A7-R5 : DATABASE TECHNOLOGIES

अवधि : 03 घंटे
DURATION : 03 Hours

अधिकतम अंक : 100
MAXIMUM MARKS : 100

ओएमआर शीट सं. : OMR Sheet No. :					

रोल नं. : Roll No. :

उत्तर-पुस्तिका सं. : Answer Sheet No. :

परीक्षार्थी का नाम :
Name of Candidate : _____

परीक्षार्थी के हस्ताक्षर :
Signature of Candidate : _____

परीक्षार्थियों के लिए निर्देश :	Instructions for Candidate :
कृपया प्रश्न-पुस्तिका, ओएमआर शीट एवं उत्तर-पुस्तिका में दिये गए निर्देशों को ध्यानपूर्वक पढ़ें।	Carefully read the instructions given on Question Paper, OMR Sheet and Answer Sheet.
प्रश्न-पुस्तिका की भाषा अंग्रेजी है। परीक्षार्थी केवल अंग्रेजी भाषा में ही उत्तर दे सकता है।	Question Paper is in English language. Candidate can answer in English language only.
इस मॉड्यूल/पेपर के **दो भाग** हैं। **भाग एक** में **चार** प्रश्न और **भाग दो** में **पाँच** प्रश्न हैं।	There are **TWO PARTS** in this Module/Paper. **PART ONE** contains **FOUR** questions and **PART TWO** contains **FIVE** questions.
भाग एक ''वैकल्पिक'' प्रकार का है जिसके कुल अंक 40 है तथा **भाग दो** ''व्यक्तिपरक'' प्रकार का है और इसके कुल अंक 60 है।	**PART ONE** is Objective type and carries 40 Marks. **PART TWO** is Subjective type and carries 60 Marks.
भाग एक के उत्तर, **ओएमआर उत्तर-पुस्तिका** पर ही दिये जाने हैं। **भाग दो** की उत्तर-पुस्तिका में **भाग एक** के उत्तर **नहीं** दिये जाने चाहिए।	**PART ONE** is to be answered in the **OMR ANSWER SHEET** only. **PART ONE** is **NOT** to be answered in the answer book for **PART TWO**.
भाग एक के लिए अधिकतम समय सीमा **एक घण्टा** निर्धारित की गई है। **भाग दो** की उत्तर-पुस्तिका, **भाग एक** की उत्तर-पुस्तिका जमा कराने के पश्चात् दी जाएगी। तथापि, निर्धारित एक घंटे से पहले **भाग एक** पूरा करने वाले परीक्षार्थी **भाग एक** की उत्तर-पुस्तिका निरीक्षक को सौंपने के तुरंत बाद, **भाग दो** की उत्तर-पुस्तिका ले सकते हैं।	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.
परीक्षार्थी, उपस्थिति-पत्रिका पर हस्ताक्षर किए बिना और अपनी उत्तर-पुस्तिका, निरीक्षक को सौंपे बिना, परीक्षा हॉल/कमरा नहीं छोड़ सकते हैं। ऐसा नहीं करने पर, परीक्षार्थी को इस मॉड्यूल/पेपर में अयोग्य घोषित कर दिया जाएगा।	**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.**
प्रश्न-पुस्तिका को खोलने के निर्देश मिलने के पश्चात् एवं उत्तर लिखना आरम्भ करने से पहले उम्मीदवार जाँच कर यह सुनिश्चित कर लें कि प्रश्न-पुस्तिका प्रत्येक दृष्टि से संपूर्ण है।	After receiving the instruction to open the booklet and before starting to answer the questions, the candidate should ensure that the Question Booklet is complete in all respect.

जब तक आपसे कहा न जाए, तब तक प्रश्न-पुस्तिका न खोलें।
DO NOT OPEN THE QUESTION BOOKLET UNTIL YOU ARE TOLD TO DO SO.

PART ONE

(Answer all the questions)

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 Course(course_id, sec_id, semester)

Here the course_id, sec_id and semester are _____ and course is a _____.

(A) Relations, Attribute

(B) Attributes, Relation

(C) Tuple, Relation

(D) Tuple, Attribute

1.2 The attribute *name* could be structured as an attribute consisting of first name, middle initial and last name. This type of attribute is called :

(A) Simple attribute

(B) Composite attribute

(C) Multivalued attribute

(D) Derived attribute

1.3 Data integrity constraints are used to :

(A) Control who is allowed access to the data

(B) Ensure that duplicate records are not entered into the table

(C) Improve the quality of data entered for a specific property

(D) Prevent users from changing the values stored in the table

1.4 An entity in A is associated with atmost one entity in B, and an entity in B is associated with at most one entity in A. This is called as :

(A) One-to-many

(B) One-to-one

(C) Many-to-many

(D) Many-to-one

1.5 The entity relationship set is represented in E-R diagram as :

(A) Double diamonds

(B) Undivided rectangles

(C) Dashed lines

(D) Diamond

1.6 What are the main features of MariaDB ?

(A) MariaDB can run on different operating systems and support a wide variety of programming language

(B) MariaDB follows a standard and popular querying language

(C) MariaDB provides Galera cluster technology

(D) All of these

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1.7 MariaDB is a community-developed branch of the _____ database, which uses the Maria engine by default.

