USN | | | | | | | | | | 18CS53

Fifth Semester B.E. Degree Examination, Feb./Mar. 2022
Database Management System

Time: 3 hrs.   Max. Marks: 100

Note: *Answer any FIVE full questions, choosing ONE full question from each module.*

Module-1

1   a.   List and discuss advantages of Database Management System over File Processing System.
                                                                      (06 Marks)
    b.   Explain three Schema Architecture and reason for need of mapping among schema level.
                                                                      (08 Marks)
    c.   Explain different types of attributes that occur in an E – R diagram model with example.
                                                                      (06 Marks)

OR

2   a.   Explain characteristics of the Database approach.   **(06 Marks)**
    b.   Discuss the different types of User friendly interfaces.   **(06 Marks)**
    c.   Draw an ER diagram for an AIRLINES database schema with atleast five entities. Also specify primary key and structural constraints.   **(08 Marks)**

Module-2

3   a.   What are the basic operations that can change the states of relations in the database? Explain how the basic operations deal with constraints violations.   **(06 Marks)**
    b.   Explain the terms Super key , Candidate key and Primary key. **(04 Marks)**
    c.   Given the following schema :
         emp (fname, Lname , SSN , Bdate, address, gender , salary , superSSN , Dno)
         dept (Dname , Dnumber , MgrSSN , mgrstartdate)
         dept_loc (Dnumber , Dloc)
         project (Pname, Pnumber, Ploc, Dnum)
         works_on (ESSN, Pno , hours)

         Dependent (ESSN , dependent _ name, gender , bdate , relationship)
         Give the relation algebra expression for the following :
         i)   Retrieve the name of the manager of each department.
         ii)   For each project retrieve the project number , project name and number of employee who worked on that project.
         iii) Retrieve the names of employees who work on all the project controlled by department 5.
         iv)   Retrieve the name of employees who have no dependents.
         v)   Retrieve number of Male and Female employee working in the Company.   **(10 Marks)**

OR

4   a.   Describe the steps of an algorithm for ER to Rational mapping with example.   **(06 Marks)**
    b.   Write command that is used for table creation. Explain how constraints are specified in SQL during table creation, with suitable example.   **(04 Marks)**

c. Given the following schema

Emp (Fname, Lname , SSN , bdate , address, gender, salary , superSSN , dno)

dept (dname , dnumber, mgrSSN , mgrstartdate)

dept_loc (dnumber, dloc)

project (Pname, Pnumber, Ploc , dnum)

works_on (ESSN, Pno, hours)

dependent (ESSN , dependent_name, gender, bdate, relationship)

Give the relation algebra expression for the following :

i) Retrieve the name and address of all employees who work for 'sports' department.

ii) Retrieve each department number, number of employers and their average salary.

iii) List the project number, controlling department number and department manager's last name , address and birthdate.

iv) Retrieve the name of employees with 2 or more dependents.

v) List female employees from dno = 20 earning more than 50000. **(10 Marks)**

Module-3

5 a. Define Database stored procedure. Explain creating and calling stored procedure with example. **(06 Marks)**

b. What is SQLJ and how is it different from JDBC? **(06 Marks)**

c. Consider the following schema :

Sailors (Sid , Sname , rating , age)

Boats (bid, bname, color)

Reservers (Sid , bid , day)

Write queries in SQL

i) Find the ages of sailors whose name begins and ends with A and has atleast three characters.

ii) Find the age of the youngest sailor who is eligible to vote (i.e. is atleast 18 years old) for each rating level with atleast two such sailors.

iii) Find the names of sailors who have not reserved a red boat. (use nested query).

iv) Compute increments for the rating of persons who have sailed two different boats on the same day. **(08 Marks)**

OR

6 a. What is CGI? Why was CGI introduced? What are the disadvantages of an architecture using CGI script? **(06 Marks)**

b. What is Dynamic SQL and how is it different from embedded SQL? Explain. **(06 Marks)**

c. Consider the following schema :

Sailors (Sid, Sname, rating , age)

Boats (bid, bname, color)

Reserves (Sid, bid, day).

Write queries in SQL.

i) Find the names of sailors who have reserved at least one boat.

ii) Find sailors whose rating is better than some sailors called 'Jennifer'. (Use nested query)

iii) Find the average age of sailor for each rating level that at least two sailors.

iv) Find the name and age of the oldest sailor. **(08 Marks)**

Module-4

7 a. Which normal form is based on 6 transitive functional dependencies and full functional dependency? Explain the same with example. **(08 Marks)**

b. A relation R satisfies the following : FDS : $A \rightarrow C$, $AC \rightarrow D$, $E \rightarrow AD$, $E \rightarrow H$. Find the cover for this set of FDS.

(06 Marks)

c. Consider the universal relation : $R = \{A, B, C, D, E, F, G, H, I, J\}$ and the set of functional dependencies. $F = \{AB \rightarrow C , A \rightarrow DE , B \rightarrow F , F \rightarrow GH , D \rightarrow IJ\}$. Determine whether each decomposition has the loss less join property with respect to F. $D_1 = \{R_1, R_2, R_3\}$; $R_1 = \{A, B, C, D, E\}$; $R_2 = \{B, F, G, H\}$; $R_3 = \{D, I, J\}$.

(06 Marks)

OR

8 a. Write an algorithm to check whether decomposed relations are in 3NF with dependency preservation and non – additive join property. Consider universal relation $R = (U, C, L, A)$ and the set of functional dependencies. $F = \{P \rightarrow LCA, LC \rightarrow AP , A \rightarrow C\}$. Decompose the relation R into 3NF with dependency preservation and non – additive join property.

(06 Marks)

b. Define Normal Form. Explain 1NF, 2NF and 3NF with suitable examples for each.

(08 Marks)

c. Consider two set of functional dependencies $F = \{A \rightarrow C, AC \rightarrow D , E \rightarrow AD , E \rightarrow H\}$ and $G = \{A \rightarrow CD, E \rightarrow AH\}$. Are they equivalent?

(06 Marks)

Module-5

9 a. What are the anomalies occur due to interleave execution? Explain them with example.

(08 Marks)

b. Explain different types of locks used in concurrency control.

(06 Marks)

c. Explain how shadow paging helps to recover from transaction failure.

(06 Marks)

OR

10 a. Explain ACID property of transaction and system log.

