UGANDA INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY
END OF SEMESTER TWO EXAMINATIONS
ACADEMIC YEAR 2025/2026

PROGRAMME(S): DIPLOMA IN BUSINESS COMPUTING (DBC)

YEAR OF STUDY: ONE SEMESTER TWO

COURSE: DATABASE SYSTEMS

COURSE CODE : CSC1204

DATE: SUNDAY 28TH, JUNE 2026

TIME: 9:00 AM – 12:00 PM

DURATION: 3 HOURS

VENUE: RM 3.2, RM 3.3

INSTRUCTIONS:

1. Answer ALL questions in Section A.
2. Answer ANY THREE questions in Section B.
3. Section A carries 40 Marks.
4. Section B carries 60 Marks.

SECTION A: MULTIPLE CHOICE QUESTIONS (40 MARKS)

Question 1

Abenaitwe Martin is designing a system to store student records that can be accessed by multiple departments simultaneously. Which property of database systems makes this possible?

A. Data atomicity
B. Data sharing
C. Data normalization
D. Data encryption

Question 2

The school's old file-based system stores a student's address in three separate files. **Acom Esther** notices that when the address changes, only one file gets updated. This problem is best classified as:

A. A referential integrity violation
B. Data inconsistency caused by redundancy
C. A partial dependency in 2NF
D. An insertion anomaly in 3NF

Question 3

According to the ANSI/SPARC three-schema architecture, **Nakacwa Sheila** logs into the hospital system and sees only patient appointment slots, while diagnosis records and billing data in the same database remain hidden from her. Which schema level defines this customised, restricted view?

A. Internal level
B. Conceptual level
C. External (View) level
D. Physical level

Question 4

Akampa Vicent observes that the Enrollment table has both StudentID and CourseID as identifiers, and neither alone uniquely identifies a row. What type of key is formed by combining both columns?

A. Candidate key
B. Foreign key
C. Composite key
D. Super key

Question 5

Akandinda Cathy discovers a row in the Enrollment table that references a StudentID which does not exist in the Students table. Which integrity rule has been violated?

A. Entity integrity
B. Domain integrity
C. Referential integrity
D. Atomicity

Question 6

Akatukunda Blessing reviews a Products table where the Category column contains 'Electronics, Computers, Gadgets' as multiple values within a single cell. Which normal form is violated?

A. 2NF — partial dependency exists
B. 3NF — transitive dependency exists
C. 1NF — atomicity is violated
D. BCNF — the key is not a superkey

Question 7

Akatusasira Bridget needs to add a PhoneNumber column to an already existing Students table in MySQL. Which SQL command should she use?

A. CREATE TABLE Students ADD PhoneNumber
B. INSERT INTO Students (PhoneNumber)
C. ALTER TABLE Students ADD PhoneNumber VARCHAR(15)
D. UPDATE TABLE Students SET PhoneNumber

Question 8

Akullo Bridget runs a query to retrieve all students from Gulu whose fees_payment_status is 'Pending'. Which SQL clause is used to filter these two conditions?

A. GROUP BY
B. HAVING
C. WHERE
D. ORDER BY

Question 9

In a table with composite key (order_id, product_id), **Turyamureeba Innocent** discovers that the customer's home_district depends only on order_id and not on the full composite key. This situation is known as:

A. Transitive dependency
B. Partial dependency
C. Functional dependency
D. Multivalued dependency

Question 10

Amanya Evaristo processes a bank transfer that successfully deducts from Account A, but the system crashes before crediting Account B. Which ACID property ensures the entire transaction is rolled back automatically?

A. Consistency
B. Durability
C. Isolation
D. Atomicity

Question 11

Anomugisha Andrew is evaluating an older database where data is organized in a tree-like structure with parent-child relationships, and each child can have only one parent. Which database model is this?

A. Relational model

B. Network model

C. Hierarchical model

D. Object-oriented model

Question 12

Anying Grace is designing a database for a bar and hangout where one bartender can mix many cocktails on the menu, but each cocktail is assigned to only one bartender responsible for it. What is the correct cardinality for this relationship?

A. M:N (Many-to-Many)
B. 1:1 (One-to-One)
C. 1:M (One-to-Many)
D. M:1 (Many-to-One)

Question 13

Namulindwa Hairat wants a query result showing each student's name alongside the courses they are enrolled in, drawing data from two separate tables. Which SQL operation is required?

A. UNION

B. SELECT with a nested subquery

C. JOIN

D. GROUP BY with COUNT

Question 14

Anxious Asingwire needs to find how many students are enrolled in each course. She already knows the answer requires counting. Which SQL clause groups the results by course name?

A. WHERE

B. ORDER BY

C. HAVING

D. GROUP BY

Question 15

Atto Angella finds that in the Employees table, the column home_state depends on state_code, and state_code depends on employee_id (the primary key). This chain violates which normal form?

