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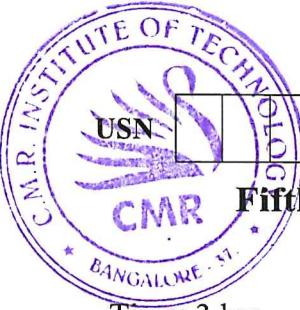
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CBCS SCHEME

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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 Constraint? 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)

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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)

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CBCS SCHEME



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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 :

- Retrieve the name and address of all employees who work for 'sports' department.
- Retrieve each department number, number of employers and their average salary.
- List the project number, controlling department number and department manager's last name , address and birthdate.
- Retrieve the name of employees with 2 or more dependents.
- 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)

Reserves (Sid , bid , day)

Write queries in SQL

- Find the ages of sailors whose name begins and ends with A and has atleast three characters.
- 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.
- Find the names of sailors who have not reserved a red boat. (use nested query).
- 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.

- Find the names of sailors who have reserved at least one boat.
- Find sailors whose rating is better than some sailors called 'Jennifer'. (Use nested query)
- Find the average age of sailor for each rating level that at least two sailors.
- Find the name and age of the oldest sailor.

(08 Marks)

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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)

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Module-5

- 9 a. What are the anomalies occur due to interleaved 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)

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CBCS SCHEME

17CS53

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

~~FAILURE~~ Time: 3 hrs.

Max. Marks: 100

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

Module-1

OR

- OR**

2 a. Explain the different types of end users in DBMS. (04 Marks)
b. Compare the Specialization and Generalization with an example. (06 Marks)
c. Define attribute and explain the types of attributes with an example to each. (10 Marks)

Module-2

- 3 a. Explain the steps to convert the basic ER model to relational database scheme with suitable example for each. (10 Marks)

b. Consider the following schema for a Company database:

EMPLOYEE (NAME , SSN , ADDRESS , SEX , SALARY, DNO, SUPERSSN, SALARY)
DEPARTMENT (DNAME , DNO , MGRSSN , MGR_START_DATE)
PROJECT (PNAME, PNO, PLOCATION, DNO)
WORKS_ON (SSN, PNO, HOURS)
DEPENDENT (SSN, DEPENDENT_NAME, SEX, BDATE, RELATIONSHIP)

Give the relational algebra expression for the following :

 - Retrieve the name of the manager who have more than two dependents.
 - Find the name of employees who work on all projects controlled by department 5.
 - Retrieve the names of employees of all employees who do not have dependent.
 - Retrieve the names of employees who gets the second highest salary.
 - Retrieve the name of employee who do not have a supervisor. (10 Marks)

OR

- 4 a. Discuss the various set theory operation used in relational algebra with an example. (10 Marks)

b. Explain the entity integrity and referential integrity constraint. Why each is considered important. Give example. (05 Marks)

c. Consider the two tables. Apply the LEFT and RIGHT OUTER JOIN operation show the result for $T_1 \bowtie_{(T_1.P = T_2.A)} T_2$ and $T_1 \bowtie_{(T_1.O = T_2.B)} T_2$.

T1		
P	Q	R
10	a	5
15	b	8
25	a	6

T ₂		
A	B	C
10	B	6
25	C	3
10	B	5

(05 Marks)

Module-3

- 5 a. Consider the following schema for a Library Database :
- Book (Book_id , Title, Publisher_Name, Pub_year)
 Book_Authors (Book_id , Author_Name)
 PUBLISHER (Name, Address, Phone)
 Book_COPIES (Book_id , Branch_id , No_of_copies)
 Book_LENDING (Book_id , Branch_id , Card_No , Date_out, Due_Date)
 LIBRARY_BRANCH (Branch_id , Branch_Name, Address)
- Write SQL Queries to :
- (i) Retrieve he details of all books in the library with library_id, title, Name of publisher, author, Number of copies in each branch etc.
 - (ii) Get the particulars of borrower who have borrowed more than 3 books, but from Jan 2017 to June 2017.
 - (iii) Delete a book in Book table. Update the contents of other tables to reflect this data manipulation operation.
 - (iv) Partition the Book table based on year of publication. Demonstrate its working with a simple query.
 - (v) Create a view of all books and its number of copies that are currently available in the library.
- (10 Marks)
- b. Explain with an example in SQL:
- | | | |
|---------------------|---------------------|----------------------|
| (i) DROP command | (ii) DELETE command | (iii) INSERT command |
| (iv) UPDATE command | (v) ALTER command | (10 Marks) |

OR

- 6 a. Define store procedure. Explain the creating and calling of stored procedure with suitable example. (08 Marks)
- b. Briefly explain types of JDBC drivers. (05 Marks)
- c. With the program segment. Explain retrieving of tuples with embedded SQL in C. (07 Marks)