(06 Marks)

b. When deadlock and starvation problem occurs? Explain how these problems can be resolved.

(06 Marks)

c. Explain ARIES recovery algorithm with example.

(08 Marks)

* * * * *

CBCS SCHEME

USN | | | | | | | | | | 18CS53

Fifth Semester B.E. Degree Examination, Jan./Feb. 2021
Database Management System

Time: 3 hrs.   Max. Marks: 100

Note: *Answer any FIVE full questions, choosing ONE full question from each module.*

Module-1

1   a.   Define the following terms :
         i) Database
         ii) DBMS catalog
         iii) Entity
         iv) Snapshot
         v) Degree of a relationship.   (05 Marks)
    b.   Explain types of end-users with suitable examples.   (05 Marks)
    c.   List and explain advantages of using DBMS approach.   (10 Marks

OR

2   a.   Define the following terms
         i)   Cardinality
         ii) Weak entity
         iii) Program data independence
         iv) Total participation
         v)   Value sets.   (05 Marks)
    b.   Describe three schema architecture. Why do we need mappings between schema levels?
                                                                         (05 Marks)
    c.   Explain different types of attributes in ER model with suitable examples for each. (10 Marks

Module-2

3   a.   Explain the entity integrity and referential integrity constraints. Why is each considered important. Give examples.   (05 Marks)
    b.   Discuss equijoin and natural join with suitable examples using relational algebra notation.
                                                                         (05 Marks)
    c.   Given the schema :
         Passenger (pid, pname, pgender, pcity)
         Agency (aid, anme, acity)
         Flight (fid, fdate, time, src, dest)
         Booking (pid, aid, fid, fdate)
         Give relation algebra expression for the following :
         i)   Get the complete details of all flights to new Delhi
         ii) Find only the flight numbers for passenger with paid 123 for flights to Chennai before 06/11/2020
         iii) Find the passenger names for those who do not have any bookings in any flights
         iv) Get the details of flights that are scheduled on both dates 01/12/2020 and 02/12/2020 at 16:00 hours
         v)   Find the details of all male passengers who are associated with jet agency.   (10 Marks)

1 of 2

OR

4 a. Explain the ER to relational mapping algorithm with suitable example for each step.
(10 Marks)

b. Write SQL query for the following database scheme :
Employee(employee_name, street, city)
Works (employee_name, company_name, salary)
Company(company_name, city)
Manages(employee_name, manager_name)
   i) Find the names, street address, and cities of residence for all employees who work for 'First Bank Corporation' and earn more than $10,000
   ii) Find the names of all employees in the database who do not work for 'First Bank Corporation'. Assume that all people work for exactly one company
   iii) Find the names of all employees in the database who earn more that every employee of 'Small Bank Corporation'. Assume that all people work for at most one company
   iv) Find the name of the company that has the smallest payroll
   v) Find the names of all employees in the database who live in the same cities and on the same streets as do their managers.
(10 Marks)

Module-3

5 a. Explain cursors and its properties in embedded SQL with suitable example. (05 Marks)
  b. How are triggers defined in SQL? Explain with example. (05 Marks)
  c. Illustrate insert, delete, update, alter and drop statements in SQL. (10 Marks)

OR

6 a. With an example, explain stored procedures In SQL. (05 Marks)
  b. Briefly explain types of JDBC drives. (05 Marks)
  c. Illustrate aggregate functions in SQL. (10 Marks)

Module-4

7 a. Explain types of update ananalies with examples. (05 Marks)
  b. Explain Armstrong inference rules. (05 Marks)
  c. What is the need for normalization? Explain 1NF, 2NF and 3NF with examples. (10 Marks)

OR

8 a. What is functional dependency? Write an algorithm to find minimal cover for set of functional dependencies. Construct minimal cover m for set of functional dependencies which are : $E : \{B \rightarrow A, D \rightarrow A, AB \rightarrow D\}$ (10 Marks)
  b. Consider the schema $R = ABCD$, subjected to FDs $F = \{A \rightarrow B, B \rightarrow C\}$, and the non-binary partition $D1 = \{ACD, AB, BC\}$. State whether D1 is a lossless decomposition? [give all steps in detail]. (10 Marks)

Module-5

9 a. Define transaction. Discuss ACID properties. (05 Marks)
  b. With a neat diagram explain transition diagram of a transaction. (05 Marks)
  c. Why concurrency control and recovery are needed in DBMS? Explain types of problems that may occur when two simple transactions run concurrently. (10 Marks)

OR

10 a. When deadlock and starvation problem occur? Explain how these problems can be resolved. (10 Marks)
   b. Briefly discuss the two-phase locking techniques for concurrency control. (10 Marks)

* * * * *

USN ☐☐☐☐☐☐☐☐☐☐   **18CS53**

Fifth Semester B.E. Degree Examination, July/August 2022
Database Management System

Time: 3 hrs.   Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

1 a. Discuss the advantages of using the DBMS approach. **(06 Marks)**
   b. Explain three-schema architecture with a neat diagram. Why do we need mapping between schema levels? **(06 Marks)**
   c. Explain the component modules of DBMS and their interaction with the help of a diagram. **(08 Marks)**

OR

2 a. Define the following terms:
       (i) Weak entity   (ii) DBMS catalog   (iii) Snapshot
       (iv) Value sets   (v) Cardinality ratio   (vi) Degree of a relationship **(06 Marks)**
   b. Explain the different categories of data models. **(06 Marks)**
   c. Write the ER diagram for an employee database. The constraints are as follows:
       (i)   An employee works for a department
       (ii)   Every department is headed by a manager
       (iii) An employee works on one or more projects
       (iv)   An employee has dependents
       (v)   A department controls the projects **(08 Marks)**

Module-2

3 a. What is meant by Integrity Constriant? Explain the importance of referential integrity constraint. How referential integrity constraint is implemented in SQL. **(08 Marks)**
   b. Write the relational algebra operations to perform the following queries:
       (i)   Retrieve the name and address of all employees who work for the "Accounts" department.
       (ii)   Retrieve the names of employers who have no dependents.
       (iii) Find the names of employees who work on all the projects controlled by department number 2. **(06 Marks)**
   c. Explain the relational algebra operations from Set theory, with examples. **(06 Marks)**

