No. of Printed Pages : **8**

A7-R5 : DATABASE TECHNOLOGIES

DURATION : 03 Hours **MAXIMUM MARKS : 100**

OMR Sheet No. :						

Roll No. :						

Answer Sheet No. :						

Name of Candidate : _____ **; Signature of Candidate :** _____

INSTRUCTIONS FOR CANDIDATES :

- Carefully read the instructions given on Question Paper, OMR Sheet and Answer Sheet.
- Question Paper is in English language. Candidate has to answer in English language only.
- There are **TWO PARTS** in this Module/Paper. **PART ONE** contains **FOUR** questions and **PART TWO** contains **FIVE** questions.
- **PART ONE** is Objective type and carries **40** Marks. **PART TWO** is Subjective type and carries **60** Marks.
- **PART ONE** is to be answered in the **OMR ANSWER SHEET** only, supplied with the question paper, as per the instructions contained therein. **PART ONE** is **NOT** to be answered in the answer book for **PART TWO**.
- Maximum time allotted for **PART ONE** is **ONE HOUR**. Answer book for **PART TWO** will be supplied at the table when the Answer Sheet for **PART ONE** is returned. However, Candidates who complete **PART ONE** earlier than one hour, can collect the answer book for **PART TWO** immediately after handing over the Answer Sheet for **PART ONE** to the Invigilator.
- **Candidate cannot leave the examination hall/room without signing on the attendance sheet and handing over his/her Answer Sheet to the invigilator. Failing in doing so, will amount to disqualification of Candidate in this Module/Paper.**
- After receiving the instruction to open the booklet and before answering the questions, the candidate should ensure that the Question Booklet is complete in all respects.

DO NOT OPEN THE QUESTION BOOKLET UNTIL YOU ARE TOLD TO DO SO.

PART ONE

(Answer all the questions; each question carries ONE mark)

1. Each question below gives a multiple choice of answers. Choose the most appropriate one and enter in the "OMR" answer sheet supplied with the question paper, following instructions therein. (1x10)

1.1 What is a database ?

(A) Organized collection of information that cannot be accessed, updated, and managed

(B) Collection of data or information without organizing

(C) Organized collection of data or information that can be accessed, updated, and managed

(D) Organized collection of data that cannot be updated

1.2 Who created the first DBMS ?

(A) Edgar Frank Codd

(B) Charles Bachman

(C) Charles Babbage

(D) Sharon B. Codd

1.3 The DBMS acts as an interface between _____ and _____ of an enterprise-class system.

(A) Data and the DBMS

(B) Application and SQL

(C) Database application and the database

(D) The user and the software

1.4 Which forms have a relation that contains information about a single entity ?

(A) 4NF

(B) 2NF

(C) 5NF

(D) 3NF

1.5 Database _____ which is the logical design of the database, and the database _____ which is a snapshot of the data in the database at a given instant in time.

(A) Instance, Schema

(B) Relation, Schema

(C) Relation, Domain

(D) Schema, Instance

1.6 MariaDB supports the fork of _____.

(A) MySQL RDBMS

(B) Oracle

(C) SQL Server

(D) SQLite

1.7 In MariaDB, what is Maria ?

(A) Maria is the nickname of Widenius'

(B) Maria is the name of Widenius' younger daughter

(C) Maria is the name of Widenius' wife

(D) There is no specific reason

1.8 Which of the following is not a NoSQL database ?

(A) SQL Server

(B) MongoDB

(C) Cassandra

(D) None of the mentioned

1.9 NoSQL databases is used mainly for handling large volumes of _____ data.

(A) unstructured

(B) structured

(C) semi-structured

(D) all of the mentioned

1.10 Which of the following is a NoSQL Database Type ?

(A) SQL

(B) Document databases

(C) JSON

(D) All of the mentioned

2. Each statement below is either TRUE or FALSE. Choose the most appropriate one and enter your choice in the "OMR" answer sheet supplied with the question paper, following instructions therein. (1x10)

2.1 A DBMS is a software system that allows users to define, create, maintain, and control access to databases.

2.2 Relational Database Management Systems (RDBMS) organize data into tables with rows and columns, where each table represents an entity.

