Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER– III (New) EXAMINATION – WINTER 2019

Subject Code: 3130703 Date: 30/11/2019

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.**

			MARKS
Q.1	**(a)**	Define Primary key, Candidate key and Super key.	**03**
	(b)	List the relational algebra operators. Discuss any two such algebra operator with suitable example.	**04**
	(c)	Enlist and explain the advantages of DBMS over traditional file system.	**07**
Q.2	**(a)**	Explain Instance and Schema in detail.	**03**
	(b)	The relational database schema is given below. employee (person-name, street, city) works (person-name, company-name, salary) company (company-name, city) manages (person-name, manager-name) Write the relational algebra expressions for the given queries. 1.Find the names of all employees who work for First Bank Corporation. 2.Find the names and cities of residence of all employees who work for First Bank Corporation. 3.. Find the names, street address, and cities of residence of all employees who work for First Bank Corporation and earn more than $10,000 per annum. 4. Find the names of all employees in this database who do not work for First Bank Corporation.	**04**
	(c)	Construct an E-R diagram for a car insurance company whose customers own one or more cars each. Each car has associated with it zero to any number of recorded accidents. Each insurance policy covers one or more cars, and has one or more premium payments associated with it. Each payment is for a particular period of time and has an associated due date and the date when the payment was received.	**07**
		OR	
	(c)	Explain specialization and generalization concepts in ER diagram with suitable example.	**07**
Q.3	**(a)**	What do you mean by integrity constraints? Discuss various integrity constraints.	**03**
	(b)	Consider schema R = (A, B, C, G, H, I) and the set F of functional dependencies {A → B, A → C, CG → H, CG → I, B → H}. Prove that AG → I Holds.	**04**

	(c)	A college maintains details of its lecturers' subject area skills. These details comprise: Lecturer Number, Lecturer Name, Lecturer Grade, Department Code, Department Name, Subject Code, Subject Name, Subject Level Assume that each lecturer may teach many subjects but may not belong to more than one department. Subject Code, Subject Name and Subject Level are repeating fields. Normalize this data to Third Normal Form.	**07**

OR

Q.3	**(a)**	Explain various Normal forms up to 3NF.	**03**
	(b)	Explain Armstrong's Axioms in detail.	**04**
	(c)	A software contract and consultancy firm maintain details of all the various projects in which its employees are currently involved. These details comprise: Employee Number, Employee Name, Date of Birth, Department Code, Department Name, Project Code, Project Description, Project Supervisor Assume the following: • Each employee number is unique. • Each department has a single department code. • Each project has a single code and supervisor. • Each employee may work on one or more projects. • Employee names need not necessarily be unique. • Project Code, Project Description and Project Supervisor are repeating fields. Normalize this data to Third Normal Form.	**07**
Q.4	**(a)**	Explain Authorization and access control in brief.	**03**
	(b)	Discuss various steps of query processing with diagram.	**04**
	(c)	Construct a B tree for the following set of key values: (2,3,5,7,11,17,19,23,29,31) Assume that the tree is initially empty and values are added in ascending order. Consider the number of pointers in each node as four.	**07**

OR

Q.4	**(a)**	Explain various mapping cardinalities.	**03**
	(b)	Describe log-based recovery in brief.	**04**
	(c)	Explain Dense and Sparse indices in detail.	**07**
Q.5	**(a)**	What is PL/SQL. Explain the difference between SQL and PL/SQL.	**03**
	(b)	Write a note on two phase locking protocol.	**04**
	(c)	**Consider following schema and write SQL for given statements.** Student (RollNo, Name, DeptCode, City) Department (DeptCode, DeptName) Result (RollNo, Semester, SPI) 1. Display the name of students with RollNo whose name ends with 'sh'. 2. Display department wise total students whose total students are greater than 500. 3. List out the RollNo, Name along with CPI of Student.	**07**

4. Create RollNo field as primary key for existing Student table.
5. Display student name who got highest SPI in semester 1.
6. Display the list of students whose DeptCode is 5, 6,7,10.
7. Create table Student_New from student table without data.

OR

Q.5 **(a)** Explain conflict serializability with the help of suitable example. **03**

(b) Enlist and explain ACID properties for transaction. **04**

(c) **Consider the tables given below. Write the SQL queries for the questions given below:** **07**

T1 (Empno, Ename , Salary, Designation,)
T2 (Empno, Deptno.)
(1) Display all the details of the employee whose salary is lesser than 10000.
(2) Display the Deptno in which Employees with name starting with letter 'S' is working.
(3) Add a new column Deptname in table T2.
(4) Change the designation of Geeta from 'Manager' to 'Senior Manager'.
(5) Find the total salary of all the employees department wise.
(6) Add Empno as primary key in existing table T1.
(7) Display the Deptno having highest number of employees.

