

GUJARAT TECHNOLOGICAL UNIVERSITY
BACHELOR OF ENGINEERING – SEMESTER 3 – EXAMINATION – SUMMER 2026

Subject Code: 3130703

Date: 19/06/2026

Subject Name: DATABASE MANAGEMENT SYSTEM

Time: 02:30 PM TO 05:00 PM

Total Marks: 70

Instructions:

- 1. Attempt all questions.**
- 2. Make suitable assumptions wherever necessary.**
- 3. Figures to the right indicate full marks.**
- 4. Simple and non-programmable scientific calculators are allowed.**

- Q.1** (a) Explain candidate key, primary key and foreign key. **03**
(b) Explain different types of database users. **04**
(c) Explain database system 3-tier architecture with diagram in detail. **07**
- Q.2** (a) Consider following relations and write queries in the form of relational algebra. **03**
Student(std_id, std_name, semester, dept_id)
Department(dept_id, dept_name, no_of_faculties)
1) Find the names of departments that have more than 12 faculties.
2) Find the names of students who are in the 3rd semester.
3) Select all students with std_id = 203.
- (b) Explain Armstrong's axioms. **04**
(c) Draw E-R diagram for canteen management system showing at least four entity types and their relationships with necessary assumptions. **07**
- OR
- Q.2** (c) Draw E-R diagram for an online shopping system showing at least four entity types and their relationships with necessary assumptions. **07**
- Q.3** (a) Explain ACID properties of transaction. **03**
(b) Differentiate lossy decomposition and lossless decomposition. **04**
(c) Consider the relation R(ABCD) with dependencies $F = \{AB \rightarrow C, BC \rightarrow D\}$. Does the above relation appear in 3NF? If not, normalize it in 3NF. **07**
- OR
- Q.3** (a) Explain Two phase commit protocol. **03**
(b) Let $R = (A, B, C, D, E, F)$ be a relation schema with the following dependencies $\{C \rightarrow F, E \rightarrow A, EC \rightarrow D, A \rightarrow B\}$ What is the Candidate key of the relation R? **04**
(c) What is normalization? Explain 2NF, 3NF and BCNF with suitable examples. **07**
- Q.4** (a) Differentiate Sparse and Dense dense index in DBMS. **03**
(b) What is the limitation of index-sequential file? Explain with example how B+ tree overcomes it. **04**
(c) What do you mean by Serializable Schedule? Explain View Serializability with example. **07**
- OR
- Q.4** (a) Differentiate dynamic hashing and static hashing. **03**
(b) Write a short note on Intrusion Detection in DBMS. **04**
(c) Discuss various steps of query processing with diagram. **07**
- Q.5** (a) Explain Triggers in PL/SQL with example. **03**

(b) What is the difference between Join and Sub query? Explain with example. **04**

(c) Consider the following relations and write SQL queries for given statements. Assume suitable constraints. **07**

Passengers(passenger_id, name, age, gender)

Trains(train_id, train_name, source, destination)

Bookings(booking_id, passenger_id, train_id, booking_date, fare)

- 1) Write a query to display all passengers with their booked train names.
- 2) Write a query to count total number of bookings per train.
- 3) Write a query to find the average fare of all bookings.
- 4) Write a query to rename the column name in Passengers table to full_name.

OR

Q.5 (a) Explain Cursors in PL/SQL with example. **03**

(b) Describe Data Definition Language and Data Manipulation Language. **04**

(c) Consider the following relations and write SQL queries for given statements. Assume suitable constraints. **07**

Guests(guest_id, name, contact, email)

Rooms(room_id, room_number, room_type, price)

Reservations(reservation_id, guest_id, room_id, check_in, check_out, total_amount)

- 1) Display guest names with their booked room numbers.
- 2) Update the price of room with room_id = 102 to 3500.
- 3) Find guests who have made more than 2 reservations.
- 4) Find guests who have not made any reservations.

GUJARAT TECHNOLOGICAL UNIVERSITY**BE - SEMESTER-III EXAMINATION – SUMMER 2025****Subject Code:3130703****Date:31-05-2025****Subject Name:Database Management Systems****Time:02:30 PM TO 05:00 PM****Total Marks:70****Instructions:**

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.
4. Simple and non-programmable scientific calculators are allowed.

