No. of Printed Pages : **11**

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

(Attempt all 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 the instructions therein. (1x10)

1.1 A database is a structured compilation of _____ interconnected data.

(A) Physically

(B) Logically

(C) Loosely

(D) Badly

1.2 The view of total database content is _____.

(A) Conceptual view

(B) Internal view

(C) External view

(D) Physical view

1.3 What components make up an RDBMS ?

(A) Collection of Records

(B) Collection of Keys

(C) Collection of Tables

(D) Collection of Fields

1.4 What set should be linked with a weak entity set to give a weak entity, a meaningful association ?

(A) Neighbour set

(B) Strong entity set

(C) Owner set

(D) Identifying set

1.5 A table is in BCNF, if it is in 3NF and if every determinant is a _____ key.

(A) Dependent

(B) Normal

(C) Candidate

(D) Both Normal and Candidate

1.6 A table is in 3NF, if it is in 2NF and if it has no _____.

(A) Functional Dependencies

(B) Transitive Dependencies

(C) Trivial Functional Dependency

(D) Multivalued Dependencies

1.7 DML is provided for _____ .

(A) Description of logical structure of database.

(B) Addition of new structures in the database system.

(C) Manipulation & processing of database.

(D) Definition of physical structure of database system.

1.8 How to create a database in MariaDB ?

(A) CREATE DB

(B) CREATE ST DATABASE

(C) CREATE DATABASE

(D) CREATE NEW DATABASE

1.9 Which command is used to drop/delete an existing database in MariaDB ?

(A) DROP DATABASES

(B) DROP DB

(C) REMOVE DATABASE

(D) DROP DATABASE

1.10 Which of the following is **not** a NoSQL database ?

(A) SQL Server

(B) MongoDB

(C) Cassandra

(D) None 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 the instructions therein. (1x10)

2.1 DBMS (Database Management System) is designed to efficiently store and manage data.

2.2 The database management architecture in which there is middle level between database server and client server is classified as three-tier architecture.

2.3 The primary key does not necessarily have to be unique for a given table.

2.4 If a relation is in 3NF, then it is also in BCNF.

2.5 SQL command types include data manipulation language (DML) and data definition language (DDL).

2.6 The HAVING clause is to groups what the WHERE clause is to rows.

2.7 The outer join describes what should happen when values in one table do not exist in the second table.

2.8 NoSQL databases are increasingly used in both Big data & Real-time web applications.

2.9 MongoDB is an open-source relational database platform written in many programming languages such as Java, Python, C, C++, etc.

2.10 NoSQL prohibits structured query language (SQL).

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 the instructions therein. (1x10)

X		Y	
3.1	Database	**A.**	Holds a variable-length string
3.2	Primary Key	**B.**	Retreives data from database
3.3	Relational data model	**C.**	Uniquely identifies each row
3.4	3-NF	**D.**	It removes Transitive dependency
3.5	Table	**E.**	Updates data in a table
3.6	Query	**F.**	Collection of related data
3.7	VARCHAR	**G.**	Left, right, Outer
3.8	Update	**H.**	Restores the database
3.9	Joins in MariaDB	**I.**	Collection of interrelated data
3.10	Backup and Recovery	**J.**	Primary data model
		K.	Image, text, audio, or video files
		L.	Transitive Dependencies

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

A	Transitive Dependencies	**B**	Unstructured	**C**	Candidate Key	**D**	Referential Integrity
E	WHERE	**F**	End Users	**G**	Image, text, audio or video files	**H**	Internal
I	User	**J**	Multi Valued Dependency	**K**	Primary data model	**L**	Database

4.1 DBMS manages the interaction between _____ and database.

4.2 In view schemas, a particular _____ group can view only the database parts that are relevant to them while hiding the rest of the database.

4.3 DBMS transform requests from the conceptual to the internal level through _____ mapping.

4.4 _____ is set of constraints applied to foreign key which prevents entering a row in child table for which you don't have any corresponding row in parent table i.e. entering NULL or invalid foreign keys.

4.5 A _____ is an indirect functional dependency, one in which XàZ only by virtue of XàY and YàZ.

4.6 In a given relationship R, if an attribute A uniquely defines all other attributes, then the attribute A is a key attribute, which is also known as the _____ key.

4.7 4NF is designed to cope with _____.