(A) Solaris (operating system)

(B) OpenSolaris

(C) MySQL

(D) OpenOffice.org

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 Which of the following is **not** a type in JSON ?

(A) date

(B) object

(C) array

(D) string

1.10 What extension in used to save a JSON file ?

(A) .on

(B) .js

(C) .javaN

(D) .json

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

2.1 Dependency preservation is not guaranteed in BCNF.

2.2 A relation is in 2NF if every field contains only atomic values that are, no lists or sets.

2.3 A candidate key is a minimal super key.

2.4 Project operator chooses subset of attributes or columns of a relation.

2.5 To change column value in a table the alter command can be used.

2.6 NoSQL was designed with security in mind, so developers or security teams don't need to worry about implementing a security layer.

2.7 NoSQL prohibits structured query language (SQL).

2.8 Referential Integrity constraint is related with Foreign key.

2.9 'name : value' is a format of writting JSON name/value pair.

2.10 The external form of a JSON object always begins and ends with {}.

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	A relational database consists of a collection of	**A.**	Row
3.2	A _____ specifies the actions needed to remove the drawbacks in the current design of a database.	**B.**	Join dependency
3.3	A relation is in _____ if an attribute of a composite key is dependent on an attribute of another composite key.	**C.**	Tables
3.4	The fifth normal form is concerned with _____.	**D.**	Normal form
3.5	In an ER model, _____ is described in the database by storing its data.	**E.**	Drop
3.6	_____ commands display schema of a table.	**F.**	Having
3.7	Most NoSQL databases support automatic _____ meaning that you get high availability and disaster recovery.	**G.**	Replication
3.8	_____ data type can store unstructured data.	**H.**	1NF
3.9	_____ is/are the DDL statements.	**I.**	Entity
3.10	_____ clause is an additional filter that is applied to the result.	**J.**	DESC
		K.	3NF
		L.	Columns
		M.	2NF

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 attached to the question paper, following instructions therein.** **(1x10)**

A.	2NF	**B.**	Rows	**C.**	Table
D.	Distinct	**E.**	Triangle	**F.**	Super Key
G.	Constraint	**H.**	Operational	**I.**	DCL
J.	Aggregate	**K.**	Columns	**L.**	Normalization
M.	Unstructured				

4.1 The file in DBMS is called as _____ in RDBMS.

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

4.3 To eliminate duplicate rows _____ is used.

4.4 A _____ is a set of column that identifies every row in a table.

4.5 Grant and revoke are _____ statements.

4.6 In E-R diagram generalization is represented by _____.

4.7 No partial functional dependencies exist in _____.

4.8 _____ defines rules regarding the values allowed in columns and is the standard mechanism for enforcing database integrity.

4.9 AVG, SUM, MIN, MAX are examples of _____ functions.

4.10 _____ database contains data assisting day to day activities of the organization.

PART TWO

(Answer any FOUR questions)

5. (a) Draw and explain the three level architecture of the database system.

   (b) What is Relational Database ? What are its advantages ? Explain with example.

   (c) What are the main features of MariaDB ?

   (5+5+5)

6. (a) Why keys are important in relational model ? Write about candidate keys, primary keys and foreign key.

   (b) Explain Boyce-Codd Normal Form with example and also Compare BCNF and 3NF.

   (c) What is NoSQL Database ? Enlist advantages and disadvantages of NoSQL.

   (5+5+5)

7. (a) What is the difference between delete and truncate statement in MariaDB ?

   (b) Discuss the clear difference between specialization and generalization with the help of an example. Is it possible to represent their difference with the help of an E-R diagram ?

   (c) What is JSON Object ? How to create & access JSON Object ?

   (4+5+6)

8. (a) Describe the purpose of normalizing data. How is the concept of functional dependency associated with the process of normalization ?

   (b) How many types of JOIN are there in MariaDB ? Explain in detail.

   (c) A university registrar's office maintains data about the following entities :

   (i) courses, including number, title, credits, syllabus and prerequisites;

   (ii) course offerings, including course number, year, semester, section number, instructor(s), timings and classroom;

   (iii) students, including student-id, name and program;

   (iv) instructors, including identification number, name, department and title. Further, the enrollment of students in courses and grades awarded to students in each course they are enrolled for must be appropriately modeled.

   Construct an E-R diagram for the registrar's office. Document all assumptions that you make about the mapping constraints. **(4+5+6)**

9. (a) What are the disadvantages of file processing systems ?

(b) The following relations keep track of students, their enrollment for classes along with faculty information.

- Student (snum: integer, sname: string, major: string, level: string, age: integer)
- Class (name: string, meets at: string, room: string, d: integer)
- Enrolled (snum: integer, cname: string)
- Faculty (fid: integer, fname: string, deptid: integer)

Write the following queries in SQL. No duplicates should be printed in any of the answers.

(i) Find the names of all juniors (level=Jr) who are enrolled for class taught by professor Harshith.

(ii) Find the names of all classes that either meet in room 128 or have 5 or more students enrolled.

(iii) Find the names of all students who are enrolled in two classes that meet at same time.

(iv) Find the names of faculty members who teach in every room in which some class is taught.

(c) Differentiate between having and where clause in SQL with proper examples.

(d) Write differences between relational and NoSQL databases.

(4+4+2+5)

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