



MERU UNIVERSITY OF SCIENCE AND TECHNOLOGY

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UNIVERSITY EXAMINATIONS 2023/2024

FIRST YEAR, SECOND SEMESTER EXAMINATION FOR BACHELOR OF BUSINESS
INFORMATION TECHNOLOGY, BACHELOR OF INFORMATION TECHNOLOGY
AND BACHELOR OF INFORMATION SCIENCE

AND

SECOND YEAR, SECOND SEMESTER EXAMINATION FOR BACHELOR OF
SCIENCE IN ACTUARIAL SCIENCE

CIT 3201: DATA BASE SYSTEMS

DATE: APRIL 2024

TIME: 2 HOURS

INSTRUCTIONS: Answer Question ONE and any other TWO questions.

QUESTION ONE (30 MARKS)

- a) Define each of the following terms as used in database design (4 Marks)
- Normalization
 - Composite key
- b) Outline five elements that constitute a database management system. (5 Marks)
- c) With the aid of an example in each case, discuss any three data definition language commands (6 Marks)
- d) In an organization there are mentors assigned to employees. A mentor may be assigned to several employees; while an employee may be assigned to none, one, or more than one mentor. An employee can be identified with the following; employeeeno, name, age, and gender; while the mentor can be identified with the mentorno, mentor name, and specialty. Represent this information in an ER diagram. (6 Marks)
- e) Using an example explain the use of the *revoke* SQL command. (2 Marks)
- f) Distinguish between logical and physical database design. (4 Marks)

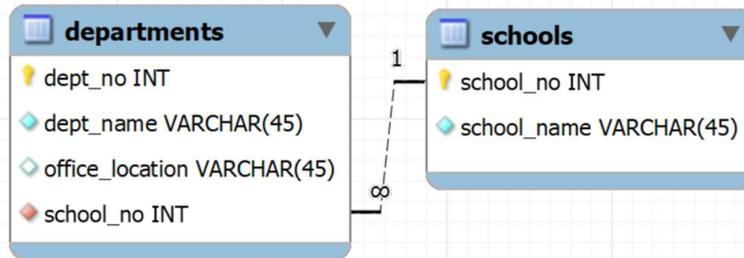


g) State any three elements of a relation

(3 Marks)

QUESTION TWO (20 MARKS)

a) The following an extract of an ERD of a university database. Use it to answer the questions that follow



Write an SQL statement to perform each of the following:

- i. Rename the field named *dept_no* to *dept_id* (2 Marks)
- ii. Remove the field named *office_location* from the department table (2 Marks)
- iii. Add a field named *email* to the departments table (2 Marks)
- iv. Remove the table *departments* from the database (2 Marks)
- v. Identify the three types of integrity constraints that have used in this ERD segment.

(6 Marks)

b) With the aid of a diagram, distinguish between the hierarchical and the network database models

(6 Marks)

QUESTION THREE (20 MARKS)

a) The following SQL command was used in preparation of a report. Interpret the SQL statement.

(4 Marks)

```

SELECT programid, COUNT(*)
FROM students
GROUP BY programid
WHERE yearofstudy=1;
    
```

b) The information below is an extract of a database table named *employees*.

EmpNo.	EmpName	Salary	Grade
E234567	Catherine	10000	A
E234568	Agnes	15000	A
E234569	Alex	25000	D
E234570	Peter	25000	D
E234571	Ted	30000	C
E234573	Esther	75000	A

Write SQL statements to:

- i. Display the salary of all employees whose Grade is D (2 Marks)
- ii. Change Alex’s salary to 30000 (2 Marks)



- iii. Display all employees with grade A and salaries ranging between 10,000 and 15,000. B (3 Marks)
- iv. Display the minimum and maximum salary (3 Marks)
- c) Explain the three types of anomalies that may be experienced when working with database tables that are not normalized (6 Marks)

QUESTION FOUR (20 MARKS)

- a) The table below represents information on different devices that were issued to employees in a certain company. Normalize the table to the 3NF. (8 Marks)

empID	empName	deptID	deptName	empDevices	dateIssued
681	P. White	23	Finance	DEV123	2024-01-01
315	R. Press	115	Security	DEV105	2024-02-09
113	P. Smith	23	Finance	DEV109	2024-01-26
681	P.White	23	Finance	DEV251	2024-02-05

- b) Discuss the following terms as used in database security. (4 Marks)
 - i. Authorization
 - ii. Authentication
- c) Discuss any four functions of a database management systems (DBMS) (8 Marks)

QUESTION FIVE (20 MARKS)

- a) Study the narrative below and use it to answer the questions that follow:

In a motor vehicle insurance company, customers are identified by the ID number, name, and phone number. The customer can own one or more vehicles, each of which, an insurance cover (policy) is purchased from the insurance company. The particulars of the policy are policy number, vehicle registration number, commencement date, and expiry date. Each vehicle may be associated with one or more accidents. A car is identified using the registration number, model, market value, and capacity.

Represent the information in an ER diagram (10 Marks)
- b) Distinguish between physical and logical data independence as used in database design (4 Marks)
- c) Explain the meaning of each of the following terms as used in ER modelling
 - i. Domain (2 Marks)
 - ii. Attribute (2 Marks)
 - iii. Entity (2 Marks)