A. 1NF

B. 2NF

C. 3NF

D. 4NF

Question 16

Atuhairwe Shinnah must create a database object that shows doctor schedules to receptionists without exposing patient personal information such as age or address. Which SQL statement achieves this?

A. CREATE INDEX

B. CREATE PROCEDURE

C. CREATE VIEW

D. CREATE TABLE

Question 17

Ayikoru Aisha is building a web-based student portal where the browser sends requests to a business logic server, which then communicates with a separate database server. This describes which architecture?

A. Single-tier architecture

B. 2-tier (client-server) architecture

C. 3-tier architecture

D. Peer-to-peer architecture

Question 18

Babirye Gorret observes that changing a book title in the library's flat-file system requires updating it in 50 different rows. If only 30 are updated, the database becomes inconsistent. This is called:

A. An insertion anomaly

B. An update anomaly caused by data redundancy

C. A deletion anomaly

D. A referential integrity violation

Question 19

Bariyo Jerome is told the DBMS data dictionary stores 'metadata'. In the context of a database system, what does metadata refer to?

A. Encrypted user passwords stored in the system

B. Backup copies of all database tables

C. Data about the structure of the database — column names, data types, and constraints

D. Transaction logs used for crash recovery

Question 20

Bukenya Brian needs to ensure that the Quantity column in an OrderDetails table never accepts a value of zero or below. Which SQL constraint is most appropriate?

A. NOT NULL

B. UNIQUE

C. DEFAULT

D. CHECK (Quantity > 0)

Question 21

Bukirwa Harriet needs to retrieve only the Name and Email columns from the Students table, discarding all other columns. Which relational algebra operator achieves this vertical subset?

A. SELECT (σ) — filters rows

B. JOIN (⋈) — combines tables

C. PROJECT (π) — selects specific columns

D. UNION (∪) — combines rows from two tables

Question 22

Bwire Valencia is designing a fraud detection system that primarily needs to traverse complex relationships between accounts, users, and transactions efficiently. Which NoSQL model is most appropriate?

A. Document-based (e.g., MongoDB)

B. Key-value (e.g., Redis)

C. Graph (e.g., Neo4j)

D. Columnar (e.g., Cassandra)

Question 23

Byanguwa Salimu is in a DDLC phase where the project scope, organizational structure, budget constraints, and system boundaries are being defined before any design begins. Which phase is this?

A. Logical design

B. Implementation and loading

C. Database initial study

D. Testing and evaluation

Question 24

Ggalabuzi Hussein creates an Enrollments table with StudentID and CourseID columns. What must be explicitly defined in the table's SQL CREATE statement to maintain referential integrity with the Students table?

A. A composite primary key on both columns

B. A UNIQUE index on StudentID

C. A FOREIGN KEY constraint referencing Students(StudentID)

D. A CHECK constraint on StudentID

Question 25

Isingoma John is at the conceptual design phase. He draws entities, their attributes, and their relationships without specifying data types, SQL syntax, or storage details. Which design tool is he using?

A. Physical schema diagram

B. Normalisation table (1NF to 3NF)

C. Entity-Relationship (ER) diagram

D. SQL DDL CREATE TABLE script

Question 26

Izule Bakir needs to find all students who are NOT enrolled in any course. Which SQL approach correctly identifies them from the Students and Enrollments tables?

A. SELECT * FROM Students WHERE StudentID = NULL

B. SELECT * FROM Students LEFT JOIN Enrollments WHERE CourseID IS NULL

C. SELECT * FROM Students WHERE StudentID NOT IN (SELECT StudentID FROM Enrollments)

D. SELECT * FROM Students GROUP BY StudentID HAVING COUNT(*) = 0

Question 27

Kaiga Kemisa creates a new database, defines a table structure, and then inserts student records. Which sequence of SQL command categories correctly reflects this complete workflow?

A. DML → DDL → DCL

B. DDL → DML → DQL

C. DQL → DDL → TCL

D. DCL → DML → DDL

Question 28

Kaiga Mariam's banking system successfully commits a deposit to an account. A power failure occurs five seconds later. When the system restarts, the deposit must still appear in the database. Which ACID property guarantees this?

A. Atomicity

B. Consistency

C. Isolation

D. Durability

Question 29

Kalyango Angelo is creating a Students table and needs to store each student's date of birth for age calculations. Which SQL data type is most appropriate for this column?

A. VARCHAR(30)

B. INT

C. DATE

D. BOOLEAN

Question 30

Kansemiire Evas, a DBA, needs to give a junior staff member read-only access to the Students table without allowing any modifications. Which SQL command achieves this?

