A7-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 ध्यान पूर्वक 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** है। **भाग एक** में चार प्रश्न और **भाग दो** में पाँच प्रश्न है।	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 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, इस प्रश्न-पत्र के साथ दी गई **ओएमआर उत्तर-पुस्तिका** पर, उसमें दिये गए अनुदेशों के अनुसार ही दिये जाने है। **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, 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**.
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 पश्चात 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.**
परीक्षार्थी, उपस्थिति-पत्रिका पर हस्ताक्षर किए बिना एवं अपनी उत्तर-पुस्तिका, निरीक्षक को सौंपे बिना, परीक्षा हाल नहीं छोड़ सकता हैं। ऐसा नही 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 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 पश्चात एवं उत्तर देने से पहले उम्मीदवार यह जाँच कर यह सुनिश्चित कर ले कि प्रश्न-पुस्तिका प्रत्येक दृष्टि से संपूर्ण है।	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 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 A relation is in _____ if an attribute of a composite key is dependent on an attribute of other composite key.
A) 2NF
B) 3NF
C) BCNF
D) 1NF

1.2 Which of the following relational algebra operations do not require the participating tables to be union-compatible?
A) Union
B) Intersection
C) Difference
D) Join

1.3 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

1.4 What is data integrity?
A) It is the data contained in database that is non redundant.
B) It is the data contained in database that is accurate and consistent.
C) It is the data contained in database that is secured.
D) It is the data contained in database that is shared.

1.5 In an E-R diagram double lines indicate.
A) Total participation
B) Multiple participation
C) Cardinality N
D) None of the above

1.6 In SQL the statement select*from R,S is equivalent to
A) Select * from R natural join S
B) Select * from R cross join S
C) Select * from R union join S
D) Select * from R inner join S

1.7 The keyword to eliminate duplicate rows from the query result in SQL is
A) DISTINCT
B) NO DUPLICATE
C) UNIQUE
D) None of the above

1.8 Which one is correct statement?
Logical data independence provides following without changing application programs:
i) Changes in access methods.
ii) Adding new entities in database
iii) Splitting an existing record into two or more records
iv) Changing storage medium
A) i) and ii)
B) iv) only
C) i) and iv)
D) ii) and iii)

1.9 Relational Algebra is
A) Data Definition Language
B) Meta Language
C) Procedural query Language
D) None of the above

1.10 Which of the following is not a characteristic of a relational database model?
A) Table
B) Tree like structure
C) Complex logical relationship
D) Records

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 Given the large capacity disks that are now available, database administrators no longer have to be concerned about estimating how much disk capacity is required for a new database.

2.2 A significant disadvantage of conventional files is their inflexibility and non-scalability.

2.3 A foreign key is a field whose values identify one and only one record in the same file.

2.4 When a computer program "reads" a record from a database, it actually retrieves a group or block (or page.) of records at a time. This approach minimizes the number of actual disk accesses.

2.5 Transaction files or tables contain records that describe business events. The data describing these events normally has a limited useful lifetime.

2.6 In an E-R diagram attributes are represented by ellipse.

2.7 A fundamental characteristic of SQL is that commands return a set of records.

2.8 Database design should proceed only if the underlying logical data model is in at least 2NF.

2.9 During the creation of database schemas, NULL means the field does not have to have a value; whereas, NOT NULL means the field must have a value.

2.10 The primary key for a record must never be allowed to have a NULL value.

ROUGH WORK SPACE:

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	The *EmployeeID* field in an employee table cannot be left blank. This is an example of	**A.**	Compare
3.2	Specialized computer software that is used to create, access, control, and manage the database is called	**B.**	Consistency
3.3	Is a meaning of C in ACID properties of transactions.	**C.**	File
3.4	The physical, relational database implementation of a data model is known as a	**D.**	primary key
3.5	The foreign key value in one table must have a matching primary key value in the related table. This refers to	**E.**	Record
3.6	In the architecture of a database system external level is called as	**F.**	view level
3.7	The field whose values identify one and only one record in a file is known as the	**G.**	Table
3.8	collection of fields arranged in a predefined format is known as	**H.**	database management system
3.9	A collection of similar records is known as	**I.**	Scenario
3.10	The relational database equivalent of a file is known as	**J.**	Schema
		K.	referential integrity
		L.	Field
		M.	key integrity