Module-4

- 7 a. Explain the informal design guidelines used as measure to determine the Quality of relation schema design. (08 Marks)
- b. Define Normal Form. Explain 1NF, 2NF and 3NF with suitable example for each. (08 Marks)
- c. State the Armstrong inference rule. (04 Marks)

OR

- 8 a. What is functional dependency? Write an algorithm to find the minimal cover for set of functional dependency. Find canonical cover of F. The FD
 $F = \{A \rightarrow BC, B \rightarrow C, A \rightarrow B, AB \rightarrow C\}$ (10 Marks)
- b. Consider R = (A, B, C, D, E) which is decomposed into $R_1 = (A, B, C)$, $R_2 (C, D, E)$ with FD = { $A \rightarrow BC$, $CD \rightarrow E$, $B \rightarrow D$, $E \rightarrow A$ }
 Show that the above decomposition of schema R is not lossless join decomposition. (10 Marks)

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Module-5

- 9 a. Why concurrency control is needed demonstrate with example. (10 Marks)
- b. What is a transaction? Discuss the desirable properties of transactions. (05 Marks)
- c. With a neat diagram explain the state transition diagram for a transaction. (05 Marks)

OR

- 10 a. Briefly discuss the two-phase locking technique for concurrency control. (10 Marks)
- b. How to check conflict serializability of a schedule. Explain with an example. (10 Marks)

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CBCS SCHEME

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17CS53

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

Database Management System

Max. Marks: 100

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

Module-1

1. a. Define DBMS. Explain in detail the characteristics of database approach. How does it differ from traditional file system? (10 Marks)
- b. What are the functions of Database Administrators (DBA)? (04 Marks)
- c. Explain the Three – Schema Architecture, with a neat diagram. (06 Marks)

OR

2. a. Write an E – R diagram for a banking database. Assume your own entries (minimum 5 entities), attributes and relations. Also mention cardinality ratio. (10 Marks)
- b. Explain with neat sketch, the different phases of database design. (10 Marks)

Module-2

3. a. Consider the following schema for a Company database :
EMPLOYEE (Name , SSN , Address , Sex , Salary, DNo)
DEPARTMENT (DName , DNumber , MGRSSN , MGRSTARTDATE)
PROJECT (PName, PNumber, PLocation, DNum)
WORKS-ON (ESSN, PNo, Hours)
DEPENDENT (ESSN, DependentName, Sex, BDate, Relationship)
 Write the queries in relational algebra to
 i) Retrieve the name and address of all employees who work for the ‘Research’ department.
 ii) Find the names of employees who work on all projects controlled by department number 5.
 iii) List all the projects on which employee ‘Smith’ is working.
 iv) Retrieve the names of employees who have no dependents. (10 Marks)
- b. What is a Relation? Explain the characteristics of relations. (10 Marks)

OR

4. a. Explain the syntax of SELECT statement. Write the SQL query for the following relational algebra expression
 $\Pi_{Bdate, Address} (\sigma_{FName = 'John' \text{ AND } LName = 'Smith'} (EMPLOYEE))$. (06 Marks)
- b. With examples, explain aggregate function in SQL. (10 Marks)
- c. Explain how the ALTER TABLE command can be used to add and drop constraints. (04 Marks)

Module-3

5. a. How is a view created and dropped? What are the problems associated with updation of views? (10 Marks)
- b. Explain the following :
 i) Embedded SQL ii) Database Stored Procedures. (10 Marks)

OR

- 6 a. Explain the various steps in JDBC process by giving examples for each step. (10 Marks)
 b. What is a Trigger? Explain with an example, how a trigger is created. (10 Marks)

Module-4

- 7 a. What is a Functional Dependency? Write an algorithm to find a minimal cover for a set of functional dependencies. (10 Marks)
 b. What is the need of Normalization? Explain second normal form. Consider the relation $EMP_PROJ = \{SSN, PNumber, Hours, EName, PName, PLocation\}$. Assume $\{SSN, PNumber\}$ as Primary key.
 The dependencies are
 $\{SSN, PNumber\} \rightarrow \{Hours\}$
 $SSN \rightarrow \{EName\}$
 $PNumber \rightarrow \{PName, PLocation\}$
 Normalize the above relation into 2NF. (10 Marks)

OR

- 8 a. Explain Multivalued dependency and fourth normal form, with an example. (10 Marks)
 b. Consider the relation schema $R = \{A, B, C, D, E\}$. Suppose the following dependencies hold :
 $\{E \rightarrow A, CD \rightarrow E, A \rightarrow BC, B \rightarrow D\}$.
 State whether the following decomposition of R are lossless join decomposition or not, Justify.
 i) $\{(A, B, C), (A, D, E)\}$ ii) $\{(A, B, C), (C, D, E)\}$. (10 Marks)

Module-5

- 9 a. Explain why a transaction execution should be atomic. Explain ACID properties by considering the following transaction :
 T1 : read (A) ;
 $A := A - 50$;
 write (A) ;
 read (B) ;
 $B := B + 50$;
 write (B). (10 Marks)
 b. Explain the Database Recovery techniques. (10 Marks)

OR

- 10 a. Draw a state diagram and discuss the typical states that a transaction goes through during execution. (10 Marks)
 b. With an algorithm, explain two phase locking. (10 Marks)



CBCS SCHEME

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15CS53

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

Database Management Systems

Time: 3 hrs.