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Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE- SEMESTER–III (NEW) EXAMINATION – WINTER 2020

Subject Code:3130703 Date:04/03/2021

Subject Name:Database Management Systems

Time:10:30 AM TO 12:30 PM Total Marks:56

Instructions:

1. **Attempt any FOUR questions out of EIGHT questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**

			Marks
Q.1	**(a)**	Define following terms. 1) Schema 2) Database Management System 3) Physical Data Independence	**03**
	(b)	Describe tasks performed by the Database Administrator.	**04**
	(c)	Differentiate strong entity set and weak entity set. Demonstrate the concept of both using real-time example using E-R diagram.	**07**
Q.2	**(a)**	Consider the relation scheme R = {E, F, G, H, I, J, K, L, M, M} and the set of functional dependencies {{E, F} -> {G}, {F} -> {I, J}, {E, H} -> {K, L}, K -> {M}, L -> {N} on R. What is the key for R?	**03**
	(b)	Consider a relation scheme R = (A, B, C, D, E, H) on which the following functional dependencies hold: {A–>B, BC–> D, E–>C, D–>A}. What are the candidate keys of R?(Any 1 in case of more than one candidate key	**04**
	(c)	Draw an E-R diagram of following scenario. Make necessary assumptions and clearly note down the same. We would like to make our College's manually operated Library to fully computerized .	**07**
Q.3	**(a)**	Define the terms: a) Primary Key b) Super Key	**03**
	(b)	List the type of joins in relational algebra. Explain with example.	**04**
	(c)	Which operator is used for "For All "type of queries? Explain same with example.	**07**
Q.4	**(a)**	Define the terms : a) foreign key b) candidate key	**03**
	(b)	List unary relational operators and explain with example.	**04**
	(c)	Consider the following relational database schema consisting of the four relation schemas: **passenger** (pid, pname, pgender, pcity) **agency** (aid, aname, acity) **flight** (fid, fdate, time, src, dest) **booking** (pid, aid, fid, fdate) Answer the following questions using relational algebra queries. **a.** Get the details about all flights from Chennai to New Delhi. **b.** Get the complete details of all flights to New Delhi. **c.** Find the passenger names for passengers who have bookings on at least one flight.	**07**

Q.5 **(a)** List and explain ACID properties with respect to Database transaction. **03**

(b) Explain RAID Levels with respect to Data Storage. **04**

(c) Explain the concept of Conflict Serializable with suitable schedules. **07**

Q.6 **(a)** List and explain types of locks in transactions. **03**

(b) With neat diagram explain data storage hierarchy so far. **04**

(c) Explain deadlock with suitable scheduling examples. **07**

Q.7 **(a)** Explain following SQL commands with syntax and significance. Grant & Revoke **03**

(b)

```
TABLE Worker(WORKER_ID INT NOT NULL PRIMARY
KEY,FIRST_NAME CHAR(25), LAST_NAME CHAR(25),SALARY
INT(15),JOINING_DATE DATETIME,DEPARTMENT CHAR(25));

TABLE Bonus(WORKER_REF_ID INT,BONUS_AMOUNT
INT(10),BONUS_DATE DATETIME,FOREIGN KEY
(WORKER_REF_ID),REFERENCES Worker(WORKER_ID));

TABLE Title(WORKER_REF_ID INT,WORKER_TITLE
CHAR(25),AFFECTED_FROM DATETIME,FOREIGN KEY
(WORKER_REF_ID)REFERENCES Worker(WORKER_ID));
```

04

Consider above 3 tables ,assume appropriate data and solve following SQL queries

1. Find out unique values of DEPARTMENT from Worker table
2. Print details of the Workers whose SALARY lies between 100000 and 500000.
3. Print details of the Workers who have joined in Feb'2014.
4. Fetch worker names with salaries >= 50000 and <= 100000.