OR

4 a. Explain the ER to relational mapping algorithm with suitable example for each step. **(10 Marks)**
   b. Write the SQL queries for the following database schema:
       Student (USN, NAME, BRANCH, PERCENTAGE)
       Faculty (FID, FNAME, DEPARTMENT, DESIGNATION, SALARY)
       Course (CID, CNAME, FID)
       Enroll (CID, USN, GRADE)
       (i)   Retrieve the names of all students enrolled for the course 'CS_54'
       (ii)   List all the departments having an average salary of the faculties above Rs.10,000.
       (iii) List the names of the students enrolled for the course'CS_51' and having 'B' grade. **(06 Marks)**
   c. Explain with examples in SQL: (i) INSERT command (ii) UPDATE command **(04 Marks)**

Module-3

5 a. How are assertions and triggers defined in SQL? Explain with examples. (08 Marks)
  b. Explain stored procedures in SQL with an example. (06 Marks)
  c. List out and explain the different types of JDBC drivers. (06 Marks)

OR

6 a. What is a three-tier architecture? What advantages it offer over single tier and two tier architectures? Give a short overview of the functionality at each of the three-tier. (10 Marks)
  b. How to create views in SQL? Explain with an example. (06 Marks)
  c. What is SQLJ? How it is different from JDBC? (04 Marks)

Module-4

7 a. Explain an informal design guidelines for relational schema design. (08 Marks)
  b. What is the need for normalization? Explain 1NF, 2NF and 3NF with examples. (08 Marks)
  c. What do you understand by attribute closure? Give an example. (04 Marks)

OR

8 a. What is functional dependency? Explain the inference rules for functional dependency with proof. (08 Marks)
  b. Define 4NF. When it is violated? Why is it useful? (06 Marks)
  c. Consider two sets of functional dependency $F = \{A \rightarrow C, AC \rightarrow D, E \rightarrow AD, E \rightarrow H\}$ and $G = \{A \rightarrow CD, E \rightarrow AH\}$. Are they equivalent? (06 Marks)

Module-5

9 a. Why concurrency control is needed? Demonstrate with an example. (10 Marks)
  b. Discuss the UNDO and REDO operations and the recovery techniques that use each. (06 Marks)
  c. Explain the ACID properties of a database transaction. (04 Marks)

OR

10 a. Discuss Two-Phase Locking Technique for concurrency control. (10 Marks)
   b. When deadlock and starvation problem occur? Explain how these problems can be resolved. (10 Marks)

* * * * *

Fifth Semester B.E. Degree Examination, July/August 2021
Database Management Systems

Time: 3 hrs.

Max. Marks: 100

Note: Answer any FIVE full questions.

1 a. List and briefly explain the characteristics of database approach. **(08 Marks)**
   b. Define a data model. Discuss the main categories of data model with examples. **(08 Marks)**
   c. Explain the different types of end users with examples. **(04 Marks)**

2 a. What are the advantages of using DBMS? Briefly explain them. **(08 Marks)**
   b. Describe the three-schema architecture. Why do we need mapping between schema levels? **(06 Marks)**
   c. List and explain the different types of attributes with examples. **(06 Marks)**

3 a. Define the following with examples:
      (i)   Super key
      (ii) Candidate key
      (iii) Primary key
      (iv) Foreign key
   (08 Marks)
   b. Summarize the steps involved in converting the ER constructs to relational schemas. **(06 Marks)**
   c. Explain the various inner join operations in relational algebra with examples. **(06 Marks)**

4 a. Describe the six clauses in the syntax of an SQL retrieval query. **(06 Marks)**
   b. How the aggregate functions and grouping are specified in relational model? Explain. **(06 Marks)**
   c. Consider the following schemas :
   SAILOR (SID, SNAME, RATING, AGE)
   BOAT (BID, BNAME, COLOR)
   RESERVE (SID, BID, DAY)
   Specify the following queries in relational algebra:
      (i)   Retrieve the sailor names that have reserved red and green boats.
      (ii) Retrieve the colors of boats reserved by Raj.
      (iii) Retrieve the SIDs of sailors with age over 20, who have not reserved a red boat.
      (iv) Retrieve the names of sailors who have reserved all boats. **(08 Marks)**

5 a. Explain the schema change statements in SQL with examples. **(06 Marks)**
   b. What are views? Explain the specification and implementation of views in SQL. **(08 Marks)**
   c. Describe the concept of cursor and how it is used in embedded SQL. **(06 Marks)**

6 a. With a neat diagram, explain the Three-Tier architecture and the technology relevant to each tier. What are the advantages of Three-Tier architecture? **(08 Marks)**
   b. How are triggers and assertions specified in SQL? Explain with examples. **(06 Marks)**
   c. What is dynamic SQL? How it differs from embedded SQL? **(06 Marks)**

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and /or equations written eg, 42+8 = 50, will be treated as malpractice.

7 a. Discuss the informal design guidelines for relation schemas with examples. (08 Marks)
   b. Explain first, second and third normal forms with examples. (06 Marks)
   c. What is functional dependency? Write an algorithm to find a minimal cover for a set of functional dependencies. (06 Marks)

8 a. Which normal form is based on the concept of transitive functional dependency? Explain the same with an example. (06 Marks)
   b. State and prove the inference rules for functional dependencies. (06 Marks)
   c. Define multivalued dependency. Explain 4NF with examples. (08 Marks)

9 a. What are the anomalies due to interleaved execution of transactions? Explain with examples. (08 Marks)
   b. Define locking protocol. Describe the strict Two Phase Locking (2PL) protocol. (06 Marks)
   c. Explain the three phases of the ARIES recovery technique. (06 Marks)

10 a. With a neat diagram, explain the typical states that a transaction goes through during execution. (08 Marks)
   b. Discuss the problems of dead lock and starvation and the different approaches to dealing with these problems. (06 Marks)
   c. Illustrate with precedence graph, which of the following schedules is conflict serializable:
      (i) $R_1(X)$; $R_3(X)$; $W_1(X)$; $R_2(X)$; $W_3(X)$;
      (ii) $R_3(X)$; $R_2(X)$; $W_3(X)$; $R_1(X)$; $W_1(X)$;   (06 Marks)

* * * * *

Model Question Paper-1 with effect from 2019-20 (CBCS Scheme)

USN

Fifth Semester B.E. Degree Examination
Data Base Management System

TIME: 03 Hours   Max. Marks: 100

Note: 01. Answer any **FIVE** full questions, choosing at least **ONE** question from each **MODULE**.