Max. Marks: 80

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

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.

Module-1

- 1 a. Describe the various advantages of using the DBMS approach. (08 Marks)
 b. Describe the three schema architecture. Why do we need mappings among schema level? How do different schema definition languages support this architecture? (08 Marks)

OR

- 2 a. Describe the component modulus of a DBMS and their interactions with block diagram. (08 Marks)
 b. What is the significance of role names in the relationship? In what situation role names are essential? Explain with example. (08 Marks)

Module-2

- 3 a. Describe the three main categories of constraints on database. Explain with example. (08 Marks)
 b. Briefly describe the steps involved in ER – to relational mapping algorithm. (08 Marks)

OR

- 4 a. Describe the characteristics of Relations with examples. (08 Marks)
 b. Consider the following COMPANY relational schema as shown below :
EMPLOYEE (Ename, SSn, Sex, Salary, Super_SSsn, Dno)
DEPARTMENT (Dname, Dnumber, Mgr_SSsn)
DEPT_LOCATIONS (Dnumber, Dlocations)
PROJECT (Pname, Pnumber, Plocations, Dnum)
WORKS_ON (ESSn, Pno, Hours)
DEPENDENT (ESSn, Dependent_name, Sex, Relationship)

Give expression in relational algebra for each of the following queries.

- i) Make a list of project numbers for project that involve an employee whose last name is "Smith", either as a worker or as a manager of the department that controls the project.
- ii) Find the names of employees who work on all the projects controlled by department number 5.
- iii) Retrieve the names of employees who have no dependents.
- iv) List the names of managers who have atleast one dependent. (08 Marks)

Module-3

- 5 a. Consider the COMPANY relation schema given in Q.No. 4(b). give an expression in SQL for each of the following queries :
 i) Retrieve the department name and number located in every locations in which 'Research' department is located.
 ii) For each department that has more than five employees, retrieve the department number and number of employees who are making more than Rs 27000.
 iii) List the names of Managers who have atleast one dependent.
 iv) Retrieve the names of each employee who has a dependent with the same first name and same sex as the employees. (08 Marks)
- b. Describe how constraints can be specified as Assertions and Actions as Triggers in SQL. (08 Marks)

OR

- 6 a. Explain the impedance mismatch between host language and SQL and describe how cursors address this. (08 Marks)
- b. Why are stored procedures important? How do we declare stored procedure and how are they called from application code? (08 Marks)

Module-4

- 7 a. Explain Second and Third normal forms with examples. How BCNF is stronger than 3NF? Explain. (08 Marks)
- b. Write the algorithm for finding a key K for R given a set of functional dependencies F. Consider R(A, B, C, D, E) with a set of FD's $A \rightarrow BC$, $BC \rightarrow AD$, $D \rightarrow E$. Find key for R and state its highest normal form. Give Reasons. (08 Marks)

OR

- 8 a. Explain informal design guidelines for relation schema. Give example. (08 Marks)
- b. Let $R = \{SSn, Ename, Pnumber, Pname, Plocation, Hours\}$ and $D = \{R_1, R_2, R_3\}$. Where $R_1 = EMP = \{SSn, Ename\}$, $R_2 = PROJ = \{Pnumber, Pname, Plocation\}$, $R_3 = WORKS_ON = \{SSn, Pnumber, Hours\}$. The following functional dependencies hold on R $F = \{SSn \rightarrow Ename, Pnumber \rightarrow \{Pname, Plocation\}, \{SSn, Pnumber\} \rightarrow Hours\}$. Prove that the above decomposition of relation R has lossless join property. (08 Marks)

Module-5

- 9 a. Explain the problems that occur when concurrent execution is uncontrolled. Give example. (08 Marks)
- b. Describe transaction support in SQL. Give example. (08 Marks)

OR

- 10 a. Describe the problems of deadlock and starvation and the different approaches to dealing with these problems. Explain with example. (08 Marks)
- b. Discuss the immediate update recovery techniques in both single – user and multiuser environments. What are the advantages and disadvantages of this recovery techniques? (08 Marks)

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10CS54

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

Time: 3 hrs.

Max. Marks: 100

Note: Answer any FIVE full questions, selecting atleast TWO questions from each part.