(c) Write short note on query processing. **07**

Q.8 **(a)** Explain following SQL commands with syntax and significance. Commit & Rollback **03**

(b)

```
TABLE Worker(WORKER_ID INT NOT NULL PRIMARY
KEY,FIRST_NAME CHAR(25), LAST_NAME CHAR(25),SALARY
INT(15),JOINING_DATE DATETIME,DEPARTMENT CHAR(25));

TABLE Bonus(WORKER_REF_ID INT,BONUS_AMOUNT
INT(10),BONUS_DATE DATETIME,FOREIGN KEY
(WORKER_REF_ID),REFERENCES Worker(WORKER_ID));

TABLE Title(WORKER_REF_ID INT,WORKER_TITLE CHAR(25),
       AFFECTED_FROM DATETIME,FOREIGN KEY
(WORKER_REF_ID)REFERENCES Worker(WORKER_ID));
```

04

Consider above 3 tables ,assume appropriate data and solve following SQL queries

1. Print details of the Workers who are also Managers.
2. SQL query to clone a new table from another table.
3. Fetch the list of employees with the same salary.
4. Fetch "FIRST_NAME" from Worker table in upper case.

(c) List the techniques to obtain the query cost. Explain any one. **07**

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Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–III (NEW) EXAMINATION – WINTER 2021

Subject Code:3130703 Date:21-02-2022

Subject Name:Database Management System

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
Q.1	**(a)**	Explain three levels of data abstraction.	**03**
	(b)	Describe Data Definition Language and Data Manipulation Language.	**04**
	(c)	What is integrity constraint? Explain primary key, reference key and check constraint with SQL syntax.	**07**
Q.2	**(a)**	Differentiate single-valued and multi-valued attributes with example.	**03**
	(b)	What is weak entity? How the weak entity can be converted to the strong entity? Show the symbol for representing weak entity.	**04**
	(c)	Why do we require E-R model? Explain the term ‘Generalization’, ‘Specialization’ and ‘Aggregation’.	**07**
		OR	
	(c)	What is the similarity between relational model and E-R model? How the entity, attributes, primary key and relationship are shown in the relational model.	**07**
Q.3	**(a)**	Write Relational Algebra syntax for the following queries. Employee(eno,ename,salary,designation) Customer(cno,cname,address,city) 1) Find out name of employees who are ‘Manager’. 2) Display name of customers. 3) Retrieve Employee records whose salary is less than 20,000.	**03**
	(b)	Differentiate lossy decomposition and lossless decomposition.	**04**
	(c)	What is redundancy? Explain insert, update and delete anomalies in database with example.	**07**
		OR	
Q.3	**(a)**	Write Relational Algebra syntax for the given queries using the following database. Employee(eno,ename,salary,designation) Customer(cno,cname,address,city) 1) Find out name of employees who are also customers. 2) Find out name of person who are employees but not customers. 3) Display all names who are either employees or customers.	**03**
	(b)	What is the limitation of index-sequential file? Explain with example how B^+ tree overcomes it.	**04**
	(c)	What is the difference between Join and Sub query? Explain any two built-in function for following category. 1) Numeric 2) String 3) Date	**07**
Q.4	**(a)**	What is the view? How does it different from the table?	**03**
	(b)	Explain below mentioned features of concurrency.	**04**

1) Improved throughput 2) Reduced waiting time

	(c)	What is index in the database? Explain sparse indices and Dense indices with proper example.	**07**

OR

Q.4	**(a)**	Differentiate dynamic hashing and static hashing.	**03**
	(b)	What is the atomicity and consistency property of transaction?	**04**
	(c)	What is Query processing? Explain why 'Parsing and translation' and 'Optimization' steps are required for query processing.	**07**

Q.5	**(a)**	How does 'partial commit' state differ from 'commit' state of the transaction?	**03**
	(b)	Enlist and explain user authorization to modify the database schema.	**04**
	(c)	How does two phase locking protocol differ from timestamp based protocol? Explain timestamp-ordering protocol.	**07**

OR

Q.5	**(a)**	Why does the trigger require in database? Write SQL syntax for creating database trigger.	**03**
	(b)	When do we require to use group by clause? How aggregate functions are used with group by clause?	**04**
	(c)	When Join is used in SQL? Explain Left outer, Right outer and Full outer join with SQL syntax.	**07**

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Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER– III EXAMINATION – SUMMER 2020

Subject Code: 3130703 Date:29/10/2020

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.**

			Marks
Q.1	**(a)**	What are the main functions of a database administrator?	**03**
	(b)	Explain the difference between physical and logical data independence.	**04**
	(c)	Explain DBMS System Architecture.	**07**
Q.2	**(a)**	Describe the differences in meaning between the terms relation and relation schema.	**03**
	(b)	Write the following queries in relational algebra: (1) Find the names of suppliers who supply some red part. (2) Find the IDs of suppliers who supply some red or green part.	**04**
	(c)	An ER diagram can be viewed as a graph. What do the following mean in terms of the structure of an enterprise schema? (1) The graph is disconnected. (2) The graph is acyclic.	**07**
		OR	
	(c)	Draw ER diagram for university database consisting four entities Student, Department, Class and Faculty. Student has a unique id, the student can enroll for multiple classes and has a most one major. Faculty must belong to department and faculty can teach multiple classes. Each class is taught by only faculty. Every student will get grade for the class he/she has enrolled.	**07**
Q.3	**(a)**	What is normalization? Explain 2NF.	**03**
	(b)	Explain typical query processing strategy of DBMS?	**04**
	(c)	Compute the closure of the following set F of functional dependencies for relation schema R = (A, B, C, D, E). $A \rightarrow BC$	**07**

CD → E

B → D

E → A

List the candidate keys for R.

