



TECHNICAL UNIVERSITY OF MOMBASA

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INSTITUTE OF COMPUTING AND INFORMATICS

DEPARTMENT OF COMPUTER SCIENCE & INFORMATION  
TECHNOLOGY

UNIVERSITY EXAMINATION FOR:

BSCSC/SEP2023/FT AND BMCS/SEP2023/J/FT

CCI 4201: DATABASE SYSTEMS

END OF SEMESTER EXAMINATION

**SERIES: DEC 2024**

**TIME: 2 HOURS**

**DATE: Pick Date Dec 2024**

**Instructions to Candidates**

You should have the following for this examination

*-Answer Booklet, examination pass and student ID*

This paper consists of **FIVE** questions. Attempt question ONE (Compulsory) and any other TWO questions.

**Do not write on the question paper.**

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**QUESTIONS**

### Question one

a) Explain the following terms;

- i. Database (1 mark)
- ii. SQL (1 mark)
- iii. Relational database (1 mark)

b) Compare and contrast;

- i. Primary key and foreign key (2 marks)
- ii. DDL and DML (2 marks)

c) Why would you advise a client to use DBMS as opposed to a file based system in his/her premises (4 marks)

d) Discuss the three levels of data abstraction (6 marks)

- e) i. What is meant by degree of relationship? (1 mark)
- ii. Explain the different degrees of relationship (6 marks)

f) Differentiate between

- i. A relation and a relationship (2 marks)
- ii. Entity type and an instance of an entity (2 marks)
- iii. Weak and strong entity (2 marks)

### Question two

- a) What is concurrency control as used in Database Management Systems? [2 Marks]
- b) Differentiate between tuple and degree as used in databases. [2 Marks]
- c) Define the term design methodology as used in database and explain the main phases of the database design process. [6 Marks]
- d) Explain THREE main demerits of views in databases. [3 Marks]
- e) A student table stores date of birth of each student in a column birth as a date. Write a query that will return the age in years of all students. [4 Marks]
- f) Write the code for a stored procedure that receives radius of a circle as a double in a variable r and calculates the area of a circle and insert it in a column area in the table Circle. [3 Marks]

### Question Three (20MARKS)

- a) Describe the goals of database systems (6 marks)

b) With the aid of an appropriate illustration briefly describe the three level database architecture (6 marks)

c) Integrity checks on data items can be divided into 4 groups state and briefly describe each (8 marks)

#### Question Four

- a) Explain what is meant by Data modeling (2 marks)
- b) Discuss the different types of data independence (6 marks)
- c) Database security is increasingly becoming important in almost every enterprise. TUM University ICT manager has requested your advice on several issues on how to make the ERP database more secure. More specifically, he wants you to advice on what counter measures he should employ to counter security threats.
  - i. What is a security threat? (1 mark)
  - ii. Discuss the factors that he should consider to determine the counter measures to employ (4 marks)
  - iii. What is a view? (1 mark)
  - iv. Explain how views could be used to provide security in a database (4 marks)
  - v. Discuss how entity integrity constraints contribute to database security (2 marks)

#### QUESTION FIVE

- a) Many firms are installing databases systems. Explain two challenges that these firms are likely experiencing in this endeavor. (4 marks)
- b) Transactions Management deals with the problem of always keeping the database in a consistent state even when concurrent accesses and failures occur.
  - i) Define a transaction. (2 marks)
  - ii) With respect to database transaction management explain the following terms; I. Atomicity. II. Consistency. III. Isolation. IV. Durability. (8 marks)
  - iii) Consider the following relations for a database that keeps track of student enrollment in courses and the books adopted for each course.  
STUDENT (Ssn, Name, Major, Bdate) COURSE (Course#, Cname, Dept)  
ENROLL (Ssn, Course#, Quarter, Grade) BOOK\_ADOPTION (Course#, Quarter, Book\_isbn) TEXT (Book\_isbn, Book\_title, Publisher, Author)

Specify the foreign keys for this schema, stating any assumptions you make. (6 marks)