PART – A

- 1 a. Discuss the main characteristics of the database approach. How does it differ from traditional file systems? (10 Marks)
- b. Describe the three scheme architecture with block diagrams. Why do we need mapping between scheme levels? (10 Marks)

- 2 a. 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.
 (12 Marks)
- b. List the summary of the notations for E-R diagram and their meanings. (08 Marks)

- 3 a. Write the relational algebra operations to perform the following queries:
 - i) Retrieve the name and address of all employees who work for the ‘Research’ department.
 - ii) List the names of managers who have at least one dependent.
 - iii) Find the names of employees who work on all the projects controlled by department number 5.
 (12 Marks)
- b. Explain the relational algebra operations from set theory, with examples. (08 Marks)

- 4 a. Consider the following schema and write the SQL Queries:
 EMP (SSN, NAME, ADDR, SALARY, SEX, DNo)
 DEP (DNo, DNAME, MGRSSN)
 DEP.LOCN (DNo, DLOCN)
 PROJ (PNo, PNAME, PLOCN, DNo)
 WORKSON (SSN, PNo, NohRS)
 DEPENDENT (SSN, DEPNTNAME, DEPNTSEX, DEPNTRELATIONSHIP)
 - i) Retrieve the names of all employees who have no dependents.
 - ii) List the names of each employee who works on all the projects controlled by department No. 5.
 - iii) Retrieve the social security numbers of all employees who work on project numbers 1, 2, 3 or 4.
 - iv) Retrieve the total number of employees and the number of employees in the ‘Research’ department.
 - v) For each project, retrieve the project number, the project name, the number of employees who work on that project.
 (12 Marks)
- b. Explain the different constraints that can be applied during table creation in SQL, with a suitable example. (08 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.

10CS54

PART – B

- 5 a. How is view created and dropped? What problems are associated with updating views?
(08 Marks)
- b. How are triggers and assertions defined in SQL? Explain.
(08 Marks)
- c. List the differences between independent nested and co-related nested query.
(04 Marks)
- 6 a. Define the 1NF, 2NF and 3NF with a suitable example for each.
(12 Marks)
- b. Discuss insertion, deletion and modification anomalies. Illustrate with examples.
(08 Marks)
- 7 a. Write the algorithm for testing non-additive join property.
(10 Marks)
- b. Explain the 4NF with a suitable example.
(10 Marks)
- 8 a. What are ACID properties? Explain.
(04 Marks)
- b. What is a schedule? Explain with example conflict serializable schedule.
(08 Marks)
- c. Explain the three phases of the ARIES recovery model.
(08 Marks)

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10CS54

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

Time: 3 hrs.

Max. Marks: 100

Note: Answer any FIVE full questions, selecting atleast TWO questions from each part.

PART – A

1. a. Discuss the main characteristics of database approach and how it differs from traditional file system. (08 Marks)
b. With a neat diagram, explain Three Schema Architecture. (08 Marks)
c. What are the responsibilities of a Database Administration (DBA)? (04 Marks)
2. a. Define the following terms with examples :
i) Entity ii) Primary key iii) Multi valued attribute iv) Cardinality ratio
v) Foreign key. (10 Marks)
b. Draw an E – R diagram for Hospital Management. Assume your own entities (minimum 5 entities), attributes and relationships. Mention the Cardinality ratio. (10 Marks)
3. a. Consider the following schema for a Company database :
Employee (Name, Ssn, Address, Bdate , Sex, Salary, Dno).
Department (Dname, Dnumber , Mgr_Ssn , Mgr_Start_date)
Dept_locations (Dnumber , Dlocation)
Project (Pname , Pnumber , Plocation, Dnum)
Works_on (Essn, Pno, Hours)
Dependent (Essn, Dependent_Name, Sex, Bdate, Relationship).
Write the queries in Relational algebra to :
i) Retrieve the name and address of all employees who work for the Research department.
ii) Find the names of the employees who work on all projects controlled by dept_number 5.
iii) For every project located in Stafford , list the project number, the controlling department number and the department Managers name, address and birth date.
iv) Retrieve the names of employees who have no dependent. (08 Marks)
b. Discuss the following relational algebra operations with example for each :
i) JOIN ii) SELECT iii) UNION iv) PROJECT. (12 Marks)
4. a. Consider the following relations for a database that keeps track of business trips of sales persons in a Sales office :
SAILORS (Sid, Sname, Rating , Age)
BOATS (Bid , Bname , Colour)
RESERVES (Sid, Bid , Day)
Specify the following queries in SQL :
i) Find the names of Sailors who have reserved red boat
ii) Find the names of Sailor who have reserved a red or a green boat.
iii) Find the name of Sailors who have all boats called Inter lake. (12 Marks)
b. What are the different Aggregate functions in SQL? Explain with example. (08 Marks)

