

UNIVERSITY OF FORT HARE

IFS215 & IFS215E

DATABASES – JUNE SUPPLEMENTARY EXAM

JUNE 2025

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Time: 3 Hours

Marks: 100

This paper consists of TEN (10) pages including the cover page

Internal Examiner

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Internal Moderator

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GENERAL INSTRUCTIONS TO CANDIDATES

1. This paper consists of **THREE (3) SECTIONS**.
 - a. Answer **ALL** questions in SECTION A on the **answer sheet (1)** provided.
 - b. Answer **ALL** question in SECTION B on the **answer sheet (2)** provided.
 - c. Answer **ALL** questions in SECTION C.
2. In Section C, Questions can be answered in any order but must be numbered correctly. Any answers you do not want marked must be clearly cancelled.
3. Time management is very important. The value of the mark for each question should be used as a rough guide to the amount of time allocated to answer the question. (100 marks in 180 minutes)
4. It is in the candidate's interest to write neatly.
5. At the end of the examination place all answer books and answer sheets inside the first answer book used.
6. Pencil may be used for the modelling questions.

SECTION A

[ANSWER **ALL** OF THE QUESTIONS IN THIS SECTION]

Question 1

[30 marks]

Multiple Choice Questions, select one correct answer for each question

1.1. What is the main purpose of a data model?

- A) To format data for printing
- B) To program logic
- C) To represent complex real-world data structures
- D) To create HTML pages

1.2. Which of the following is NOT a basic building block of data models?

- A) Entities
- B) Attributes
- C) Processes
- D) Relationships

1.3. What does a constraint in a database model do?

- A) Adds new entities
- B) Removes redundancy
- C) Enforces data integrity
- D) Deletes nulls

1.4. Which of the following is a valid one-to-many relationship?

- A) One student has one student number
- B) One lecturer teaches many students
- C) One student studies one subject
- D) One invoice has one payment

1.5. Business rules are used to:

- A) Develop HTML interfaces
- B) Enforce database engine compatibility
- C) Define data relationships and constraints
- D) Encrypt data

1.6. Business rules can be discovered by:

- A) Managers
- B) Policy makers
- C) End users
- D) All of the above

1.7. A relational model was introduced by:

- A) Bill Gates
- B) E. F. Codd
- C) Tim Berners-Lee
- D) Ada Lovelace

1.8. Which language is associated with querying relational models?

- A) Python
- B) HTML
- C) SQL
- D) C++

1.9. Which data abstraction level focuses on user views?

- A) Physical
- B) Internal
- C) Conceptual
- D) External

1.10. What is the primary role of the internal model?

- A) Maps business rules
- B) Describes physical storage
- C) Interfaces with the DBMS
- D) Creates external views

1.11. In system design, “things” in the problem domain are typically:

- A) Input forms
- B) Domain classes or entities
- C) Programming statements
- D) GUI components

1.12. The “noun technique” is used to:

- A) Identify relationships
- B) Identify database users
- C) Find domain classes
- D) Determine input types

1.13. Which of the following would most likely be a domain class?

- A) “Sale” in a retail system
- B) “Print”
- C) “Calculate”
- D) “Search”

1.14. Which question helps determine if a noun should be stored as an entity?

- A) Is it a verb?
- B) Is it used in the UI?
- C) Is it unique and worth storing?
- D) Is it an output format?

1.15. The brainstorming technique includes:

- A) Making diagrams
- B) Listing verbs
- C) Asking systematic questions
- D) Writing code

1.16. A term that is an input but not stored in the database should be:

- A) Included as a domain class
- B) Excluded
- C) Stored in memory
- D) Made into a table

1.17. What’s the primary difference between brainstorming and noun technique?

- A) Noun technique requires software
- B) Brainstorming focuses on attributes
- C) Brainstorming is user-driven; noun is text-based
- D) Noun is obsolete

1.18. The term “Customer” in a CRM system would typically be:

- A) An attribute
- B) An entity
- C) A report
- D) A relationship

1.19. If a user says “we ship products to customers,” the likely entities are:

- A) Products and Reports
- B) Customers and Tables
- C) Products and Customers
- D) Shipping and Files

