics of a well-designed database [4 Marks]

### QUESTION THREE (20 MARKS)

- a) An organization wish to computerize its payroll system. During analysis of the current system the following set of data were captured to be used in database design:  
EMP\_CODE, EMP\_LNAME, EMP\_EDUCATION, JOB\_CLASS, EMP\_DEPENDENTS,  
DEPT\_CODE, DEPT\_NAME, DEPT\_MANAGER, EMP\_TITLE, EMP\_DOB,  
EMP\_HIRE\_DATE, EMP\_TRAINING, EMP\_BASE\_SALARY, and  
EMP\_COMMISSION\_RATE.  
Normalize the above data to 3<sup>rd</sup> Normal form indicating the objective of each normal form. (9 marks)
- b) Write SQL statements to perform the following.
  - (i) Delete table "Student"? (2 marks)
  - (ii) Insert "GJU" as the "FName" in the "University" table? (2 marks)
  - (iii) How can you delete a record from table "student" where "RollNo"=GJU501? (2 marks)
- c) Explain the use of Grant and Revoke SQL Commands? (2 marks)
- d) Explain the purpose of indexes as used in database management system. (3 marks)

### QUESTION FOUR (20 MARKS)

Consider the following relation schema:

employee(employee-name, street, city)

works(employee-name, company-name, salary)

company(company-name, city)

manages(employee-name, manager-name)

- a) Give an expression in SQL for each of the following queries:
- b) a) Find the names, street address, and cities of residence for all employees who work for 'First Bank Corporation' and earn more than kshs10,000. (3 marks)
- c) b) Find the names of all employees in the database who live in the same cities and on the same streets as do their managers. (4 marks)
- d) c) Find the names of all employees in the database who live in the same cities as the companies for which they work. (3 marks)
- d) Find the names of all employees in the database who do not work for 'First Bank Corporation'. Assume that all people work for exactly one company. (3 marks)
- e) Find the names of all employees in the database who earn more than every employee of 'Small Bank Corporation'. Assume that all people work for at most one company. (4 marks)
- f) Assume that the companies may be located in several cities. Find all companies located in every city in which 'Small Bank Corporation' is located. (3 marks)

### QUESTION FIVE (20 MARKS)

- a) Using MySQL, demonstrate how you will implement the following tables. Give appropriate names to the tables: (8 marks)

EMP_CODE	EMP_LNAME	JOB_CODE
14	Rudell	2
15	McDade	1
16	Ruellardo	1
17	Smith	3
20	Smith	2

PLAN_CODE	PLAN_DESCRIPTION
1	Term life
2	Stock purchase
3	Long-term disability
4	Dental

EMP_CODE	PLAN_CODE
15	2
15	3
16	1
17	1
17	3
17	4
20	3

JOB_CODE	JOB_DESCRIPTION
1	Clerical
2	Technical
3	Managerial

- i. Study the tables below and answer the questions that follow:

Lecturer Table

LecturerID	Name	Department	Gender	Date of Birth	Salary Band
T005	John Williams	ICT	Male	07/07/1960	A
T101	Andrew Mathews	SC	Male	02/08/1968	A
T411	Nancy Johson	SC	Female	12/12/1975	B
T001	Rozey Robinson	IT	Female	19/09/1970	B

Unit table

UnitNo	Title	LecturerID
UN002	Java Programming	T005
UN005	Multimedia	T001
UN011	Website design	T001
UN007	Introduction to Chemistry	T411

Departmental table

Departmental Code	Name
ICT	Information, communication & Technology
ML	Modern Language
SC	Sciences

- i. Draw an Entity-Relationship Diagram (ERD) for the three logical tables above. [3 Marks]
- ii. Using the above logical tables, write the following SQL statement:
- CREATE TABLE statement for the Lecturer table. [2 Marks]
  - List the names of Lecturers in alphabetical order and their department names. [2 Marks]
  - List the Unit titles and Lecturer names by department name. [3Marks]
- iii. Explain why the word ' DISTINCT ' may be included in an SQL statement, such as SELECT DISTINCT Name. [2 Marks]