Seat No./Enrollment No.: _____

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

Subject Code: BE03000091 **Date: 24/06/2026**

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)**	Define Database Management System. Explain its purpose.	**03**
	(b)	Differentiate between Database Users and Database Administrator (DBA).	**04**
	(c)	Explain Database Architecture with a neat diagram.	**07**
Q.2	**(a)**	Define Superkey, Candidate Key and Primary Key in Relational Model.	**03**
	(b)	Write relational algebra expressions for :i) Select students with marks > 60 ii) Project student names only	**04**
	(c)	Briefly explain generalization and specialization in E-R diagram with suitable example.	**07**
		OR	
Q.2	**(c)**	Draw an E-R diagram of following scenario. Make necessary assumptions and clearly note down the assumptions. We would like to make our College's manually operated Library to fully computerized .	**07**
Q.3	**(a)**	What is functional dependency? Explain armstrong's axioms.	**03**
	(b)	Explain trivial functional dependencies with suitable example	**04**
	(c)	For the mentioned the relation Employees (empId, empName, carName, parkingSlot) with functional dependencies F : {empId→ carName, empId→ empName, carName→ parkingSlot}. Does the above table appear in 3NF? If not, normalize it in 3NF	**07**
		OR	
Q.3	**(a)**	What is the closure of a set of attributes? Illustrate with an example.	**03**
	(b)	Consider the relation R(A, B, C, D) with functional dependencies: • A → B • B → C • C → D Find the candidate keys of R and state whether R is in BCNF. Justify your answer.	**04**
	(c)	Consider a relation R(A, B, C, D, E) with the following three functional dependencies. AB → C ; BC → D ; C → E Find out the number of superkeys in the relation R.	**07**

Q.4	**(a)**	What is a transaction? List its types.	**03**
	(b)	Explain authentication methods used in DBMS with example	**04**
	(c)	Explain static hashing with an example.	**07**
		OR	
Q.4	**(a)**	Differentiate between primary index and secondary index.	**03**
	(b)	What are ACID properties? Explain with simple example.	**04**
	(c)	Explain the steps of query processing with neat diagram.	**07**
Q.5	**(a)**	Define deadlock in transaction management. List two methods to handle it.	**03**
	(b)	Consider a case where a bank transfers money from Account A to Account B. Analyze where COMMIT and ROLLBACK should be applied to maintain correctness if an error occurs during the transfer	**04**
	(c)	The given relation CUSTOMER (CId,Name, Age, Address,Salary). Write a PL/SQL procedure that increases the salary of employees by 5% whose age is greater than 50	**07**
		OR	
Q.5	**(a)**	What is timestamp protocol in concurrency control?	**03**
	(b)	For the relation EMPLOYEE(EmpId, Name, Age, Salary), analyze which constraints are necessary to ensure: i) Every employee has a unique ID ii) Age must be greater than 18 iii) Salary cannot be NULL.	**04**
	(c)	Consider following relations. Students(stdId, stdName, semester, deptId) Departments(deptId, deptName, totalFaculties) Write SQL queries for: 1) List the department names and the number of students enrolled in each department. 2) List the names of students along with their department names, but only those in departments with more than 20 faculty members. 3) Display all information of students in "Semester 1"	**07**

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