1.20. The first step in the brainstorming technique is:

- A) Review previous designs
- B) Interview a user
- C) Code the system
- D) Design a UI

True/False Questions choose whether each statement is true or false

1.21 In an Entity Relationship Diagram (ERD), attributes are typically shown inside ovals.

1.22 A null set contains exactly one member that is the value zero.

1.23 A composite attribute is one that can be broken down into smaller parts, like an address.

1.24 A bridging entity is used to represent one-to-one relationships between entities.

1.25 Participation in a relationship is mandatory when its minimum cardinality is 1.

1.26 A weak entity can exist on its own, without being linked to any other entity.

1.27 The union of two disjoint sets will result in a null set.

1.28 If set $A = \{1, 2, 3, 4\}$ and set $B = \{3, 4, 5\}$, then $A \cap B = \{3, 4\}$.

1.29 A subset must always contain fewer elements than its parent set.

1.30 The complement of set A contains all elements from the universal set that are not in A.

SECTION B

[ANSWER ALL OF THE QUESTIONS IN THIS SECTION]

Question 2

[30 marks]

Multiple Choice Questions, select one correct answer for each question

2.1 Which SQL command is used to add new records to a table?

- a) INSERT
- b) UPDATE
- c) DELETE
- d) SELECT

2.2 What does SQL stand for?

- a) Structured Query Language
- b) Simple Query Language
- c) Standard Question Language
- d) Sequential Query Language

2.3 Which SQL operator returns only the rows that appear in both sets of two queries?

- a) UNION
- b) INTERSECT
- c) MINUS
- d) JOIN

2.4 What is the function of the MINUS operator in SQL?

- a) Combines rows and excludes duplicates
- b) Returns rows that appear in both queries
- c) Returns rows from the first query that do not appear in the second
- d) Joins two tables on a common attribute

2.5 What type of join returns all rows from the left table and matching rows from the right table, including unmatched rows from the left?

- a) INNER JOIN
- b) RIGHT OUTER JOIN
- c) FULL OUTER JOIN
- d) LEFT OUTER JOIN

2.6 What is a trigger in SQL?

- a) A stored procedure that runs on demand
- b) Procedural SQL code automatically invoked by the DBMS upon data manipulation events
- c) A cursor used to hold query results
- d) A function to manipulate data strings

2.7 What is the purpose of a cursor in procedural SQL?

- a) To store procedural code
- b) To hold data rows returned by an SQL query in memory
- c) To define triggers
- d) To create stored procedures

2.8 Which SQL join condition is used when no common attribute exists in both tables?

- a) NATURAL JOIN
- b) JOIN ON clause with a condition
- c) USING clause
- d) CROSS JOIN

2.9 Which SQL function category is used to insert, update, delete, and retrieve data?

- a) Data Definition Language (DDL)
- b) Data Manipulation Language (DML)
- c) Procedural SQL
- d) Embedded SQL

2.10 What does an outer join return that an inner join does not?

- a) Only matching rows
- b) Rows with unmatched attribute values from one or both tables
- c) Only rows with common values in all columns
- d) Rows from the first table only

2.11 How often is a row-level trigger executed?

- a) Once per statement
- b) Once per row affected by the statement
- c) Only when a table is created
- d) Only when a stored procedure is called

2.12 What is the main advantage of stored procedures?

- a) They increase network traffic
- b) They reduce network traffic and improve performance
- c) They replace SQL functions
- d) They are used only for data definition

2.13 Which SQL command is used to modify existing data in a table?

- a) SELECT
- b) INSERT
- c) UPDATE
- d) CREATE

2.14 Which SQL language category includes commands to create tables, indexes, and views?

- a) Data Manipulation Language (DML)
- b) Data Definition Language (DDL)
- c) Procedural SQL
- d) Embedded SQL

2.15 Which SQL operator requires that the relations be union-compatible (same attribute names and data types)?

- a) UNION
- b) JOIN
- c) INTERSECT
- d) Both UNION and INTERSECT

2.16 What does the ANSI standard specify for SQL?

- a) A proprietary language for each DBMS
- b) A standard SQL language for database queries
- c) Only data definition commands

d) Only data manipulation commands

2.17 What does SQL stand for?

- a) Structured Query Language
- b) Simple Query Language
- c) Standard Question Language
- d) Sequential Query Language