4.8 _____ clauses filter various statements, such as SELECT, UPDATE, DELETE and INSERT.

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

4.10 _____ data can be stored in the database.

PART - TWO

(Answer any FOUR questions)

5. (a) Explain the 3-Level architecture of Database Management Systems.

(b) Compute the closure of the following set F of functional dependencies for relation schema R = (A, B, C, D, E).

$A \rightarrow BC$

$CD \rightarrow E$

$B \rightarrow D$

$E \rightarrow A$

List the candidate keys for R.

(c) What constitute the primary characteristics of MariaDB ?

(d) What main configuration parameters are specified in MapReduce ?

(e) Draw an ER Diagram that represents an Identifying Relationship.

(2+3+4+4+2)

6. (a) Mention 12 E.F.Codd's rule.

(b) Mention any five string functions in SQL.

(c) Explain the concept of nested queries with example.

(d) Mention SQL statements.

(e) Compare RDBMS and NoSQL.

(2+2+2+5+4)

7. (a) What are the permissions required to perform Backup and Restore the Database ?

(b) Mention various criteria for choosing the right database.

(c) What are the criteria for fully functional dependency ?

(d) Draw an ER Diagram for the following

The database keeps track of three types of persons : employees, alumni and students. A person can belong to one, two or all three of these types. Each person has a name, SSN, sex, address, and birth date.

- Every employee has a salary, and there are three types of employees: faculty, staff and student assistants. Each employee belongs to exactly one of these types. For each alumnus, a record of the degree or degrees that he or she earned at the university is kept, including the name of the degree, the year granted, and the major department. Each student has a major department.
- Each faculty has a rank, whereas each staff member has a staff position. Student assistants are classified further as either research assistants or teaching assistants, and the percent of time that they work is recorded in the database. Research assistants have their research project stored, whereas teaching assistants have the current course they work on.
- Students are further classified as either graduate or undergraduate, with the specific attributes degree program (M.S., Ph.D., M.B.A. and so on) for graduate students and class (freshman, sophomore and so on) for under-graduates. **(4+4+2+5)**

8. (a) Describe the benefits and characteristics of JSON in detail.

(b) Describe the benefits and drawbacks of pipelined parallelism.

(c) Which data types does JSON accommodate ?

(d) For the following relation schema :

employee(employee-name, street, city)
works(employee-name, company-name, salary)
company(company-name, city)
manages(employee-name, manager-name)

Give an expression in SQL for each of the following queries:

(i) Find the names, street address, and cities of residence for all employees who work for 'First Bank Corporation' and earn more than $10,000.

(ii) Find the names of all employees in the database who live in the same cities as the companies for which they work.

(4+4+2+5)

9. (a) Mention any 5 date functions in SQL.

(b) Mention any three differences between Primary Key and Foreign Key.

(c) Mention any four advantages of DBMS.

(d) Write SQL Queries.

TABLE : ACCOUNT

ANO	ANAME	ADDRESS
101	Nirja Singh	Bangalore
102	Rohan Gupta	Chennai
103	Ali Reza	Hyderabad
104	Rishabh Jain	Chennai
105	Simran Kaur	Chandigarh

TABLE: TRANSACT

TRNO	ANO	AMOUNT	TYPE	DOT
T001	101	2500	Withdraw	2017-12-21
T002	103	3000	Deposit	2017-06-01
T003	102	2000	Withdraw	2017-05-12
T004	103	1000	Deposit	2017-10-22
T005	102	12000	Deposit	2017-11-06

(i) To display details of all transactions of TYPE Withdraw from TRANSACT table.

(ii) To display ANO and AMOUNT of all Deposit and Withdrawals done in month of 'May' 2017 from table TRANSACT.

(iii) To display first date of transaction (DOT) from table TRANSACT for Account having ANO as 102.

(iv) To display ANO, ANAME, AMOUNT and DOT of those persons from ACCOUNT and TRANSACT table who have done transaction less than or equal to 3000.

(v) SELECT ANO, ANAME FROM ACCOUNT WHERE ADDRESS NOT IN ('CHENNAI', 'BANGALORE'). Mention the output.

(vi) SELECT DISTINCT ANO FROM TRANSACT. Mention the output.

(e) What is the difference between composite attribute and multivalued attribute in E-R Diagram ? **(2+3+2+6+2)**

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