		MARKS
Q.1*	(a) Explain Logical & Physical data independence supported by DBMS	03
	(b) Explain different types of users of DBMS.	04
	(c) Compare database approach with traditional file systems to store application data.	07
Q.2	(a) Explain Three Layer Schema Architecture of DBMS.	03
	(b) Explain Specialization, Generalization and Categorization in EER Modeling.	04
	(c) Explain Following Constraints supported by RDBMS:	07
	1. Primary Key	
	2. Foreign Key / Referential Integrity Constraints	
	3. Entity Integrity	
	4. Domain Constraint	
	OR	
Q.3	(c) Explain Relational Algebra Operations in detail.	07
	(a) Explain Recursive Relationship in ER Modeling with example.	03
	(b) Explain Cardinality Ratio and Participation constraint of ER Model.	04
	(c) What is the need to normalize data? Explain 1NF, 2NF & 3NF in detail.	07
	OR	
Q.3	(a) Explain ACID Properties of transaction with appropriate example.	03
	(b) Consider a relation R(A,B,C,D,E) with following dependencies: AB→C, CD→E, DE→B . Is ABD a candidate key of this relation?	04
	(c) Explain Inference Rules for Functional Dependency.	07
Q.4	(a) What is the use of system log? What are the typical kinds of records in a system log? What are transaction commit points, and why are they important?	03
	(b) Explain SQL Injection in brief.	04
	(c) Explain Query Optimization with example.	07
	OR	
Q.4	(a) Explain the use of Btrees.	03
	(b) Explain Cursor in PL/SQL with example.	04
	(c) Explain Conflict Serializability with precedence graph in Transaction Processing.	07
Q.5	(a) Draw a state diagram, and discuss the typical states that a transaction goes through during execution.	03

- (b) Explain Two phase locking protocol for guaranteeing Serializability. 04
(c) Explain Deadlock handling in Transaction Processing. 07

OR

- Q.5** (a) Explain the use of group by and having clause in SQL queries. 03
(b) Explain Triggers in PL/SQL with example. 04
(c) Consider Following 3 Tables and Write SQL Queries. 07
1. Books (BookID, BookTitle, Price, Author, Publisher)
2. Students (StudID, StudName, DOB, Gender, Branch, Sem)
3. Issue_Books (StudID, BookID, Issue_Date)

Query1: List all Books whose price in range of 300 to 500 Rs.

Query2: Display all Publisher Name & Total count of Books of that publisher.

Query3: Display list of all books which are not issued to any students.

Query4: Display the name students who are issued books in current month.

Query5: Display all Books assigned to student with name “mahesh”.

Query6: Display total no of books in library

Query7: Display the list of girl students who have taken book from library.

GUJARAT TECHNOLOGICAL UNIVERSITY**BE - SEMESTER-III (NEW) EXAMINATION – SUMMER 2024****Subject Code:3130703****Date:29-06-2024****Subject Name: Database Management Systems****Time:10:30 AM TO 01:00 PM****Total Marks:70****Instructions:**

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.
4. Simple and non-programmable scientific calculators are allowed.

MARKS

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|------------|--|-----------|
| Q.1 | (a) Define Logical Data Independence and Physical Data Independence. | 03 |
| | (b) Draw and explain 3 layers of abstraction of DBMS | 04 |
| | (c) Write relational algebra expression for following
<u>(query 1,2 and 3 carry one mark/query 4 & 5 carry two marks)</u>
Employee(eid, ename, salary, deptid)
Department(deptid, dname)
1) List name of all employee
2) List all the departments with id > 5
3) List sum of the salary all employees.
4) Department wise count the number of employees
5) Find the name of employee earning highest salary. | 07 |
| OR | | |
| Q.2 | (a) List various symbol used for ER diagram | 03 |
| | (b) Define referential integrity constraint with example. | 04 |
| | (c) List the Armstrong axioms used to compute closure of the set of functional dependency. | 07 |
| OR | | |
| | (c) What is decomposition? Explain dependency preserving decomposition with the help of example. | 07 |
| Q.3 | (a) Give syntax of command used to add a new column in a table. | 03 |
| | (b) Define indexing. How will it be useful for searching data? | 04 |
| | (c) How can we measure cost of Join query? Explain using example. | 07 |
| OR | | |
| Q.3 | (a) Write an SQL command to modify the content of table. | 03 |
| | (b) Explain sparse indexing with the help of diagram. | 04 |
| | (c) Draw and explain the query processing steps | 07 |
| Q.4 | (a) What is relational model? Explain schema diagram using example. | 03 |
| | (b) Define transaction and its properties? | 04 |
| | (c) Write a note on view serializability | 07 |
| OR | | |
| Q.4 | (a) With the help of example explain Generalization.. | 03 |
| | (b) Define various approach used for Log based recovery | 04 |
| | (c) List and explain various types of Locks used for concurrency control. | 07 |