2.18 Which SQL operator excludes duplicate records when combining the results of two queries?

- a) UNION ALL
- b) UNION
- c) INTERSECT
- d) MINUS

2.19 Which SQL command is used to remove records from a table?

- a) DELETE
- b) DROP
- c) REMOVE
- d) ERASE

2.20 What does the UNION ALL operator do?

- a) Excludes duplicate rows
- b) Retains duplicate rows
- c) Returns only rows that appear in both queries
- d) Returns rows from the first query that do not appear in the second

True/False Questions choose whether each statement is true or false

2.21 SQL is a procedural programming language.

2.22 The SELECT * statement retrieves all columns from a table.

2.23 A primary key can contain duplicate values.

2.24 The DROP TABLE command deletes both the table and its data.

2.25 The WHERE clause is used to filter rows in a SELECT statement.

2.26 Views in SQL store data permanently in the database.

2.27 The UPDATE command is used to modify existing data in a table.

2.28 The COMMIT command discards all uncommitted changes.

2.29 JOIN operations are used to combine rows from two or more tables.

2.30 The HAVING clause is used to filter individual rows before aggregation.

SECTION C**[Total 40]****[ANSWER ALL QUESTIONS IN THIS SECTION]****Question 3****[10 marks]**

Database Management Systems (DBMS) offer significant benefits to organizations in handling data efficiently and securely. Describe five primary roles of a DBMS.

Question 4**[20 MARKS]**

- a. List and describe the five steps of the **Brainstorming Technique** for identifying Things (5)
- b. Why is normalisation important for database design? (4)
- c. Describe the difference between 1NF, 2NF and 3NF. (3)
- d. Describe the process/steps to convert a table to 1NF. (8)

Question 5**[10 marks]****Entity-Relationship Diagram (ERD) Scenario**

A music streaming service tracks its users, the playlists they create, and the songs they listen to.

- A user can create multiple playlists, and each playlist belongs to one user.
- A playlist can contain multiple songs, and a song can appear in multiple playlists.
- Each song is performed by one artist, but an artist can perform multiple songs.

Entities:

- **User** (UserID, Name, Email, SubscriptionType)
- **Playlist** (PlaylistID, Title, CreatedDate, UserID)
- **Song** (SongID, Title, Genre, Duration)
- **Artist** (ArtistID, Name, Country)
- **PlaylistSong** (PlaylistID, SongID, AddedDate)

Task:

Draw an ERD representing the structure of the music streaming service including relationships, primary keys (PK) and foreign keys (FK).

[END OF PAPER]

REMOVE ANSWER SHEET AND INSERT INTO ANSWER BOOK
IFS215/E Answer Sheet 1

Student Number: _____

Name: _____

Multiple Choice Questions:

Place an X in the square corresponding to the answer to the question

Question	A	B	C	D
1.1				
1.2				
1.3				
1.4				
1.5				
1.6				
1.7				
1.8				
1.9				
1.10				

Question	A	B	C	D
1.11				
1.12				
1.13				
1.14				
1.15				
1.16				
1.17				
1.18				
1.19				
1.20				

True/False Questions:

Place an X in the square corresponding to the answer to the question

Question	True	False
1.21		
1.22		
1.23		
1.24		
1.25		
1.26		
1.27		
1.28		
1.29		
1.30		

REMOVE ANSWER SHEET AND INSERT INTO ANSWER BOOK

IFS215/E Answer Sheet 2

Student Number: _____

Name: _____

Multiple Choice Questions:

Place an X in the square corresponding to the answer to the question

Question	A	B	C	D
2.1				
2.2				
2.3				
2.4				
2.5				
2.6				
2.7				
2.8				
2.9				
2.10				

Question	A	B	C	D
2.11				
2.12				
2.13				
2.14				
2.15				
2.16				
2.17				
2.18				
2.19				
2.20				

True/False Questions:

Place an X in the square corresponding to the answer to the question

Question	True	False
2.21		
2.22		
2.23		
2.24		
2.25		
2.26		
2.27		
2.28		
2.29		
2.30		