OR

Q.3	**(a)**	What is normalization? Explain 3NF.	**03**
	(b)	Write short on block nested loop join.	**04**
	(c)	Use the definition of functional dependency to argue that each of Armstrong's axioms (reflexivity, augmentation, and transitivity) is sound.	**07**
Q.4	**(a)**	Explain hashing.	**03**
	(b)	What is transaction? What are the functions of commit and rollback?	**04**
	(c)	Write a short note on SQL injection.	**07**

OR

Q.4	**(a)**	Explain B-trees.	**03**
	(b)	Explain conflict serializability and view serializability.	**04**
	(c)	Write a short note on intrusion detection.	**07**
Q.5	**(a)**	What is trigger? Explain its type with their syntax.	**03**
	(b)	Write a PL/SQL block to print the given number is odd or even.	**04**
	(c)	Consider the following relational schemas: EMPLOYEE (EMPLOYEE_NAME, STREET, CITY) WORKS (EMPLOYEE_NAME, COMPANYNAME, SALARY) COMPANY (COMPANY_NAME, CITY) Give an expression in SQL for each of queries below:: (1) Specify the table definitions in SQL. (2) Find the names of all employees who work for first Bank Corporation. (3) Find the names and company names of all employees sorted in ascending order of company name and descending order of employee names of that company. (4) Change the city of First Bank Corporation to 'New Delhi'.	**07**

OR

Q.5	**(a)**	Explain cursor and its types.	**03**
	(b)	Write a PL/SQL block to print the sum of even numbers from 1 to 50.	**04**
	(c)	Given the following relations TRAIN (NAME, START, DEST) TICKET (PNRNO., START, DEST, FARE)	**07**

PASSENGER (NAME, ADDRESS, PNRNO.)

Write SQL expressions for the following queries:
Note: Assume NAME of Train is a column of Ticket.

(1) List the names of passengers who are travelling from the start to the destination station of the train.
(2) List the names of passengers who have a return journey ticket.
(3) Insert a new Shatabti train from Delhi to Bangalore.
(4) Cancel the ticket of Tintin.

Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–III (NEW) EXAMINATION – SUMMER 2021

Subject Code:3130703 Date:11/09/2021

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
Q.1	**(a)**	What is Data Definition Language? List DDL statements and explain anyone with an example.	**03**
	(b)	List and describe ACID property of transactions.	**04**
	(c)	Consider the relation R = {A, B, C, D, E, F, G, H, I, J} and the set of functional dependencies F={{A, B} → C, A → {D, E}, B → F, F →{G, H}, D →{I, J}} What is the key for R? Decompose R into 2NF, then 3NF relations.	**07**
Q.2	**(a)**	Differentiate shared lock and exclusive lock in lock-based protocol.	**03**
	(b)	Describe the Cartesian Product operation in relational algebra.	**04**
	(c)	Draw E-R diagram for student management system with the necessary assumption.	**07**
		OR	
	(c)	Consider the relational database given below. Give an expression in the relational algebra to express each of the following queries: Employee (person-name, street, city), Works (person-name, company-name, salary), Company (company-name, city), Manages (person-name, manager-name) (1) Find name of all employees. (2) Find city of employee whose name is 'jashu'. (3) Find name and city of all employees who are having salary>50000. (4) Find total salary of all employees who are working for company 'HCL'.	**07**
Q.3	**(a)**	Describe various state of transaction.	**03**
	(b)	List and explain mapping cardinalities of E-R diagram with example.	**04**
	(c)	What is the use of two-phase locking protocol in concurrency control? Describe the two-phase locking protocol in detail.	**07**
		OR	
Q.3	**(a)**	What is dirty write in the transaction? Explain with example.	**03**
	(b)	What are the importance of Primary key and Unique key in database? Explain with example.	**04**
	(c)	What is a deadlock in transaction? How to detect deadlock in system? Explain with example.	**07**
Q.4	**(a)**	Differentiate closed hashing and open hashing in DBMS.	**03**