- Q.5** (a) How can we print output in PL/SQL block? Give example. **03**
(b) Explain cursor and its types. **04**
(c) Write SQL queries for the following **07**
(query 1,2 and 3 carry one mark/query 4 & 5 carry two marks)
Employee(eid, ename, salary, deptid)
Department(deptid, dname)
1. List name of all employee
2. List all the departments with id > 5
3. List sum of the salary all employees.
4. Department wise count the number of employees
5. Find the name of employee earning highest salary.

OR

- Q.5** (a) Define encryption and decryption. **03**
(b) List various types of Triggers. **04**
(c) What is role? How can we authorize a user using grant and revoke command? Give example. **07**

GUJARAT TECHNOLOGICAL UNIVERSITY**BE - SEMESTER-III(NEW) EXAMINATION – SUMMER 2023****Subject Code:3130703****Date:28-07-2023****Subject Name:Database Management Systems****Time:02:30 PM TO 05:00 PM****Total Marks:70****Instructions:**

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.
4. Simple and non-programmable scientific calculators are allowed.

		MARKS
Q.1	(a) Explain the different types of database users.	03
	(b) What are the responsibilities of a DBA?	04
	(c) Explain database system 3 tier architecture with clear diagram in detail.	07
Q.2	(a) Explain candidate key, primary key and foreign key.	03
	(b) Explain Mapping Cardinalities.	04
	(c) Explain Entity Relationship model with example.	07
	OR	
	(c) What is join? Explain various type of joins with example.	07
Q.3	(a) Explain query optimization process.	03
	(b) Explain 3NF with example	04
	(c) What is functional dependency? Explain its types in detail.	07
	OR	
Q.3	(a) What are anomalies in database design? How can we solve it?	03
	(b) Explain BCNF with example.	04
	(c) Enlist and explain the basic steps in Query Processing.	07
Q.4	(a) Explain log based recovery and mention all its types.	03
	(b) Explain Two phase commit protocol?	04
	(c) What is a transaction? Explain the ACID properties.	07
	OR	
Q.4	(a) Write short note on data encryption.	03
	(b) Explain deadlock detection.	04
	(c) Explain conflict serializability and view serializability.	07
Q.5	(a) Describe GRANT and REVOKE commands	03
	(b) Explain Transaction Control Commands	04
	(c) Consider the following employee database, primary keys are underlined : employee (<u>employee-name</u> , street, city) works (<u>employee-name</u> , company-name, salary) company (<u>company-name</u> , city) manages (<u>employee-name</u> , manager_name) Give an expression in SQL for each of the following queries:	07

1. Find the names of all employees who work for First Bank Corporation.
2. Give all employees of First Bank Corporation a 10 percent raise.
3. Find the names and cities of residence of all employees who work for First Bank Corporation.
4. Find the names, street addresses, and cities of residence of all employees who work for First Bank Corporation and earn more than \$10,000.
5. Find all employees in the database who live in the same cities as the companies for which they work.
6. Find all employees in the database who do not work for First Bank Corporation.

OR

- | | | |
|------------|--|-----------|
| Q.5 | (a) Explain DDL,DML,DCL with example | 03 |
| | (b) Discuss aggregate functions with example(s). | 04 |
| | (c) Explain stored procedures and stored functions. | 07 |
