GRETSA UNIVERSITY - THIKA

UNIVERSITY EXAMINATIONS

JANUARY – APRIL 2026 SEMESTER

BACHELOR OF COMPUTER SCIENCE

COURSE CODE: BSCS 107

COURSE TITLE: DATABASE SYSTEMS

DATE: 07 APRIL 2026 **TIME: 2 HOURS**

INSTRUCTIONS TO CANDIDATES

1. SECTION A IS **COMPULSORY.**
2. SECTION B: ANSWER ANY OTHER **TWO** QUESTIONS.
3. **DO NOT** WRITE ANYTHING ON THIS QUESTION PAPER AS IT WILL BE AN EXAM IRREGULARITY.
4. ALL ROUGH WORK SHOULD BE AT THE BACK OF YOUR ANSWER BOOKLET AND CROSSED OUT.

CAUTION: *All exam rooms are under CCTV surveillance during the examination period.*

SECTION A: COMPULSORY

Question One

a) Clearly distinguish between a file-based system and a Database Management System (DBMS) Highlight four limitations of file-based systems. **[5 Marks]**

b) Define the following terms as used in database design **[5 Marks]**

- **i.** Entity
- **ii.** Attribute
- **iii.** Relationship
- **iv.** Primary Key
- **v.** Foreign Key

c) Explain the concept of data independence. Differentiate between: **[5 Marks]**

- **i.** Logical data independence
- **ii.** Physical data independence

d) Describe the three-tier DBMS architecture using a well-labeled diagram. **[5 Marks]**

e) Explain the purpose of database normalization and its role in improving database design. **[5 Marks]**

f) What is an Entity-Relationship (ER) diagram? Explain how it supports the database design process **[5 Marks]**

SECTION B: ANSWER ANY THREE QUESTIONS

Question Two

a) Using a University Course Registration System, design an ER diagram that includes at least four entities and clearly shows their relationships and primary keys **[8 Marks]**

b) Explain how an ER diagram is transformed into a relational schema **[6 Marks]**

c) Describe integrity constraints in relational databases and provide relevant examples **[6 Marks]**

Question three

a) Discuss the different categories of database users in a database environment and describe their roles. **[4 Marks]**

b) Explain the stages involved in the database development lifecycle**.** **[6 Marks]**

c) Identify three different types of database systems and describe their characteristics. Provide one example for each type **[6 Marks]**

d) Highlight four benefits of using a DBMS instead of traditional file processing systems. **[4 Marks]**

Question Four

a) Write SQL statements to perform the following tasks:

b) **i**. Define a table called Students with the attributes: StudentID, Name, Age, and Course. **[4 Marks]**

ii. Add one record into the Students table. **[4 Marks]**

iii. Display all students who are registered in the "Computer Science" course. **[2 Marks]**

c) Distinguish between INNER JOIN and OUTER JOIN. Support your explanation with one SQL example for each **[6 Marks]**

d) What are SQL aggregate functions? Describe at least three and explain how they are used. **[4 Marks]**

Question five

a) Define the term functional dependency and give one example **[4 Marks]**

b) Consider the table below showing employee project assignments:

EmpID	EmpName	Project	ProjectManager	ManagerPhone
E01	James	Payroll System	Mr. Otieno	0712345678
E02	Mary	Payroll System	Mr. Otieno	0712345678
E03	Brian	Inventory System	Ms. Amina	0723456789

i. Identify the functional dependencies in the table. **[4 Marks]**

ii. Normalize the table up to Third Normal Form (3NF). Clearly show the resulting relations. **[8 Marks]**

c) Explain two benefits of normalization in relational database design. **[4 Marks]**