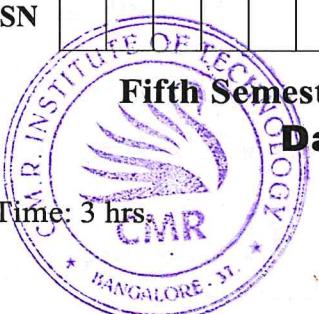
PART -B

- | | | |
|---|---|------------|
| 5 | a. Explain Insert, Delete and Update statements in SQL with examples. | (12 Marks) |
| | b. Explain the following : i) Views ii) Embedded SQL. | (08 Marks) |
| 6 | a. Explain Informal design guidelines for relation schemas. | (08 Marks) |
| | b. Explain the First , Second and Third Normal Forms with examples. | (12 Marks) |
| 7 | a. Explain Multivalued dependencies and Fourth Normal Form (4NF) with example. | (10 Marks) |
| | b. Explain i) Inclusion dependencies ii) Domain key normal forms. | (10 Marks) |
| 8 | a. Explain the ACID properties. | (10 Marks) |
| | b. Briefly discuss on the two phase locking protocol used in Concurrency control. | (10 Marks) |

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10CS54

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

Time: 3 hrs

Max. Marks: 100

Note: Answer any FIVE full questions.

1. a. Discuss any six advantages of DBMS over file systems. (06 Marks)
b. With a neat block diagram, explain the various components of DBMS. (06 Marks)
c. Explain the three-schema architecture with the help of a diagram and also explain logical data independence and physical data independence. (08 Marks)

 2. Explain the following with appropriate examples:
 - a. Strong and weak entity
 - b. Cardinality of relationship and their types
 - c. Degree of relationship and their types
 - d. Attribute types(20 Marks)

 3. a. Explain briefly the need of :
 - (i) Primary integrity constraint
 - (ii) Referential integrity constraintin relations. (Explain with appropriate examples) (04 Marks)
b. Explain the following with examples:
 - (i) Selection operator
 - (ii) Projection operator
 - (iii) Union compatibility condition of relational algebra(06 Marks)
c. Consider the following relation:

PERSON (Driver_ID, Driver_name, Driver_address, DOB)
CAR (Registration_number, model, and year_of_manufacture)
OWNS (Driver_ID, Registration_number)
ACCIDENTS (Report_number, Date_of_accident, location of accident)
PARTCIPATED (Driver_ID, Registration_number, Report_num)

Write the Relational Algebraic expressions for the following queries:
 - (i) Retrieve the Driver_ID and Registration_number details where the damage amount claimed is more than 10,000.
 - (ii) List the report numbers for accidents that took place in the year 2014.
 - (iii) Retrieve the name person and registration number of cars not involved in accident.
 - (iv) Retrieve the name of person not owning any cars
 - (v) List the details of drivers aged over 18 years.(10 Marks)
-
4. a. (i) Differentiate between where clause and HAVING clause in SQL statements. (02 Marks)
(ii) Explain with example the various types of JOIN operations. (06 Marks)
(iii) Explain the order of execution of the following SQL commands:
SELECT, FROM, GROUP-BY, HAVING, WHERE, ORDER-BY (02 Marks)
b. Consider the following relations for a database:

DEPENDENT (ENO, DEP_NAME, DOB, RELATIONSHIP)
EMP (ENO, ENAME, SAL, EMP_SUPERSSM, DNO)
PROJECT (PNO, PNAME, PLOC)
WORKS ON (PNO, ENO, NUM_OF_HOURS)
DEPT (DNO, DNAME, DEPT_MGR)

10CS54

Write the SQL queries for retrieving:

- (i) Retrieve the name and salary of manager of each department.
- (ii) SQL query for creating WORKS_ON table by specifying appropriate primary and foreign keys.
- (iii) List the employees who work on the same project as that of JONES.
- (iv) Retrieve the employee number and name of all employees who either work in department number 3 or surprise employees working for department number 3.
- (v) List the employees who do not have any dependents. (10 Marks)

5 Write short notes on:

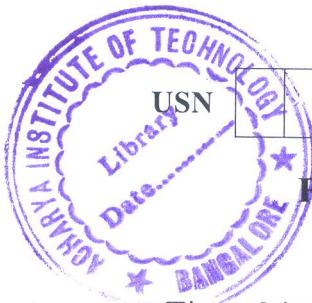
- a. Embedded SQL
- b. Views
- c. Triggers and Assertions
- d. Database Stored Procedures (20 Marks)

6 a. Explain with example the four informal guidelines of database design for relation schemas. (06 Marks)
b. Explain briefly 1NF, 2NF, 3NF and BCNF with example for normalizing a relation. (08 Marks)
c. Explain the six Armstrong AXIOMS with appropriate examples. (06 Marks)

7 a. Consider the relation R(A, B, C, G, H, I) with a set of functional dependencies $F = \{A \rightarrow BC, CG \rightarrow HI, B \rightarrow H\}$. Find the candidate keys of Relation R. (06 Marks)
b. Explain lossless join decomposition with appropriate algorithm. (06 Marks)
c. Explain briefly:
(i) Multi-valued dependency and 4NF
(ii) JOIN dependency and 5 NF. (08 Marks)

8 a. Explain the ACID properties of transaction. (06 Marks)
b. List the problems associated with concurrent transactions and explain the temporary update problem by considering an appropriate schedule. (06 Marks)
c. Explain the ARIES Recovery Algorithm. (08 Marks)

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18CS53

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) R₁(X); R₃(X); W₁(X); R₂(X); W₃(X);
(ii) R₃(X); R₂(X); W₃(X); R₁(X); W₁(X); (06 Marks)



CBCS SCHEME

17CS53

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

Time: 3 hrs.