A. COMMIT SELECT ON Students TO junior_staff

B. GRANT SELECT ON Students TO junior_staff

C. REVOKE ALL ON Students FROM junior_staff

D. CREATE ROLE junior_staff WITH SELECT

Question 31

Kasita Hamza notices that searching a library database for books by title performs a full table scan and is extremely slow. What physical design improvement should be applied to the BookTitle column?

A. Add more foreign keys to the Books table

B. Create an index on the BookTitle column

C. Apply 3NF normalization to the Books table

D. Create a SQL view that filters by BookTitle

Question 32

Khainaza Ritah is modelling a hospital system. PatientID, Name, and Age describe individual patients. In ER modelling terminology, what are PatientID, Name, and Age classified as?

A. Entities

B. Relationships

C. Attributes

D. Tuples

Question 33

Kirabo Jesca has a table Orders(OrderID, CustomerID, CustomerName, ProductID, Quantity) where CustomerName depends on CustomerID, which depends on OrderID. CustomerName does not directly depend on the primary key. This violates:

A. 1NF because CustomerName contains multiple values

B. 2NF because CustomerName partially depends on OrderID

C. 3NF because CustomerName transitively depends on OrderID via CustomerID

D. BCNF because OrderID is not a superkey of the relation

Question 34

Kirabo Ruth tries to insert a new student record into the Students table but leaves the StudentID field (the primary key) as NULL. The DBMS immediately rejects this operation. Which rule is being enforced?

A. Referential integrity

B. Domain integrity

C. Entity integrity

D. Relational integrity

Question 35

Kiringoba Patricia is told the Students table is a 'relation' in the relational model. In this context, what does each individual row in the Students table represent?

A. An attribute (column definition)

B. A schema (structural blueprint)

C. A tuple (a single record instance)

D. A foreign key relationship

Question 36

Kiiza Asaph compares NTFS (a file system) with MySQL (a DBMS) for managing student records. Which capability does MySQL provide that NTFS fundamentally lacks?

A. The ability to store files in a hierarchical directory structure

B. SQL querying, concurrent multi-user access, and referential integrity enforcement

C. Password protection for individual file documents

D. Faster read speeds for large binary media files

Question 37

Lunkuse Jawuharah is asked to create a reusable SQL routine that inserts a new property sale record and automatically updates the total sales figure for that property type. What database object should she create?

A. A SQL view

B. A database trigger

C. A stored procedure

D. A composite index

Question 38

Lusiba Solomon needs to understand how data in the university database is physically stored on disk, including file organisation, indexing strategies, and access paths. Which schema level addresses this?

A. External (View) schema

B. Conceptual schema

C. Internal (Physical) schema

D. Logical schema

Question 39

Masane Angella models a system where a student can take many courses and a course can have many students (M:N). How is this relationship correctly resolved in a relational database?

A. By adding a foreign key column to the Students table pointing to Courses

B. By duplicating course data into each student row

C. By creating a junction table (e.g., Enrollments) with foreign keys referencing both tables

D. By using a composite primary key solely within the Students table

Question 40

Mayiga Steven queries a real estate database and needs to retrieve only cities where the average property sale price exceeds 500,000,000 UGX. He has already used GROUP BY city. Which clause filters these aggregated group results?

A. WHERE AVG(price) > 500000000

B. GROUP BY city LIMIT

C. HAVING AVG(price) > 500000000

D. ORDER BY AVG(price) DESC

SECTION B

(ANSWER ANY 3 QUESTIONS)

Question One (20 marks)

The table below shows lab test results for **Angela Masane Medical Services**. Study the table and answer the questions that follow.

Table: LabTest Results

TestID	PatientID	PatientName	TestName	TechnicianName	Result
T001	P101	Alice Namukisa	Full Blood Count	John Ssemugabi	Normal
T002	P102	Brian Mpora	Urinalysis	Grace Anying	Not Applicable
T003	P101	Alice Namukisa	Liver Function Test	John Ssemugabi	
T004	P103	Doreen Natukunda	Malaria RDT	Faith Akullu	Negative
T005	P104	Prosper Muzito	Blood Glucose	Grace Anying	6.1 mmol/L
T006	P102	Brian Mpora	Full Blood Count	John Ssemugabi	Normal
T007	P105	Ritah Khainaza	HIV Screening	Denis Talyaka	
T008	P103	Doreen Natukunda	Kidney Function Test	Faith Akullu	Normal
T009	P106	Treasure Nasasira	Urinalysis	Grace Anying	Normal
T010	P104	Prosper Muzito	Malaria RDT	Denis Talyaka	Negative
T011	P107	Oscar Nahabwe	Thyroid Function	John Ssemugabi	