2.3 DBMS is only used for storing data; it doesn't provide any tools for manipulating or analyzing the data.

2.4 In a relational database, a primary key can have duplicate values.

2.5 ACID (Atomicity, Consistency, Isolation, Durability) properties ensure database transactions are processed reliably.

2.6 NoSQL databases are gaining popularity due to their ability to handle unstructured and semi-structured data efficiently.

2.7 Data redundancy is a desirable feature in a database system as it enhances data availability.

2.8 SQL (Structured Query Language) is the standard language for managing and manipulating relational databases.

2.9 In a distributed database system, all data is stored in a single location for easy management.

2.10 A DBMS provides mechanisms for data security, such as access control, encryption, and authentication.

3. Match words and phrases in column X with the closest related meaning / word(s) / phrase(s) in column Y. Enter your selection in the "OMR" answer sheet supplied with the question paper, following instructions therein. (1x10)

X		Y	
3.1	Process of organizing data in a database efficiently.	**A.**	Relational Algebra
3.2	A sequence of operations that must be executed as a whole, ensuring database consistency.	**B.**	Data Warehouse
3.3	Techniques used to improve the performance of database queries.	**C.**	Normalization
3.4	Procedures for safeguarding data against loss and restoring it in case of failure.	**D.**	Indexing
3.5	Mechanisms to manage simultaneous access to the database by multiple users or processes.	**E.**	Transaction
3.6	Method to enhance the speed of data retrieval operations by creating indexes on columns.	**F.**	Concurrency Control
3.7	A subset of SQL used to define database schema and structure.	**G.**	DML
3.8	A subset of SQL used to manipulate data within the database.	**H.**	Query Optimization
3.9	A theoretical framework for manipulating and querying relational databases.	**I.**	DDL
3.10	A repository for storing and managing large volumes of historical data for analysis and reporting purposes.	**J.**	Backup and Recovery
		K.	4NF
		L.	Shared Lock
		M.	Temporary Buffer

4. Each statement below has a blank space to fit one of the word(s) or phrase(s) in the list below. Choose the most appropriate option, enter your choice in the "OMR" answer sheet supplied with the question paper, following instructions therein. (1x10)

A	data integrity	**B**	Foreign keys	**C**	security	**D**	atomicity and consistency
E	consistent	**F**	relational databases	**G**	tables	**H**	data retrieval
I	relational	**J**	reliability	**K**	Tree like structure	**L**	Record Lock
M	One less						

4.1 ACID properties ensure _____ of database transactions.

4.2 _____ are used to enforce referential integrity in a database.

4.3 Normalization helps to achieve better _____ and reduce data anomalies.

4.4 Database _____ involves ensuring data security, access control, and authentication.

4.5 In a relational database, data is organized into _____.

4.6 Concurrency control mechanisms ensure _____ access to the database.

4.7 SQL is the standard language for managing and manipulating _____.

4.8 Indexing improves the speed of _____ operations.

4.9 Relational algebra is a theoretical framework for manipulating _____ databases.

4.10 Transaction management ensures _____ of database operations.

PART TWO

(Answer any four questions)

5. (a) What are the primary components of a DBMS ?

(b) What are the primary factors to consider when choosing a DBMS for an organization ?

(c) What is the role of DBA ? Discuss. **(5+5+5)**

6. (a) Which tool is used for database design ? Teacher teaches multiple subjects to multiple students. A student is taught subject by single teacher. Give the database design.

(b) Discuss the following constraints in RDBMS through example for each of the following :

(i) Entity integrity constraint

(ii) Referential integrity constraint

(iii) Domain constraint **(6+9)**

7. (a) Define - Candidate key, primary key, alternate key and foreign key. Give example of each.

(b) What is normalization ? Discuss the database anomalies and how they are handled through normalization. **(8+7)**

8. (a) List five features of MariaDB that differentiate it from MySQL.

(b) What security features does MariaDB offer, and how does it ensure data protection ? **(8+7)**

9. (a) How do NoSQL databases handle complex data structures like JSON, XML, or hierarchical data ?

(b) What are the advantages and disadvantages of using a NoSQL database ?

(c) List any three features of MongoDB. **(5+7+3)**

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SPACE FOR ROUGH WORK

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