Max. Marks: 100

Note: Answer any FIVE full questions.

1. a. Define DBMS. Discuss the advantages of DBMS over traditional file system. (06 Marks)
b. What are the responsibilities of DBA and Database Designers? (04 Marks)
c. With an aid of a neat diagram, describe a Three – Schema Architecture and Data Independence. (10 Marks)

2. a. What are Structural constraints on a relation type? Explain with examples. (05 Marks)
b. What is a Weak Entity type? Explain the role of partial key in design of weak entity type. (05 Marks)
c. Design an ER – Diagram for a UNIVERSITY database schema and indicate all key and cardinality constraints. (10 Marks)

3. a. List and explain characteristics of Relations. (05 Marks)
b. List Set theory operations used in relational data model. Explain any two with examples. (05 Marks)
c. Briefly discuss the different type of Update Operations on relational database. Show an example of a violation of the referential integrity in each of the update operations. (10 Marks)

4. a. Explain the following SQL commands : CREATE , INSERT , SELECT and UPDATE. Give their syntax and atleast one example for each. (14 Marks)
b. Write the SQL statement for the :
 - i) Show the resulting salaries if every employees working on the ‘Product X’ project is given a 10% raise.
 - ii) Retrieve all employees in department 5. Whose salary is between \$ 30,000 and \$ 40,000.
 - iii) Retrieve the name and address of all employees who work for the ‘Research’ department.(06 Marks)

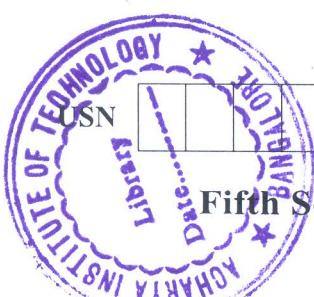
5. a. Explain how the group by clause works. What is the difference between the WHERE and HAVING clause? (05 Marks)
b. What is a View? Explain how view’s are created and dropped. (05 Marks)
c. Explain with an example constraints as Assertions and Actions as trigger. (10 Marks)

6. a. What is a CURSOR? Explain with example, retrieving multiple tuples with embedded SQL. (10 Marks)
b. Explain the concept of Create, Passing parameter, Call stored procedure from JDBC. (10 Marks)

7. a. Briefly explain the informal design guidelines used as measure to determine the quality of relations schema design. (08 Marks)
b. Define the 1NF, 2NF and 3NF with a suitable example for each. (12 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.

- 8 a. Write an Algorithm to find a minimal cover for a set of functional dependencies. (06 Marks)
b. Find the minimal cover of G : The given set of FDs be G : {A → BCDE , CD → E}. (04 Marks)
c. Define Multi – valued dependency. Explain 4NF with an example. (10 Marks)
- 9 a. Discuss ACID properties of a database transaction. (04 Marks)
b. Explain the following with suitable example :
i) The lost update problem ii) The Temporary update (dirty read) problem. (06 Marks)
c. What is Schedule? Explain Conflict Serialization schedule with example. (10 Marks)
- 10 a. Briefly explain the two phase locking protocol used in concurrency control. (10 Marks)
b. Explain the following with an example :
i) NO – UNDO / REDO Recovery based on deferred update.
ii) Shadow paging. (10 Marks)



CBCS SCHEME

15CS/IS53

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

Time: 3 hrs.

Max. Marks: 80

Note: Answer any FIVE full questions.

1. a. Mention the main characteristics of the database approach. (04 Marks)
b. Describe the three-schema architecture with a neat diagram. (04 Marks)
c. With a neat diagram, explain the component module of DBMS. (08 Marks)

2. a. Explain different types of attributes and their notations in ER diagram. (04 Marks)
b. Discuss the concept related to structural constraints of relationship type with suitable example. (04 Marks)
c. Write an ER diagram for a company database. (08 Marks)

3. a. Explain unary relational operators along with their syntax and example. (04 Marks)
b. Consider the following SAILORS database:
SAILORS (Sid, Sname, rating, age)
BOATS (bid, bname, color)
RESERVES (Sid, bid, day)
(i) Find the names of sailors who have reserved green boat.
(ii) Find the names of sailors who have reserved all boats.
(iii) Find the names of sailors who have reserved boat 103. (06 Marks)
c. Explain with example left outer join and right outer join. (06 Marks)