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.	Audit	**B.**	database schema	**C.**	Non-Procedural
D.	Triggers	**E.**	UPDATE	**F.**	Table look-up
G.	Primary Key	**H.**	Views	**I.**	file
J.	JOIN	**K.**	Relationship set	**L.**	Normalization
M.	Database architecture				

4.1 _____ is combination of unique and not Null.

4.2 _____ is the physical model or blueprint for a database. It represents the technical implementation of the logical data model.

4.3 _____ is a three-step technique that places the data model into first normal form, second normal form and third normal form.

4.4 In an Entity-Relationship diagram "Diamonds" Represents _____.

4.5 Relational calculus is _____.

4.6 _____ files are special records of updates to other files, especially master and transaction files. They are used in conjunction with archival files to recover "lost" data.

4.7 _____ refers to the database technology including the database engine, database utilities, database CASE tools for analysis and design, and database application development tools.

4.8 SQL allows you to _____two or more tables across a common field (a primary and a foreign key).

4.9 _____ restrict the portion of the database that may be used or accessed by different users and programs.

4.10 _____ files contain relatively static data that can be shared by applications to maintain consistency and improve performance.

ROUGH WORK SPACE:

5.
a) How does the system cope up with a record crash when recovery is going on after the first crash? Define check point and its impact on data base recovery.
b) Explain Boyce-Codd Normal Form with example and also Compare BCNF and 3NF.

(7+8)

6.
a) Draw and explain the three level architecture of the database system.
b) We can convert any weak entity set to a strong entity set by simply adding appropriate attributes. Why, then, do we have weak entity sets?
c) Define entity integrity rule and integrity constraints? Explain the two constraints, check and foreign key in SQL.

(8+3+4)

7.
a) Consider the following relations:
EMPLOYEE (EMPLOYEE_NAME, STREET, CITY)
WORKS (EMPLOYEE_NAME, COMPANYNAME, SALARY)
COMPANY (COMPANY_NAME, CITY)
Write the SQL Queries -
i) Find the names of all employees who work for first Bank Corporation.
ii) Find the names and company names of all employees sorted in ascending order of company name and descending order of employee names of that company.
iii) Change the city of First Bank Corporation to 'New Delhi'.
b) What is Normalization? Why it is required?

([3x4]+3)

8.
a) Consider the following information about a university database:
• Professors have an SSN, a name, an age, a rank, and a research specialty.
• Projects have a project number, a sponsor name (e.g., NSF), a starting date, an ending date, and a budget.
• Graduate students have an SSN, a name, an age, and a degree program (e.g., M.S. or Ph.D.).
• Each project is managed by one professor (known as the project's principal investigator).
• Each project is worked on by one or more professors (known as the project's co-investigators).
• Professors can manage and/or work on multiple projects.

• Each project is worked on by one or more graduate students (known as the project's research assistants).
• When graduate students work on a project, a professor must supervise their work on the project. Graduate students can work on multiple projects, in which case they will have a (potentially different) supervisor for each one.
• Departments have a department number, a department name, and a main office.
• Departments have a professor (known as the chairman) who runs the department.
• Professor's work in one or more departments and for each department that they work in, a time percentage is associated with their job.
• Graduate students have one major department in which they are working on their degree.
• Each graduate student has another, more senior graduate student (known as a student advisor) who advises him or her on what courses to take.

Design and draw an ER diagram that captures the information about the university. Be sure to indicate any key and participation constraints.

b) What is the basic difference between relational algebra and relational calculus? Define the atoms in tuple relational calculus.

(10+5)

9.
a) What do you mean by audit trail? List its usage with respect to security.
b) Define the concept of aggregation. Give two examples where this concept is useful.

(8+7)

ROUGH WORK SPACE: