*Roll No. : ……*

**Bharati Vidyapeeth's**

**Institute of Computer Applications and Management (BVICAM)**

**A-4, Paschim Vihar, New Delhi-63**

**FIRST SEMESTER [MCA] Internal Examination, October 2024**

| **Paper Code: MCA–107** | **Subject: Database Management Systems** |
|---|---|
| **Time: 2 Hours** | **Maximum Marks: 45** |

**Note: Attempt THREE questions in all. Question No. 1 is compulsory, and attempt one question from each unit.**

1. Answer all the following questions briefly: - 1.5 × 10 = 15

   (a) Elaborate the concept of Generalization and Specialization with an example. In which situation, the aggregation concept come into picture. CO1

   (b) The users of database system can be classified in many forms, List them along with their roles. CO1

   (c) Compare (in tabular format) Schemas and Instances. Why they are necessary for data models. CO1

   (d) Evaluate how the three-tier database architecture supports data abstraction by describing its three levels and explaining how each level contributes to abstraction. CO1

   (e) List the differences between Hierarchical, Network and Relational DBMS. CO1

   (f) Illustrate one-to-one, one-to-many and many-to-many relationships. CO2

   (g) Explain what a key constraint is in a relational database. How does a primary key differ from a unique key? CO2

   (h) Write a SQL query using a single-row function to display the uppercase version of the FirstName column from the Employees table. CO2

   (i) Evaluate the impact of using the DROP command on a table that is being referenced by other tables in a database. CO2

   (j) Differentiate between outer and inner joins, explaining the contexts in which they are used. CO2

**UNIT - I**

2. (a) Illustrate the architecture of DBMS while providing suitable example. 5 CO1

   (b) Explain why navigation is simpler in the relational data model than in the hierarchial data model. 5 CO1

   (c) Discuss Union, intersection and difference operators with an example. Why they are termed as union compatible. 5 CO1

**OR**

3. (a) Explain the concept of Logical Data Independence and Physical Data Independence with suitable diagram. 5 CO1

   (b) Design a database schema using DDL commands that includes three related tables: Students, Courses, and Enrollments. Ensure that you implement appropriate primary and foreign keys. 5 CO1

   (c) Explain the following terms: 5 CO1
   (i) Association
   (ii) Relationship
   (iii) Aggregation
   (iv) Cardinality
   (v) Degree

## UNIT - II

4. (a) For the relations P and Q shown in figure below, perform the following operations and show the resulting relations as well: 5 CO2
   (i) Find the projection of Q on the attributes (B, C)
   (ii) Find the natural join of P and Q on the common attributes.

| P | | | |
|---|---|---|---|
| A | B | C | D |
| a1 | b2 | c1 | d2 |
| a2 | b1 | c1 | d2 |
| a1 | b1 | c2 | d1 |
| a2 | b1 | c2 | d2 |
| a1 | b2 | c1 | d2 |
| a3 | b1 | c2 | d1 |
| a1 | b2 | c2 | d2 |
| a2 | b1 | c1 | d2 |
| a1 | b3 | c2 | d2 |

| Q | | |
|---|---|---|
| B | C | D |
| b1 | c1 | d2 |
| b3 | c1 | d2 |
| b2 | c2 | d1 |
| b1 | c1 | d2 |
| b3 | c2 | d2 |

(b) Suppose a table Employee has a column Age with a domain constraint specifying that Age must be an integer between 18 and 65. Write an INSERT statement that would violate this domain constraint, and explain why the violation occurs. How can you modify the data or the constraint to ensure successful insertion? 5 CO2

(c) Consider the schema: 5 CO2
College (CCode#, CName, NoOfCourses, Address, ContactNo)
Student (Eno#, SName, DOB, DateOfEnrollment, Rank, CCode)
CCode - Foreign Key based on College entity.
Rank – unique key.
   (i) Display the names of students who have been enrolled for more than a year.
   (ii) Find the contact number of the college where the student named 'Rakhee' is enrolled.

**OR**

5. (a) Evaluate the advantages and disadvantages of using Domain Relational Calculus (DRC) compared to Tuple Relational Calculus (TRC) in expressing complex queries in a relational database. Provide examples to support your analysis. 5 CO2

(b) Given two tables, Orders and Customers, where Orders contains a foreign key CustomerID that references Customers (CustomerID), demonstrate how referential integrity ensures the consistency of data when inserting a new order. Provide an example of an INSERT statement that would violate referential integrity and explain why. 5 CO2

(c) Compare Relational Algebra and SQL. Also discuss various relational algebra operators with example of each. 5 CO2

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