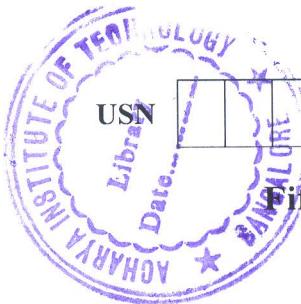
4. a. Explain the steps in mapping from ER to relational schema. Discuss each step with example. (10 Marks)
b. Describe the six clauses in the syntax of SQL retrieval query with example. Which of the six are required and which are optional? (06 Marks)

5. a. 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.50,000 and Rs.70,000.
(iii) Find the names of all persons who live and work in the same city. (06 Marks)
b. What is a view? Explain how views are created and dropped. (06 Marks)
c. Write a note on aggregate function in SQL. (04 Marks)

6. a. Explain the classification of drivers in JDBC. (04 Marks)
b. What are stored procedures? Explain with example. (06 Marks)
c. Explain the three-tier application architecture. State its advantages. (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 e.g, $42+8 = 50$, will be treated as malpractice.

- 7 a. Explain update anomalies with example. (04 Marks)
b. Explain when the relational schema is said to be in 1NF. Explain different techniques to achieve 1NF. (06 Marks)
c. With example discuss second normal form and third normal form. (06 Marks)
- 8 a. Write an algorithm to find the closure of X.
If $R = (V, W, X, Y, Z)$
 $FD = \{W \rightarrow XY, Y \rightarrow V, Z \rightarrow V, X \rightarrow Z\}$
Find the key of R. (08 Marks)
- b. Consider the relation
 $R = \{\text{ssn, ename, Pnumber, Pname, Ploc, Hrs}\}$
 $R_1 = \text{EMP} = \{\text{ssn, ename}\}$
 $R_2 = \text{PROJ} = \{\text{Pnumber, Pname, Ploc}\}$
 $R_3 = \text{WORKS_ON} = \{\text{ssn, Pnumber, Hrs}\}$
 $F = \{\text{ssn} \rightarrow \text{ename}; \text{Pnumber} \rightarrow \{\text{Pname, Ploc}\}; \{\text{ssn, Pnumber}\} \rightarrow \text{Hrs}\}$
Prove that decomposition of R into R_1, R_2 and R_3 is lossless. (08 Marks)
- 9 a. Explain the state transition diagram of a transaction. (04 Marks)
b. Explain two-phase locking techniques for concurrency control. (06 Marks)
c. Explain the following with example:
(i) Serial schedule
(ii) Non-serial schedule
(iii) Conflict serializable schedule (06 Marks)
- 10 a. Explain concurrency control based on timestamp ordering. (06 Marks)
b. Explain the principles used behind ARIES algorithm. (06 Marks)
c. Explain Shadow-paging with example. (04 Marks)



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10CS54

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

Database Management Systems

Time: 3 hrs.

Max. Marks: 100

Note: Answer any **FIVE** full questions, selecting atleast **TWO** questions from each part.

PART – A

1. a. Define the following terms with example :
i) Database ii) DBMS iii) Attribute iv) Entity v) Metadata. (05 Marks)
b. List and explain advantages of using DBMS approach. (10 Marks)
c. With neat diagram explain “three schema architecture”. (05 Marks)

2. a. With simplified diagram, illustrate the main phases of database design. (07 Marks)
b. Design ER diagram for the company database with structural constraints. Assume the entities, attributes and relationships. (08 Marks)
c. Explain different types of attributes in ER model with example. (05 Marks)

3. a. Discuss the entity integrity and referential integrity constraints with example. (07 Marks)
b. Discuss the various types of JOIN operations. (07 Marks)
c. Consider the following schema and write relational algebra expressions.
Sailors (Sid, Sname, rating, age)
Boats(bid, bname, color)
Reserves (Sid, bid, day)
i) Find the names of sailors who have reserved boat 103
ii) Find the names of sailors who have reserved a red boat
iii) Find the colors of boats reserved by Lubber. (06 Marks)

4. a. What are the basic datatypes available for attributes in SQL? (05 Marks)
b. Explain referential triggered actions give an example of how to use a trigger to emulate referential actions. (05 Marks)
c. Consider the following schema and write the SQL queries.
STUDENT(Snum, Sname, Major, level age)
FACULTY(fid, fname, dept, salary)
COURSE(Cname, time, Room, fid)
ENROLL(Snum, cname)
i) Find the names of student who are enrolled in class taught by Prof. Harshith
ii) Find the names of student studying under faculty of mechanical dept.
iii) Retrieve the faculty name whose salary greater than the average salary of all faculties
iv) Find the name of all class that meet in R128 or five or more students enrolled. (10 Marks)

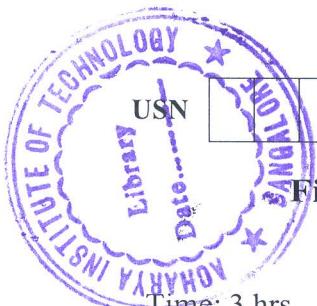
Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and /or equations written e.g. $42+8 = 50$, will be treated as malpractice.