		Module – 1	
Q.1	**(a)**	Compare DBMS and early file systems bringing out the major advantages of the database approach.	6M
	(b)	With a neat block diagram, explain the architecture of a typical DBMS.	10M
	(c)	Explain different types of user friendly interfaces and types of user who typically use each.	4M
		OR	
Q2	**(a)**	Define the following with an example: (i) Weak entity type (ii) participation constraint (iii)cardinality ratio (iv) recursive relationship (v) specialization	10M
	(b)	Develop an ER diagram for keeping track of information about a company database taking into account atleast five entities.	10M
		Module – 2	
Q.3	**(a)**	Define the following terms i) Key ii) Super key iii) Candidate key iv) Primary key v) Foreign key	5M

	(b)	Consider the following COMPANY database
		    EMP(Name,SSN,Salary,SuperSSN,Gender,Dno)
		    DEPT(DNum,Dname,MgrSSN,Dno)
		    DEPT_LOC(Dnum,Dlocation)
		    DEPENDENT(ESSN,Dep_name,Sex)
		    WORKS_ON(ESSN,Pno,Hours)
		    PROJECT(Pname,Pnumber,Plocation,Dnum)
		Write the **relational algebra** queries for the following
		(i)Retrieve the name, address, salary of employees who work for the Research department.
		(ii) find the names of employees who work on all projects controlled by department number4.
		iii) Retrieve the SSN of all employees who either in department no :4 or directly supervise an employee who work in department number :4
		(iv) Retrieve the names of employees who have no dependents
		(v) Retrieve each department number, the number of employees in the department and their average salary.
			10M

	(c)	Summarize the steps involved in converting the ER constructs to corresponding relational tables.	5M
		OR	
	(a)	Explain with example basic constraints that can be specified when a database table is created.	4M

Q.4	**(b)**	Write SQL syntax for the following with example: (i) SELECT (ii) ALTER (iii) UPDATE	6

	(c)	Consider the following relation schema
		        Works(Pname,Cname,salary)
		        Lives(Pname,Street,City)
		        located_in (Cname, city)
		        Manager(Pname,Mgrname)
		Write the SQL queries for the following
		i) Find the names of all persons who live in the city Bangalore.
		ii) Retrieve the names of all person of "Infosys" whose salary is between Rs .50000
		iii)Find the names of all persons who lives and work in the same city
		iv)List the names of the people who work for "Tech M" along with the cities they live in.
		 v)Find the average salary of "Infosys" persons
			10M

Module – 3			
Q.5	**(a)**	Explain the following constructs used in SQL with example: (i)Nested queries ii)Aggregate functions iii) Triggers iv)Views and their updability v) schema change statements	5M
	(b)	What is Dynamic SQL? How it is different from Embedded SQL	10M

	(c)	Consider the following COMPANY database(10 marks)
		    EMP(Name,SSN,Salary,SuperSSN,Dno)
		    DEPT(DNum,Dname,MgrSSN,Dno)
		     DEPT_LOC(Dnum,Dlocation)
		     DEPENDENT(ESSN,Dep_name,Sex)
		    WORKS_ON(ESSN,Pno,Hours)
		    PROJECT(Pname,Pnumber,Plocation,Dnum)
		Write the **SQL** queries for the following
		i) Retrieve the name of the employee who works with same department as ravi
		ii)Retrieve the number of dependents for an employee "Ravi"
		iii)Retrieve the name of the managers working in location "DELHI"who has no female dependents
		iv)List female employees from Dno=20 earning more than 50000
		v)List "CSE" department details
			5M

OR			
Q.6	**(a)**	What is SQLJ? How it is different from JDBC.	4M
	(b)	Draw and explain 3-tier Architecture and technology relevant to each tier. Write the advantages of 3- tier architecture.	6M

	(c)	Write a short note on
		  a)html forms b)Java scripts
		  c)CGI d)Application servers e)Servlets
			10M

Module – 4			
Q.7	**(a)**	Explain insertion, deletion and modification anomalies. Why are they considered bad? Illustrate with example.	4M
	(b)	Explain 1NF,2NF,3NF with example.	6M
	(c)	Consider the relation schema R(A,B,C,D,E,F) and the functional dependencies A->B,C->DF,AC->E, D->F.What is the primary key of this relation R?What is its highest normal form?Preserving the dependency,decompose R into third normal form.	10M

OR			

Q.8	**(a)**	Define non-additive join property of a decomposition and write an algorithm for testing of non additive join property.	5M
	(b)	Write the algorithm to find the minimal cover for a sets of FD's Consider R={A,B,C,D,E,F} .FD's {A->C,AC->D,E->AD,E->H} Find the irreducible cover for this set of FD's(minimal cover)	10M
	(c)	Given below are two sets of FD's for a relation R(A,B,C,D,E).Are they equivalent? F={A->C,AC->D,E->AD,E->H} and G={A->CD,E->AH}	5M

		Module – 5	
Q.9	**(a)**	Briefly discuss on the two phase locking protocol used in concurrency control. How does it gurantees serializability.	10M
	(b)	Check whether given schedule is serializable or not using precedence graph. Explain with algorithm. S1:R1(X) R2(Z) R1(Z) R3(X) R3(Y) W1(X) W3(Y) R2(Y) W2(Z) W2(Y)	6M
	(c)	Explain Basic time stamping algorithm.	4M

		OR	
Q.10	**(a)**	Explain multi version concurrency control protocols.	10M

	(b)	Write short notes on the following
		    I. transaction rollback and cascading rollback.
		    II. transaction support in SQL
		    III. shadow paging
		    IV. NO-UNDO/REDO Recovery Based on Deferred Update
		    V. Recovery Techniques Based on Immediate Update
			10M

