R.N.G.PATEL INSTITUTE OF TECHNOLOGY-RNGPIT
(An Autonomous Institute U/s UGC Act 1956)

B.Tech. SEMESTER-III, SEMESTER END EXAMINATION – WINTER 2025

SUBJECT CODE: 1CS302   **DATE: 18-12-2025**
SUBJECT NAME: DATABASE MANAGEMENT SYSTEMS
TIME: 11:00 AM to 01:30 PM   **TOTAL MARKS: 70**

Instructions
1. It is **compulsory** for students to write **Enrolment No. /Seat No.** on the question paper.
2. Write answers of **Section A** and **Section B** in **separate answer books**.
3. Attempt all questions from both **Section A** and **Section B**.
4. Each section carries **35 marks**, with a total of **70 marks** for the examination.
5. The figures to the right of each question indicate full marks, make suitable assumptions with justification.
6. BL - Cognitive Level (As per Revised Bloom's Taxonomy) (R-Remember, U-Understanding, A –Application, N –Analyze, E – Evaluate, C -Create), CO - Course Outcomes.

SECTION A

			Marks	BL	CO
Q.1	**(a)**	Compare how DBMS is better than file management system.	03	N	1
	(b)	Explain database system 3 tier architecture with clear diagram in detail.	04	U	1
Q.2	**(a)**	What is the difference between Join and Sub query?	03	N	4
	(b)	What are the key differences between WHERE and HAVING clauses? Explain with an examples.	04	N	4
	(c)	Consider the following tables and answer the queries in SQL.	07	A	4

Books (isbn_no, title, publisher_id, year)
Authors (author_id, author_name, country, city) Publishers (publisher_id, publisher_name, city)
WrittenBy (isbn_no, author_id)

Give an expression in SQL for each of the following queries:
    I. List all the books published after 1998.
    II. Update the city of author to "Baroda" whose author id is 10.
    III. List all the book titles written by author "korth".
    IV. Add column "price" in the table Books.
    V. Display number of Publishers from the city "Ahmedabad".
    VI. List all the books published by "McGaw Hill".
    VII. Display all publishers in the ascending order of their name.

OR

Q.2	**(a)**	Explain any two built-in function for following category. I) Numeric II) String III) Date	03	A	4
	(b)	What is the view? How does it different from the table?	04	N	4

(c)	Consider the following tables and answer the queries in SQL. Products(prod_id, prod_name, category, price) Customers(cust_id, cust_name, country, city) Orders(order_id, cust_id, prod_id, order_date, quantity)	**07**	**A**	**4**

Give an expression in SQL for each of the following queries:
  I. List all the products having price less than 2000.
  II. Update price of a product to 3000 whose product id is 43.
  III. Display names of customer who have placed atleast one order.
  IV. Display customer id and total number of orders placed by them.
  V. List all Customers in the descending order of their city.
  VI. Display names of customers who have ordered "Television" (Product Name)
  VII. Remove column "category" from the Products table.

Q.3	**(a)**	Define Following: I. Logging II. Checkpointing III. Shadow Paging	**03**	**R**	**5**
	(b)	Define deadlock. Explain the methods for detection, prevention, and avoidance of deadlocks.	**04**	**U**	**5**
	(c)	Explain the ACID properties of a transaction. Illustrate each property with a suitable example.	**07**	**A**	**5**

OR

Q.3	**(a)**	Define Following: I. B-tree II. B+ Tree III. Bitmap Indexing	**03**	**R**	**5**
	(b)	Explain the following transaction control commands with an example: I. COMMIT II. ROLLBACK	**04**	**A**	**5**
	(c)	Draw and explain the state transition diagram of a transaction. Describe all the states involved.	**07**	**A**	**5**

SECTION B

			Marks	BL	CO
Q.4	**(a)**	What is query optimization and why is it important in database systems?	**03**	**R**	**6**
	(b)	Describe Access Control in Database Management Systems. How does it ensure data security?	**04**	**U**	**6**
Q.5	**(a)**	Describe composite, multivalued, and derived attributes used in ER model.	**03**	**R**	**2**
	(b)	Explain Generalization and Specialization in ER modeling with examples of each.	**04**	**U**	**2**
	(c)	Draw an ER diagram for an Online Bookstore System for the following information.	**07**	**A**	**2**

- **Book**: ISBN, Title, Price
- **Author**: AuthorID, Name — a book can have multiple authors; an author can write multiple books
- **Customer**: CustomerID, Name, Address — a customer can place multiple orders; each order can include multiple books
- **Publisher**: PublisherID, Name — a publisher can publish multiple books
- **Order**: OrderID, Date — placed by a customer; contains one or more books

OR

			Marks	BL	CO
Q.5	**(a)**	What is a Weak Entity? How does it differ from a Strong Entity?	**03**	**R**	**2**
	(b)	What is relational algebra in database? Describe the selection and projection operations with suitable example.	**04**	**U**	**2**
	(c)	Draw an ER diagram for a University Database for the following information:	**07**	**A**	**2**

- Department: DeptID, Name
- Course: CourseID, Title, Credits — belongs to one department
- Professor: ProfID, Name — teaches multiple courses
- Student: RollNo, Name, Address — enrolls in multiple courses
- Project: ProjectID, Title — supervised by a professor, involves multiple students

			Marks	BL	CO
Q.6	**(a)**	Given relations R(A, B) and S(A, B), analyze the difference in the results of R ∪ S, R ∩ S, and R − S.	**03**	**N**	**3**
	(b)	Consider the following relations of Library Management System:	**04**	**A**	**3**

Book(ISBN, Title, AuthorID, Price, CategoryID)
Author(AuthorID, Name, Email)
Category(CategoryID, CategoryName)

Write down relational algebras to answer the following:

i) Display all books priced above 500.

ii) Display Book Title, Author Name, and Category Name.

iii) Count the number of books in each category.

iv) List the names of authors who have written more than one book.

(c) Explain 2NF and 3NF with suitable examples of each. **07** U 3

OR

Q.6 **(a)** Explain the purpose of normalization in relational databases and how it reduces data redundancy. **03** N 3

(b) Consider the following relation: **04** A 3
EmpDept(EmpID, EmpName, DeptID, DeptName, ManagerID, ManagerName)

Candidate key is (EmpID, DeptID).
Apply normalization decompose the relation into 3NF relations.

(c) What is a join operation in relational algebra? Explain Theta Join, Natural Join, Outer Join, and Self Join with suitable examples. **07** U 3