

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: _____; परीक्षार्थी के हस्ताक्षर: _____
Name of Candidate: _____; 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 कर 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 हैं तथा भाग दो, "व्यक्तिपरक" प्रकार है और इसके कुल अंक 60 हैं।	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 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, 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 अथवा अपनी उत्तर-पुस्तिका, निरीक्षक को सौंपे बिना, परीक्षा हॉल नहीं छोड़ सकता है। 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 or 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.
नोट: यदि हिन्दी संस्करण में कोई त्रुटि / विसंगति पाई जाती है, तो उस अवस्था में अंग्रेजी संस्करण ही मान्य होगा। Note: In case of any discrepancy found in Hindi language, English version will be treated as final.	

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 _____ is collection of interrelated data and set of program to access them.
A) Data structure
B) Database
C) Database management system
D) Programming language
- 1.2 In the architecture of a database system external level is the
A) Physical level
B) Logical level
C) Conceptual level
D) View level
- 1.3 In a SELECT statement that includes a WHERE clause, where is the GROUP BY clause place in the SELECT statement.
A) Immediately after the SELECT clause
B) Before the WHERE clause
C) After the ORDER BY clause
D) After the WHERE clause
- 1.4 Which task can perform by using the TO_CHAR function?
A) Convert 10 to 'TEN'
B) Convert a date to a character expression
C) Convert a character expression to a date
D) Convert 'TEN' to 10
- 1.5 For each attribute of a relation, there is a set of permitted values, called the _____ of that attribute.
A) Domain
B) Relation
C) Set
D) Schema
- 1.6 In the _____ normal form, a composite attribute is converted to individual attributes.
A) First
B) Second
C) Third
D) Fourth
- 1.7 Which of the operations constitute a basic set of operations for manipulating relational data?
A) Predicate calculus
B) Relational calculus
C) Relational algebra
D) None of the above

- 1.8 In a database where the encryption is applied the data is cannot be handled by the unauthorized user without
A) Encryption key
B) Decryption key
C) Primary key
D) Authorized key
- 1.9 Domain constraints, functional dependency and referential integrity are special forms of _____.
A) Foreign key
B) Primary key
C) Assertion
D) Referential constraint
- 1.10 A query in the tuple relational calculus is expressed as:
A) $\{t \mid P(t) \mid t\}$
B) $\{P(t) \mid t\}$
C) $\{t \mid P(t)\}$
D) All of the above
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 Properties of an object are stored as rows in a table.
- 2.2 If a table is in 1NF and does not have a composite key, then it is in 2NF.
- 2.3 The primary key does not necessarily have to be unique for a given table.
- 2.4 If you use a GROUP BY command, you cannot see the non-aggregated data in the same query.
- 2.5 Using an IN operator is an alternative to using a group of OR clauses in a WHERE statement.
- 2.6 $S \bowtie R = S \times R$, if S and R don't share any attributes, and $S \bowtie R = S \cup R$, if S and R have the same attributes.
- 2.7 Data manipulation language (DML) commands are used to define a database, including creating, altering, and dropping tables and establishing constraints.
- 2.8 Hierarchical database systems are less navigational than relational database systems.
- 2.9 An audit trail is the recorded history of operations performed on a file.
- 2.10 Rollback is the preferred way to recover a database after a system failure.

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	Relational algebra	A.	Prevents inconsistent data
3.2	Record	B.	Description of a database
3.3	Schema	C.	No primary key
3.4	Every relation in 4NF is in	D.	3NF
3.5	Attribute	E.	SQL is based on this form of mathematics
3.6	SQL	F.	Has a primary key
3.7	Weak entity set	G.	A collection of related records
3.8	NULL value	H.	A group of related fields
3.9	File	I.	BCNF
3.10	Referential integrity	J.	Zero
		K.	Is a characteristic of an entity
		L.	Missing information
		M.	ANSI standard query language for relational databases

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.	BETWEEN	B.	View level	C.	Fourth normal form
D.	Projection	E.	ANY	F.	M:N
G.	DBA	H.	NVL	I.	Data dictionary
J.	DML	K.	Functional dependency	L.	Foreign key
M.	Transitive dependency				

- 4.1 _____ uses multiple dependency criteria for relation decomposition.
- 4.2 One of the responsibilities of a _____ is to create database schema.
- 4.3 _____ data abstraction provides security mechanism to prevent user from accessing certain parts of database.
- 4.4 The _____ operator is used to compare a value to a list of literals values that have been specified.
- 4.5 _____ operation is used if we are interested in only certain columns of a table?
- 4.6 The language used in application programs to request data from the DBMS is referred to as the _____.
- 4.7 A _____ is an indirect functional dependency, one in which $X \twoheadrightarrow Y$, only by virtue of $X \rightarrow Y$ and $Y \rightarrow Z$.
- 4.8 A _____ relationship has an associative entity with its own characteristics.
- 4.9 _____ function converts null to an actual value.
- 4.10 Drop Table cannot be used to drop a table referenced by a _____ constraint.

PART TWO
(Answer any FOUR questions)

- 5.
- a) What is database system? What are the benefits of database?
- b) Consider the following set of functional dependencies on relation schema $R = \{ I, J, K, L, M, N \}$
 $F = \{ I \twoheadrightarrow JK, JL \twoheadrightarrow M, J \twoheadrightarrow K, IKN \twoheadrightarrow M, JK \twoheadrightarrow N, IL \twoheadrightarrow K \}$
Find the minimal cover for F. You must show all the steps you followed to find your answer.
(7+8)

- 6.
- a) What happens when a COMMIT is not executed after any SQL statement is executed? Is there any benefit to not use COMMIT or any side effect of using COMMIT?
- b) Consider the following schema
Car (vin, make, model, year)
Mechanic (mid, name, speciality, exp_years)
Parts (pid, name)
Estimates (vin, mid, pid, date_estimated, quantity)
[Here, VIN references CAR, MID references MECHANICS, PID references PARTS]
RepairStore (rsid, name, address, phone_num)
Sell (rsid, pid, price)
[Here, RSID references REPAIRSTORE, PID references PARTS]
Specify the following queries in relational algebra
- Find all mechanics (names), who provided estimates for cars of year 2001.
 - Find all cars (vin) with make = 'Dodge', model = 'Viper' and were manufactured between 1999 to 2001.
 - Find all repair store names, which sell parts priced lower than Rs. 2000.
 - Find all mechanics (mid) who have never estimated for any car.
- (6+9)**

- 7.
- a) Why keys are important in relational model? Write about candidate keys, primary keys, alternate key and foreign key.
- b) Explain how domain relational calculus differs from tuple relational calculus.
(10+5)

- 8.
- a) Describe the purpose of normalizing data. How is the concept of functional dependency associated with the process of normalization?
- b) Explain how does encryption support in databases with an example.
(8+7)

- 9.
- a) Consider the following schema:
Department(name, dept_no, locations, manager)
Project(name, proj_no, locations)
Employee(ssn, name, address, sal, gender, birthdate)
Dependent(name, gender, birthdate, relationship)
Construct an E-R diagram for the above schema; specify keys, mapping cardinalities, participation constraints (if necessary).
- b) Explain the three level of abstraction using the three-tier architecture proposed by ANSI/SPARC.
(9+6)