		Table showing the Bloom's Taxonomy Level, Course Outcome and Programme Outcome		
Question		**Bloom's Taxonomy Level attached**	**Course Outcome**	**Programme Outcome**
Q.1	(a)	L2	CO1	PO1
	(b)	L2	CO1	PO1
	(c)	L2	CO1	PO1
Q.2	(a)	L1	CO1	PO1
	(b)	L3	CO1	PO1
Q.3	(a)	L1	CO1	PO1
	(b)	L3	CO1	PO1
	(c)	L2	CO1	PO1
Q.4	(a)	L2	CO2	PO2,PO3
	(b)	L2	CO2	PO2,PO3
	(c)	L3	CO2	PO2,PO3
Q.5	(a)	L2	CO2	PO2,PO3
	(b)	L2	CO2	PO2,PO3
	(c)	L3	CO2	PO2,PO3
Q.6	(a)	L2	CO4	PO1,PO3
	(b)	L2	CO4	PO1,PO3
	(c)	L2	CO4	PO1,PO3
Q.7	(a)	L2	CO3	PO2,PO3
	(b)	L2	CO3	PO2,PO3
	(c)	L3	CO3	PO2,PO3
Q.8	(a)	L2	CO3	PO2,PO3
	(b)	L3	CO3	PO2,PO3
	(c)	L3	CO3	PO2,PO3
Q.9	(a)	L2	CO3	PO1
	(b)	L3	CO3	PO1
	(c)	L2	CO3	PO1
Q.10	(a)	L2	CO3	PO1
	(b)	L2	CO3	PO1

Bloom's Taxonomy Levels	**Lower order thinking skills**		
	Remembering(knowledge):L_1	Understanding Comprehension): L_2	Applying (Application): L_3
	Higher order thinking skills		
	Analyzing (Analysis): L_4	Valuating (Evaluation): L_5	Creating (Synthesis): L_6

Model Question Paper-1 with effect from 2018-19 (CBCS Scheme)

USN [ ][ ][ ][ ][ ][ ][ ][ ][ ][ ]

Fifth Semester B.E. Degree Examination
Database Management System

TIME: 03 Hours   Max. Marks: 100

Note: 01. Answer any **FIVE** full questions, choosing at least **ONE** question from each **MODULE**.
        02.
        03.

		Module – 1	Marks
Q.1	**(a)**	List and briefly explain the characteristics of Database Approach	8
	(b)	Briefly explain the Following i.Database ii. DBMS	2
	(c)	List and briefly explain the advantages of using DBMS Approach	10
		OR	
Q.2	**(a)**	Briefly explain the following i. Database Schema ii. Weak Entity Type	2
	(b)	With a neat diagram, explain the Three Schema Architecture	8
	(c)	Draw an ER Diagram for University Database by considering at least 5 entities	10
		Module – 2	**Marks**
Q.3	**(a)**	List & briefly explain the characteristics of Relations	8
	(b)	Briefly explain the following i. Domain Constraints ii. Referential Integrity Constraints	2
	(c)	By refereeing the following Database schema. Employee(Fname, Minit, Lname, <u>SSN</u>, Bdate, Address, Sex, Salary, Sup_SSN,Dno) Department(Dname, <u>Dnumber</u>, Mgr_SSN, Mgr_Start_date) Dept_Locations(<u>Dnumber</u>, <u>Dlocation</u>) Project(Pname, <u>Pnumber</u>, Plocation, Dnum) Works_On(<u>Essn</u>, <u>Pno</u>, Hours) Dependent (<u>Essn</u>, <u>Dependent_Name</u>, Sex, Bdate, Relationship) **Write the relational algebra expressions for the following queries** (i) Retrieve all the employee names who are working for department number 5. (ii) Retrieve all the projects which are controlled by department number 4. (iii) Retrieve the names of employees who have no dependents. (iv) Retrieve all the Employee Name who is working on all the projects in which John Smith works on. (v) Retrieve all the project numbers along with number of employee working on each project	10
		OR	
Q.4	**(a)**	With an example explain the steps of ER to Relational Mapping Algorithm	10
	(b)	List and briefly explain the various attribute Data Types and Domains in SQL	7

	(c)	With an explain, UPDATE Statement in SQL	3

		Module – 3	Marks
Q.5	(a)	By refereeing the following Database schema. Employee(Fname, Minit, Lname, <u>SSN</u>, Bdate, Address, Sex, Salary, Sup_SSN,Dno) Department(Dname, <u>Dnumber</u>, Mgr_SSN, Mgr_Start_date) Dept_Locations(<u>Dnumber</u>, <u>Dlocation</u>) Project(Pname, <u>Pnumber</u>, Plocation, Dnum) Works_On(<u>Essn</u>, <u>Pno</u>, Hours) Dependent (<u>Essn</u>, <u>Dependent_Name</u>, Sex, Bdate, Relationship) **Write the SQL Queries for the following** (i). Retrieve the name and address of all employees who work for the 'Research' department. (ii). Make a list of all project numbers for projects that involve an employee whose last name is 'Smith', either as a worker or as a manager of the department that controls the project. (iii). List the names of managers who have at least one dependent. (iv). Find the sum of the salaries of all employees, the maximum salary, the minimum salary, and the average salary. (v). For each project, retrieve the project number, the project name, and the number of employees who work on that project.	10

	(b)	With an example, explain Specifying Constraints as Assertions in SQL	5
	(c)	With an example, explain the concept of View in SQL	5

		OR	
Q.6	(a)	With an example, explain Cursors in Embedded SQL.	5
	(b)	List & briefly explain different types of JDBC Drivers	5
	(c)	With a neat diagram, Explain Three Tier Architecture Database Applications and briefly explain the advantages of Three tier Architecture	10

		Module – 4	Marks
Q.7	(a)	With an suitable explain Informal Design Guidelines for Relation Schemas	10
	(b)	With an suitable explain, First Normal Form, Second Normal Form, & Third Normal Form	10

		OR	
Q.8	(a)	With an suitable example, explain Properties of Relational Decompositions	10

	(b)	Consider the relation REFRIG(Model#, Year, Price, Manuf_plant, Color), which is abbreviated as REFRIG(M, Y, P, MP, C), and the following set F of functional dependencies:
		$F = \{M \rightarrow MP, \{M, Y\} \rightarrow P, MP \rightarrow C\}$
		    (i) Evaluate each of the following as a candidate key for REFRIG, giving reasons why it can or cannot be a key: $\{M\}, \{M, Y\}, \{M, C\}$.
		    (ii) Based on the above key determination, state whether the relation REFRIG is in 3NF and in BCNF, giving proper reasons.
		    (iii)Consider the decomposition of REFRIG into $D = \{R1(M, Y, P), R2(M, MP,C)\}$. Is this decomposition lossless?
			10