a) With an example, what do you understand by the term tuple in SQL? (2 marks)
b) Write the SQL DDL statement to create the LabTests table with appropriate data types for each column. Ensure to specify the primary key. (2 marks)
c) Modify the LabTests table to add a new column named TestDate of type DATE. Provide the SQL statement for this modification. (2 marks)
d) Write an SQL statement to insert a new record into the LabTests table for a patient named " Nakacwa Fazira" who has undergone a "Cholesterol Test" conducted by " Rwothomio Opio Moses" with a result of "Normal". (2 marks)
e) Write an SQL statement to update the result of the test with TestID T003 to "Normal". (2 marks)
f) Given the LabTests table structure, identify any potential issues related to data redundancy. Normalize the table to the 1st Normal Form (1NF) and provide the resulting tables. (5 marks)

g) Explain how a well-implemented database system can enhance the quality of patient care at a healthcare facility. Discuss specific ways in which it contributes to better health outcomes for patients (5 marks)

Question Two (20 marks)

A group of database students is discussing key concepts in their course.

a. Nakato Nuuru needs to distinguish between **DDL** and **DML**. What should she say? (2 marks)

b. Nakilya Viola is explaining **Data Integrity**. What is her definition? (2 marks)

c. Nakimuli Tracy will cover the **ACID properties** of transactions. What key points should she mention? (8 marks)

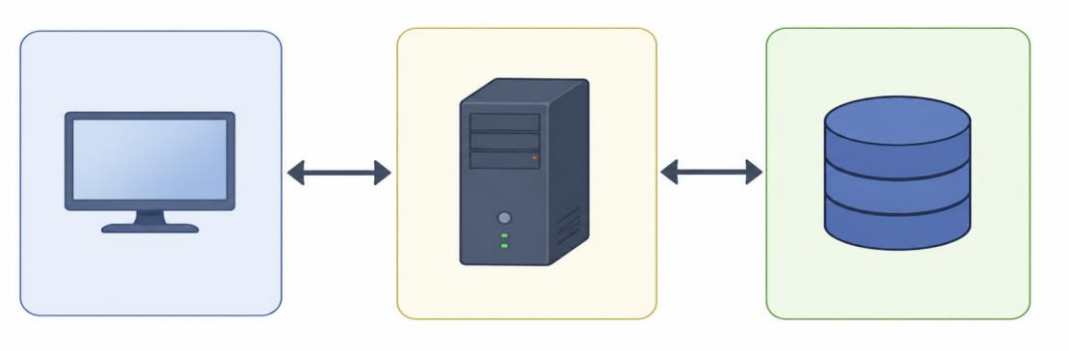
d. Nakiragga Catherine is discussing **Stored Procedures**. What should she define them as? (2 marks)

e. Namagogwe Daphine needs to explain **Indexing**. What is its purpose? (2 marks)

f. Namirimu Mercy will explain the **Entity-Relationship (ER) Model**. What key aspect should she focus on? (2 marks)

Question Three (20 marks)

a) Explain your understanding of this diagram in database system context: (8 marks)



b) Define what a transaction is in the context of databases and explain its importance in maintaining data integrity. (5 marks)
c) Define an Entity-Relationship Diagram (ERD) and explain its role in database development.

Question Four (20 marks)

Hope Mutoni is building a database for her primary school. She is considering the necessary steps in the Database Development Life Cycle (DDLC) and seeks advice from her colleague, Nasasira Treasure.

a. What counsel do you expect Treasure to give Hope regarding the key steps she should take in the DDLC to ensure a successful database implementation? (5 marks)

b. As Hope moves into the design phase, what specific actions should she take to create a proper database design? Consider aspects like data modeling and structure in your response. (5 marks)

c. Faith Namulondo joins the team as a Testing specialist. What actions do you expect Faith to undertake to ensure that the database functions correctly and meets the user requirements? (5 marks)

d. Senyonga Kelvin believes he is the best at database maintenance. What responsibilities and activities should he focus on to maintain the database effectively after it has been implemented? (5 marks)

Question Five (20 marks)

Nabukenya Irene has a task to develop a simple database for her retail business, Nabukenya Investments Ltd, using Microsoft SQL Server.

a. Write the SQL script that generates a database named NabInvestments. (1 marks)

b. Define the major tables in the database and provide the SQL scripts for each (4 marks)

c. Write an SQL script to capture records for the five most popular items that will be traded at the business. Provide the SQL script for this insertion. (4 marks)

d. Write an SQL script to create a Primary Key constraint on the you think is best for the primary key. (2 marks)

e. Write an SQL script to create a Foreign Key constraint that links the Customers to the items they order from the business (state your assumptions where applicable) (2 marks)

f. Write a simple SQL query to retrieve all products from the Products table where the price is greater than 100. (2 marks)

Note: Any evidence of creative thinking will not go unrewarded.

END

Good lucky to you all!