



REFORMED CHURCH UNIVERSITY

FACULTY OF EDUCATION AND SOCIAL SCIENCES

**BACHELOR OF SCIENCE HONOURS DEGREE IN INFORMATION
TECHNOLOGY**

Database Management Systems

HICT 404

Part 4 Semester 1 Examination

Total Marks [100]

Date: October 2024

Time: 3 Hours

INSTRUCTIONS

1. This paper has *six (6)* questions
2. Answer any *four (4)* questions
3. Each question carries *25 marks*
4. Start each question on a new page

1. (a) Compare DBMS and early file systems, bringing out the major advantages of the database approach. (8 Marks)
- (b) With a neat block diagram, explain the architecture of a typical DBMS. (7 Marks)
- (c) What are the responsibilities of the DBA and the database designers? (10 Marks)
2. Using any database platform of your choice analyse any security measures you would implement to secure your database. (25 marks)
3. Briefly explain how the following are used in databases, clearly showing the importance of each
 - i. Entity (5 marks)
 - ii. Attributes (5 marks)
 - iii. Relationships (5 marks)
 - iv. Queries (5 marks)
 - v. Aggregation (5 marks) (25 marks)
4. (a) Define the following terms:
 - i. Data model
 - ii. Schema
 - iii. Instance
 - iv. Canned Transaction
 - v. Drop (10 Marks)
- (b) Draw an ER diagram to represent the Election Information System based on the following description:
 In the Zimbabwean national election, a state is divided into a number of constituencies depending upon the population of the state. Several candidates contest elections in the constituency. Candidates may be from some party or independent. The election information system must record the number of votes obtained by each candidate. The system also maintains the voter and a voter normally belongs to a particular constituency. Note that the party details must be taken care in the design. (15 Marks)
5. (a) Define the following terms as they are used in databases:
 - i. Key

- ii. Super Key
- iii. Candidate Key
- iv. Primary Key
- v. Foreign Key (10Marks)

(b) Enumerate the steps involved in converting the ER constructs to corresponding relational tables. (8 Marks)

(c) Considering the schema

Sailors (sid , sname , rating , age)

Boats (bid , bname , color)

Reserves (sid , bid , day)

Write relational algebraic queries for the following:

- i) Find names of sailors who have reserved boat# 103.(1 Marks)
- ii) Find names of sailors who have reserved a red boat.(2 Marks)
- iii) Find names of sailors who have reserved a red or green boat.(2 Marks).
- iv) Find names of sailors who have reserved all boats. .(2 Marks)

4. (a) Explain with examples, the basic constraints that can be specified when a database table is created in SQL

(b) Write SQL queries for the following relational schema :

CUSTOMER (CID, CNAME, EMAIL, ADDR, PHONE) ITEM

(ITEM NO, LITEM_NAME, PRICE, BRAND)

SALES (CFD, ITEM NO , # ITEMS , AMOUNT .

SALE_DATE)

SUPPLIER (SID, SNAME, SPHONE, SADDR)

SUPPLY (SID, ITEM NO, SUPPLY_DATE, QTY)

- i. List the items purchased by customer 'Prasanth'. (3 marks)
- ii. Retrieve items supplied by all suppliers starting from 1st Jan 2022 to 30th Jan 2022. (3 marks)
- iii. Get the details of customers whose total purchase of items worth more than ZW\$5000. (5 marks)
- iv. List total sales amount, total items, and average sale amount of all items. (7 marks)
- v. Display customers who have not purchased any items. (7 marks)

(25 Marks)

5. (a) What are assertions and triggers in SQL (5 marks)
 (b) Write a SQL program to create an assertion to specify the constraint that the salary of an employee must not be greater than the salary of the department. The employee works for in the COMPANY database. (7 marks)
 (c) Write a trigger in SQL to call a stored procedure INFORM_SUPERVISOR() whenever a new record is inserted or updated, check whether an employee's salary is greater than the salary of his or her direct supervisor in the COMPANY database. (5 marks)
 (d) Explain how one create a view in SQL, giving examples. (5 marks) (25 Marks)

6. (a) What are the problems caused by insertion, updation and deletion anomalies? Discuss with an example.(10 marks)

(b) Normalize the below relation up to 3NF:

Module	Dept	Lecturer	Text
M1	D1	L1	T1
M1	D1	L1	T2
M2	D1	L1	T1
M2	D1	L1	T3

M3	D1	L2	T4
M4	D2	L3	T1
M4	D2	L3	T5
M5	D2	L4	T6

(7 marks)

(c) Define Multi valued Dependency and Join Dependency. Explain 4NF and 5NF with examples.

(8 Marks)