		Module – 5	Marks
Q.9	(a)	List and explain ACID Properties	5
	(b)	Briefly explain two phase locking protocol	5
	(c)	Consider the three transactions $T1$, $T2$, and $T3$, and the schedules $S1$ and $S2$ given below. Draw the serializability (precedence) graphs for $S1$ and $S2$, and state whether	10

		each schedule is serializable or not. If a schedule is serializable, write down the equivalent serial schedule(s). T1: r1 (X); r1 (Z); w1 (X); T2: r2 (Z); r2 (Y); w2 (Z); w2 (Y); T3: r3 (X); r3 (Y); w3 (Y); S1: r1 (X); r2 (Z); r1 (Z); r3 (X); r3 (Y); w1 (X); w3 (Y); r2 (Y); w2 (Z); w2 (Y); S2: r1 (X); r2 (Z); r3 (X); r1 (Z); r2 (Y); r3 (Y); w1 (X); w2 (Z); w3 (Y); w2 (Y);	
		OR	
Q.10	(a)	With an example, explain basic Timestamp Ordering algorithm for Concurrency Control	6
	(b)	Briefly explain Transaction Support in SQL	4
	(b)	With an example, explain ARIES Recovery Algorithm	10

Table showing the Bloom's Taxonomy Level, Course Outcome and Programme Outcome				
Question		**Bloom's Taxonomy Level attached**	**Course Outcome**	**Programme Outcome**
Q.1	(a)	L2	CO1	PO1
	(b)	L1	CO1	PO1
	(c)	L1	CO1	PO1
Q.2	(a)	L1	CO1	PO1
	(b)	L2	CO1	PO1
	(c)	L6	CO1	PO3
Q.3	(a)	L2	CO2	PO1
	(b)	L1	CO2	PO1
	(c)	L3	CO2	PO3
Q.4	(a)	L2	CO2	PO4
	(b)	L1	CO2	PO1
	(c)	L3	CO2	PO3
Q.5	(a)	L3	CO3	PO3
	(b)	L2	CO3	PO4
	(c)	L2	CO3	PO3
Q.6	(a)	L2	CO3	PO1
	(b)	L1	CO3	PO1
	(c)	L1	CO3	PO1
Q.7	(a)	L1	CO4	PO1
	(b)	L2	CO4	PO2
Q.8	(a)	L2	CO4	PO2
	(b)	L5	CO4	PO4
Q.9	(a)	L1	CO5	PO1
	(b)	L2	CO5	PO1
	(c)	L4	CO5	PO2
Q.10	(a)	L2	CO5	PO1
	(b)	L1	CO5	PO1
	(c)	L3	CO5	PO4
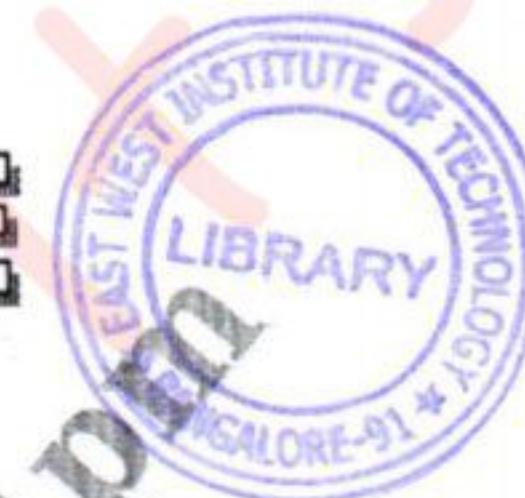
Bloom's Taxonomy Levels	**Lower order thinking skills**		
	Remembering(knowledge):L_1	Understanding Comprehension): L_2	Applying (Application): L_3
	Higher order thinking skills		
	Analyzing (Analysis): L_4	Valuating (Evaluation): L_5	Creating (Synthesis): L_6

USN | | | | | | | | | |

18CS53

Fifth Semester B.E. Degree Examination, Jan./Feb. 2023
Database Management System

Time: 3 hrs.

Max. Marks: 100

Note: *Answer any FIVE full questions, choosing ONE full question from each module.*

Module-1

1   a. Describe the characteristics of database approach. **(08 Marks)**
     b. List and explain the criteria for classification of DBMS. **(08 Marks)**
     c. Write an ER diagram to represent CAR entity type with 2 key attributes Registration and Vehicle ID. **(04 Marks)**
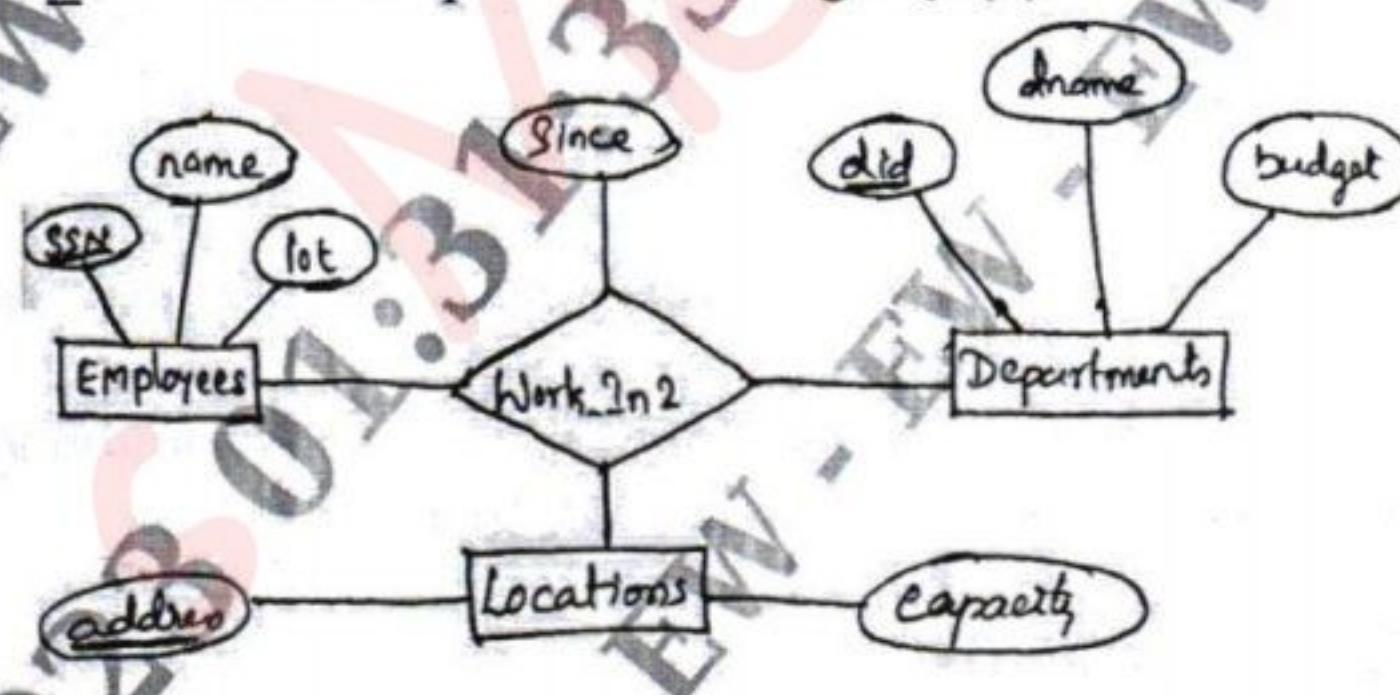
OR

