A7-R4/B2.2-R4 : INTRODUCTION TO DATABASE MANAGEMENT SYSTEMS

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 If there is a relationship between two tables, this indicates that _____.

(A) the data contained in the two tables are related to each other in some way.

(B) the structure of the one table is inherited from the other table.

(C) information from both tables is always used together.

(D) the data from one table is inherited from the other table.

1.2 The definition of primary and foreign key relationships are set using SQL _____.

(A) Keys

(B) Assignments

(C) Rules

(D) Constraints

1.3 Which of the following types of isolation levels provides the MOST protection against concurrency problems ?

(A) Repeatable Read

(B) Serializable

(C) Read Committed

(D) Read Uncommitted

1.4 What is the component of a DBMS that is responsible for storing, retrieving and updating data ?

(A) Database engine

(B) Query engine

(C) Data management engine

(D) Data dictionary

1.5 Which of the following statements apply to Foreign Keys ?

(A) A Foreign Key cannot consist of a composite attribute

(B) Foreign Keys cannot have null values

(C) A table may contain only a single Foreign Key

(D) None of the above

1.6 DBA is responsible for _____.

(A) Designing the logical and physical schemas

(B) Security and authorization

(C) Data availability and recovery from failures

(D) All of the above

1.7 The type of form that displays data from two tables that have a one-to-many relationship is called a _____.

(A) Relational form

(B) Crosstab form

(C) Sub form

(D) Referential form

1.8 An empty triangle is used to signify which construct in a class diagram ?

(A) Composition

(B) Reflexive association

(C) Aggregation

(D) Generalization

1.9 Which of the followings are not SQL DDL commands ?

(A) CREATE VIEW

(B) CREATE SCHEMA, CREATE TABLE, ALTER TABLE

(C) UNION, INTERSECT and EXCEPT

(D) DROP TABLE, CREATE INDEX, DROP INDEX

1.10 What is the purpose of the serialization process ?

(A) Forces transactions to run separately so that result consistency is maintained.

(B) In a two-phase commit scheme, it ensures that everyone has obtained locks on resources before committing to the change.

(C) Forces the operations within a transaction to be run in a specific, predefined sequence.

(D) Allocates access time to the database to make sure it is fair.

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 A database is a collection of information that you organize and access according to the physical structure of that information.

2.2 The goal of normalization is to split tables into smaller related tables to avoid creating anomalies.

2.3 A DBMS consists of three parts : Information, the logical structure of that information and tables.

2.4 A Primary Key must consist of one and only one field.

2.5 If you need to add a new field to a database, you would use the data manipulation system.

2.6 Structured Query Language (SQL) is a standardized third-generation query language found in most DBMSs.

2.7 A Relational Database uses a series of logically related two-dimensional tables or files to store information in the form of a database.

2.8 An Intersection Relation is also called a Composite Relation.

2.9 The SQL keyword DISTINCT is used to indicate that an attribute must have unique values in the original table used in the query.

2.10 A reflexive join means that a table is joined to itself.

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 set of possible values for an attribute	**A.**	Degree
3.2	The number of fields in the relation	**B.**	Domain
3.3	The logical structure of the database	**C.**	Null Values
3.4	A functional dependency is a relationship between	**D.**	Candidate Key
3.5	A key that cannot contain	**E.**	Instance
3.6	A key to represent relationship between tables is	**F.**	Relations
3.7	An atomic sequence of database actions is	**G.**	Attribute
3.8	A state in which a transaction can be	**H.**	Drop
3.9	A snapshot of data in the database at time	**I.**	Schema
3.10	A command to delete a database	**J.**	Active
		K.	Transaction
		L.	Cardinality
		M.	Foreign Key

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 instructions therein. (1x10)

A.	Assertion	**B.**	Rectangle	**C.**	Cycle
D.	Double line	**E.**	Composite Key	**F.**	Durability
G.	Rollback	**H.**	Dashed line	**I.**	Fixed
J.	Candidate Key	**K.**	Relational algebra	**L.**	Triangle
M.	Aggregation				

4.1 _____ is a combination of two or more attributes used as a Primary Key.

4.2 The _____ provides a set of operations that take one or more relations as input and return a relation as an output.

4.3 The basic data type char(n) is a _____ length character string.

4.4 _____ will undo all statements of transaction upto commit.

4.5 Domain constraints, Functional dependency and Referential integrity are special forms of _____.

4.6 _____ is a feature of the Entity Relationship Model that allows a relationship set to participate in another relationship set.

4.7 The total participation by entities is represented in E-R diagram as _____.

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

4.9 _____ refers to the ability of the system to recover committed transaction updates if either the system or the storage media fails.

4.10 A deadlock exists in the system if and only if the wait-for graph contains a _____.

PART TWO

(Answer any FOUR questions)

5. (a) What are the responsibilities of DBA ? Discuss.

(b) What are the advantages of DBMS over File Processing System ?

(c) Differentiate between :

(i) Procedural and Non-procedural DML.

(ii) Logical and Physical data independence. **(6+5+4)**

6. (a) Consider a database used to record the marks that students get in different exams of different course offerings. Construct an E-R diagram that models exams as entities and uses a ternary relationship for the above database.

(b) Explain three tier architecture of database systems.

(c) Explain the difference between a weak and a strong entity set. Can we convert any weak entity set to a strong entity set ? **(6+5+4)**

7. (a) Describe ACID properties of transaction. Explain using an example.

(b) What is the reason behind transaction failure ? Explain Log-Based recovery process of transaction. **(8+7)**

8. (a) Discuss Entity Integrity and Referential Integrity rules.

(b) What is Tuple Calculus ? How can expressions be made in Tuple Calculus ?

(c) Write short notes on :

(i) Multi-valued dependencies

(ii) 3NF

(iii) BCNF **(4+5+6)**

9. (a) Compute the closure of the following set F of functional dependencies for relation schema

$R = (A,B,C,D,E)$

$F = \{A \rightarrow BC,\ CD \rightarrow E,\ B \rightarrow D,\ E \rightarrow A\}$

(b) What is Relational Data model ? How Primary Key and Foreign Key concepts is useful in Relational Data Model ?

(c) Explain Embedded SQL and Dynamic SQL. How they are different from each other ? **(5+5+5)**

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SPACE FOR ROUGH WORK

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