**B2.2-R4: INTRODUCTION TO DATABASE MANAGEMENT SYSTEMS**

**DURATION:** 03 Hours  
**MAXIMUM MARKS:** 100

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<th>Name of Candidate:</th>
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**Instructions for Candidate:**

- Carefully read the instructions given on Question Paper, OMR Sheet and Answer Sheet.
- Question Paper is in English language. Candidate can 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.
- 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.
- 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.

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**Jab tak aapse kaha n jaaye tab tak prashn-pustika n khole**

**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.  

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.

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.
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)

<table>
<thead>
<tr>
<th>X</th>
<th>Y</th>
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<tbody>
<tr>
<td>3.1 The EmployeeID field in an employee table cannot be left blank. This is an example of</td>
<td>A. Compare</td>
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<td>3.2 Specialized computer software that is used to create, access, control, and manage the database is called</td>
<td>B. Consistency</td>
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<td>3.3 Is a meaning of C in ACID properties of transactions.</td>
<td>C. File</td>
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<td>3.4 The physical, relational database implementation of a data model is known as a</td>
<td>D. primary key</td>
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<td>3.5 The foreign key value in one table must have a matching primary key value in the related table. This refers to</td>
<td>E. Record</td>
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<td>3.6 In the architecture of a database system external level is called as</td>
<td>F. view level</td>
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<td>3.7 The field whose values identify one and only one record in a file is known as the</td>
<td>G. Table</td>
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<td>3.8 collection of fields arranged in a predefined format is known as</td>
<td>H. database management system</td>
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<td>3.9 A collection of similar records is known as</td>
<td>I. Scenario</td>
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<td>3.10 The relational database equivalent of a file is known as</td>
<td>J. Schema</td>
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<td>K. referential integrity</td>
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<td>L. Field</td>
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<td>M. key integrity</td>
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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.
PART TWO  
(Assign any FOUR questions)

5.  
(a) How does the system cope up with a record crash when recovery is ongoing after the first crash? Define checkpoint 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, COMPANY_NAME, 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) Design and draw an ER diagram that captures the information about the university. Be sure to indicate any key and participation constraints.  
(10+5)

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.  
(b) What is Normalization? Why it is required?  
((3x4)+3)

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)