2   a. Write an UML class diagram notation for company conceptual schema. **(10 Marks)**
     b. Define the following terms :   i) Data Model   ii) Schema   iii) Instance
        iv) Canned transaction   v) Data Manipulation Language (DML). **(10 Marks)**

Module-2

3   a. Explain the concepts of specialization and Generalization, with the help of VEHICLE superclass. **(08Marks)**
     b. Explain the different Relational Model constraints. **(06 Marks)**
     c. Create a table for the Works_In relationship shown in Fig. Q3(c). **(06 Marks)**

Fig. Q3(c)

OR

4   Considered the COMPANY DATABASE
     EMPLOYEE (Fname , Minit , Lname , Ssn , Bdata , Address , Sex , Salary , Super_Ssn , Dno).
     DEPARTMENT (Dname , Dnumber , Mgr_Ssn , Mgr_Start_data)
     DEPART_LOCATIONS (Dnumber , DLocation)
     PROJECT (Pname , Pnumber , PLocation , Dnum)
     WORKS_ON (ESsn , Pno , Hours)
     DEPENDENT (ESsn , Dependent_name , Sex , Bdate , Relationship).
     Specify the following queries in SQL on the database schema given above.
     a. For every project located in 'Stafford' , list the project number, the controlling department number and the department managers last name , address and birth date. **(06 Marks)**
     b. Retrieve the birth date and address of the employees whose name is 'John B, Smith'. **(06 Marks)**
     c. Retrieve the name and address of all employees who work for the 'Research' department. **(06 Marks)**
   d. Retrieve the salary of every employee. **(02 Marks)**

1 of 2

Module-3
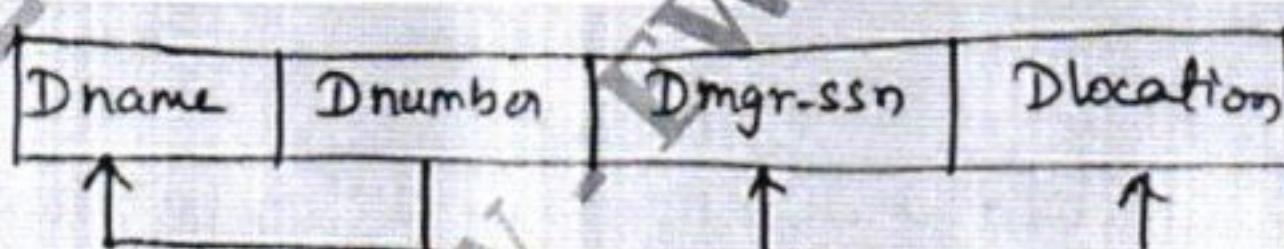
5 a. Discuss EXISTS and UNIQUE functions in SQL. Consider the COMPANY database given in Question number 04, write a query to list the name of the Manager who have atleast one dependent. **(08 Marks)**

   b. With a real World example, explain the following :
      i) JDBC   ii) Correlated nested queries   iii) Stored Procedures
      iv) Schema change statements in SQL. **(12 Marks)**

OR

6 a. Explain the usage of Aggregate function in SQL. Write an SQL query to find sum of the salaries of all employees, the maximum salary, the minimum salary and the average salary by renaming the columns in a single row table. **(10 Marks)**

   b. Create an HTML form to collect user id and password fields and it also has to have two buttons one for reset and another for login. **(06 Marks)**

   c. Write a short note on : i) JavaScript   ii) CGI. **(04 Marks)**

Module-4

7 a. Describe the 3 main techniques to achieve first normal form for the relation by taking following examples schema. **(04 Marks)**

Dname	Dnumber	Dmgr-ssn	Dlocation

   b. Discuss the Informal guidelines to determine the quality of relations schema design with a suitable example. **(10 Marks)**

   c. Discuss the Insertion , Deletion and Modification anomalies. Illustrate, why are they considered bad, with an example. **(06 Marks)**

OR

8 a. What do you mean by Normalization? Explain 2NF and BCNF, with a suitable example. **(06 Marks)**

   b. Consider the universal relation $R = \{A, B, C, D, E, F, G, H, I, J\}$ and the set of functional dependencies
      $F = \{\{A, B\} \rightarrow \{C\} \{A\} \rightarrow \{D, E\} , \{B\} \rightarrow \{F\} , \{F\} \rightarrow \{G, H\} , \{D\} \rightarrow \{I, J\}\}$.
      i) What is key of R?   ii) Decompose R into 2NF and then 3NF relation. **(06 Marks)**

   c. Write an algorithm to find a minimal cover F for a set of functional dependencies E. **(08 Marks)**

Module-5

9 a. Discuss the ACID properties of database transaction. **(08 Marks)**

   b. Why concurrency control is needed? Demonstrate with an example. **(12 Marks)**

OR

10 a. Briefly explain 2 phase locking protocols. **(05 Marks)**

   b. Explain Transaction support in SQL. **(05 Marks)**

   c. Write a short note on :
      i) Single user and Multiuser system.
      ii) Transaction roll back and Cascadding roll back.
      iii) Shadow paging.
      iv) Database backup and recovery from catastrophic failure.
      v) Deadlock prevention protocol. **(10 Marks)**