	(b)	What is the role of an index in the database management system? Explain dense index with example.	**04**
	(c)	What is the schedule in truncation? How to identify that the given schedule is conflict serializable? Explain with example.	**07**
		OR	
Q.4	**(a)**	What is log-based recovery? List and explain various fields use in log records for log-based recovery.	**03**
	(b)	Discuss view serializability in transactions.	**04**
	(c)	Explain various steps involved in query processing with example.	**07**
Q.5	**(a)**	Explain SQL injection in brief.	**03**
	(b)	What is the use of a cursor in PL/SQL? Explain with example.	**04**
	(c)	Consider the following relations and write SQL queries for given statements. Assume suitable constraints. job(job-id, job-title, minimum-salary, maximum-salary) employee(emp-no, emp-name, emp-salary,dept-no) deposit(acc-no, cust-name, branch-name, amount, account-date) borrow(loan-no, cust-name, branch-name, amount) department (dept-no, dept-name) (1) Give name of employees whose employee number is '001' (2) Give name of depositors whose branch name starts from ‘S’. (3) Give employee name(s) whose salary is between Rs. 20000 to 30000 and department name is Finance. (4) Update the salary of employee by 10% of their salary who is working in the Finance department.	**07**
		OR	
Q.5	**(a)**	Describe two rules of mandatory access control.	**03**
	(b)	Describe Grant and Revoke commands with suitable example.	**04**
	(c)	Write a PL/SQL program that fetches records of all students and insert record as students having CPI > 4 in ELIGIBLE table and students having CPI <= 4 in NOT_ELIGIBLE table from student_master table.	**07**

Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER– III (NEW) EXAMINATION – SUMMER 2022

Subject Code:3130703 Date:15-07-2022

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 Program Data Independence supported by DBMS.	**03**
	(b)	Explain two tier & three tier client/server architecture of DBMS in brief.	**04**
	(c)	Discuss the main characteristics of database approach and how it differs from traditional file systems.	**07**
Q.2	**(a)**	Compare Single,Multi-valued & Composite attributes in E-R Model	**03**
	(b)	Explain Cardinality Ratio & Participation constraint in E-R Modeling.	**04**
	(c)	Explain Three Layer Schema Architecture of DBMS.	**07**
		OR	
	(c)	Explain Following Constraints supported by DBMS: 1. Primary Key 2. Foreign Key / Referential Integrity Constraints 3. Not NULL	**07**
Q.3	**(a)**	Consider a relation R(A,B,C,D,E) with following dependencies: AB→C, CD→E, DE→B . Is AB a candidate key of this relation?	**03**
	(b)	Explain Inference Rules for Functional Dependency.	**04**
	(c)	Explain Specialization, Generalization and Categorization in EER Modeling.	**07**
		OR	
Q.3	**(a)**	Explain ACID Properties of transaction with appropriate example.	**03**
	(b)	Explain Update anomalies with example.	**04**
	(c)	Explain various types of JOIN operation in Relational Algebra.	**07**
Q.4	**(a)**	Explain Cursors in PL/SQL with example.	**03**
	(b)	Explain Lost update & Dirty Read problem in Transaction Processing.	**04**
	(c)	Explain Normalization with 1NF, 2NF and 3NF in brief.	**07**
		OR	
Q.4	**(a)**	Explain the Rollback and commit commands.	**03**
	(b)	Explain Triggers in PL/SQL with example.	**04**
	(c)	Explain working of two phase commit protocol.	**07**
Q.5	**(a)**	What is Serial & Serializable Schedule in Transaction Processing.	**03**
	(b)	Explain state transition Diagram for Transaction Processing in DBMS.	**04**
	(c)	Explain Conflict Serializability with precedence graph in Transaction Processing.	**07**
		OR	
Q.5	**(a)**	What is a query execution plan?	**03**
	(b)	Explain handling of aggregate functions with GROUP BY clouse in SQL.	**04**
	(c)	Consider Following 3 Tables for library database and Write SQL Queries. 1. Books (BookID, BookTitle, Price, Author, Publisher)	**07**

2. Students (StudID, StudName, DOB, Gender, Branch, Sem, Address)
3. Issue_Books (StudID, BookID, Issue_Date)

Query1: List all Books whose Title contains word 'DBMS'.
Query2: Display all Publisher Name & Total Price of Books of that publisher.
Query3: Display list of all books which are not issued to any students.
Query4. Display the author name whose number of books is maximum in library.
Query5: Display all Books assigned to student with name "RAJESH".

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