

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.