* * * * *

Fifth Semester B.E. Degree Examination, June/July 2023
Database Management Systems

Time: 3 hrs.   Max. Marks: 100

Note: *Answer any FIVE full questions, choosing ONE full question from each module.*

Module-1

1 a. With neat diagram, describe "Three Schema Architecture" and "Data Independence".
                                                                 (06 Marks)
   b. Discuss the different types of user friendly interfaces and the types of user who typically use each.
                                                                 (06 Marks)
   c. With a neat diagram, explain the component modules of DBMS and their interactions.
                                                                 (08 Marks)

OR

2 a. Explain with the block diagram, the different phases of database design. **(06 Marks)**
   b. Draw an ER diagram of Banking Database. Assume your own entities (minimum 4) , attributes and relationships. Specify 3NF tables.   **(14 Marks)**

Module-2

3 a. Briefly discuss different type of update operations on relational database. Show an example of a violation of the referential and entity integrity in each of the update operation. **(08 Marks)**
   b. Consider the two tables. Show the result of the following :

   T₁

A	B	C
10	a	5
15	b	8
25	a	6

   T₂

P	Q	R
10	b	6
25	c	3
10	b	5

   i) $T_1 \bowtie T_2$
       $T_1 \cdot B = T_2 \cdot Q$

   ii) $T_1 \bowtie T_2$
       $T_1 \cdot A = T_2 \cdot P$

   iii) $T_1 \bowtie T_2$
        $(T_1 \cdot A = T_2 \cdot P) \text{ AND } (T_1 \cdot C = T_2 \cdot R)$

   iv) $T_1 - T_2$

                                                                 (08 Marks)
   c. List and explain the characteristics of Relations.   **(04 Marks)**

OR

4 a. Define the following :
      i) Primary key   ii) Super key
      iii) Foreign key   iv) Candidate key.   **(04 Marks)**
   b. Discuss all the forms of ALTER Commands with example.   **(06 Marks)**

c. Consider the following tables :
Works (Pname , Cname , Salary)
Lives (Pname , Street , City)
Located – in (Cname , City)
Write the following queries in Relational algebra :
i) List the names of the people who work for the Company 'Wipro' along with the cities they live in.
ii) Find the names of the persons who do not work for 'Infosys'.
iii) Find the people whose salaries are more than that of all of the 'Oracle' employees.
iv) Find the persons who works and lives in the same City.
v) Find the names of the companies that are located in every city where the Company Infosys is located. **(10 Marks)**

Module-3

5 a. Describe the six clauses in the syntax of an SQL retrieval query. Show what type of constructs can be specified in each of six clauses. Which of the six clauses are required and which are optional? **(04 Marks)**
b. How are Triggers and Assertions defined in SQL? Explain. **(06 Marks)**
c. Consider the following tables :
Branch (Bname , Bcity , Assets)
Account (Accno , Bname , Accbal)
Loan (Loan no , Bname , LoanAmt)
Customer (Cname , Cstreet , CCity)
Depositer (Cname , Accnum)
Borrow (Cname , Loannum)
Write the following queries in SQL :
i) Find all loan numbers for loans made at cantonment branch with loan amounts greater than 20000.
ii) Find the names of all customers whose street address includes 'Main'.
iii) Find the average balance for each branch, if average balance is greater than 12000.
iv) Find the Customers who have an account, at all the branches located in "Mysure".
v) Find all Customers who do not have loan at the bank, but do have an account. **(10 Marks)**

OR

6 a. How is view created and dropped? What problems are associated with updating view? **(06 Marks)**
b. What is Cursor? With program segment, explain retrieving of tuples with embedded SQL in C. **(06 Marks)**
c. Explain the concept of Create , Passing parameter , Call stored procedure from JDBC. **(08 Marks)**

Module-4

7 a. Briefly explain the informal design guidelines used as measure to determine the quality of relations schema design. **(08 Marks)**
b. What do you mean by Closure of Attributes? Write an algorithm to find closure of attributes. **(06 Marks)**
c. Given below are two set of FDs for a relation R(A, B, C, D, E). Are they equivalent?
i) $A \rightarrow B$, $AB \rightarrow C$, $D \rightarrow AC$, $D \rightarrow E$
ii) $A \rightarrow BC$, $D \rightarrow AE$. **(06 Marks)**

OR

8 a. What do you mean by Multivalued Dependency? Explain the 4NF with example. (06 Marks)
  b. Define First , Second and Third Normal forms by taking an example. (06 Marks)
  c. Consider the following Relation R(A, B, C, D, E, F, G, H, I, J) with
     FDs{A, B}→ C , A → {D, E} , D → J, B → {F, G} , F → {H, I}.
     How would you Normalize completely? (08 Marks)

Module-5

9 a. Describe the problems that occur when concurrent execution uncontrolled. Give examples.
     (06 Marks)
  b. Explain the transaction support in SQL. (06 Marks)
  c. Consider the three transactions T_1 , T_2 and T_3 and schedule S1 & S2 given below. Determine whether each schedule is serializable or not? If serializable, write down the equivalent serial schedule (S).
     T_1 : $R_1(x)$, $R_1(z)$, $W_1(x)$;
     T_2 : $R_2(x)$, $R_2(y)$, $W_2(z)$, $W_2(y)$;
     T_3 : $R_3(x)$, $R_3(y)$, $W_3(y)$;
     S_1 : $R_1(x)$, $R_2(z)$; $R_1(z)$; $R_3(x)$; $R_3(y)$; $W_1(x)$; $W_3(y)$; $R_2(y)$; $W_2(z)$; $W_2(y)$;
     S_2 : $R_1(x)$; $R_2(z)$; $R_3(x)$; $R_1(z)$; $R_2(y)$; $W_1(x)$; $W_2(z)$; $W_3(y)$; $W_2(y)$; (08 Marks)

OR

10 a. What is Schedule? Explain Conflict and view Serializibility schedule with example.
      (08 Marks)
   b. Briefly discuss the two phase locking protocol used in concurrency control. (06 Marks)
   c. Briefly explain ARIES recovery process. (06 Marks)

* * * * *