PART – B

5. a. How a views is created and dropped explain with example. (06 Marks)
b. Explain the syntax of UPDATE statement in SQL. (04 Marks)
c. Describe the concept of embedded SQL with program segment that uses cursor for update operation. (10 Marks)

10CS54

- 6 a. Explain the informal design guidelines for relational schema in detail. (10 Marks)
b. Define 1NF, 2NF, 3NF with suitable example for each. (10 Marks)
- 7 a. Define multivalued dependency. Explain 4NF with an example. (10 Marks)
b. Explain :
i) Inclusion dependences
ii) Domain key normal form. (10 Marks)
- 8 a. What are ACID properties? Explain. (08 Marks)
b. Explain 2 phase locking protocol. (06 Marks)
c. Explain time stamp ordering algorithm. (06 Marks)



CBCS SCHEME

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, aname, 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 pid 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)

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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 than 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 anomalies 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)

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2 of 2



CBCS SCHEME

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17CS53

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. Discuss the main characteristics of the database approach and how it differs from traditional file systems? (08 Marks)
- b. What are the different types of database end users? Discuss the main activities of each. (06 Marks)
- c. Describe the three schema architecture? (06 Marks)

OR

2. a. Design an ER diagram for company database with atleast four entities. (08 Marks)
- b. What is meant by Recursive relationship type? Give some example of recursive relationship type. (06 Marks)
- c. What is Generalization? Illustrate how it is helpful with an example. (06 Marks)

Module-2

3. a. Discuss the characteristics of relation that make them different from ordinary tables. (08 Marks)
- b. Discuss DIVISION operation. Find the quotient for the following : A/B₁, A/B₂ and A/B₃; where A, B₁, B₂ and B₃ are

SNo.	PNo.	B ₁ =	B ₂ =	B ₃ =
S ₁	P ₁			
S ₁	P ₂			
S ₁	P ₃			
S ₁	P ₄			
S ₂	P ₁	PNo. P ₂		
S ₂	P ₂		PNo. P ₂	
S ₃	P ₂			PNo. P ₄
S ₄	P ₂			PNo. P ₁
S ₄	P ₄			PNo. P ₂

- c. Explain the basic datatypes available for attributes in SQL. (08 Marks)
- (04 Marks)

OR

4. a. Explain the steps to convert the basic ER model to Relational Database Schema? (10 Marks)
 - b. For the following relations for a book club :
- MEMBERS (member-id, Name, Designation, Age)
 BOOKS (Bookid, BookTitle, Book-Author, Book-Publisher, Book-price)
 RESERVES (Member-id, Book-id, Date)
- Write the SQL queries,
- (i) Find the names of members who are professors older than 45 years.
 - (ii) List the titles of books reserved by professors.
 - (iii) Find ID's of members who have not reserved books that cost more than Rs.500.
 - (iv) Find the authors and titles of books reserved on 27-May-2017.
 - (v) Find the names of members who have reserved all books. (10 Marks)

Module-3

- 5 a. What are the components of the JDBC architecture? Describe four different architectural alternatives for JDBC drivers. (10 Marks)
b. Why are stored procedures important? How do we declare stored procedure and how they called from application code? (05 Marks)
c. Explain the impedance mismatch between host Languages and SQL. (05 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 tiers. (10 Marks)
b. What is SQLJ and how it is different from JDBC? (05 Marks)
c. What is CGI and what problems does it address? (05 Marks)

Module-4

- 7 a. Explain an Informal design guidelines for a relational schema design. (08 Marks)
b. What do you understand by attribute closure? Give an example. (04 Marks)
c. Consider the following relations for published books
Book (Book_title, Author_Name, Book_type, List_Price, Author_Application, Publisher)
Suppose the following dependencies exists
Book_Title → Publisher, Book_Type
Book_Type → List_Price
Author_Name → Author_Affiliation.
(i) What normal form is the relation in? Explain your answer.
(ii) Apply normalization until you cannot decompose the relations further, state the reasons behind each decomposition. (08 Marks)

OR

- 8 a. A set of functional dependencies for the relation R{A, B, C, D, E, F} is AB→C, C→A, BC→D, ACD→B, BE→C, EC→FA, CF→BD, D→E. Find minimal cover for this set of functional dependencies. (10 Marks)
b. Define fourth normal form? When is it violated? Why is it useful? (06 Marks)
c. Why is the domain key normal form (DKNF) known as ultimate normal form? (04 Marks)

Module-5

- 9 a. Explain the desirable properties of transaction. (08 Marks)
b. Describe the four levels of isolation in SQL. (06 Marks)
c. What is the two phase locking protocol? How does it Guarantee serializability? (06 Marks)

OR

- 10 a. What is a time stamp? How does the system generates time stamps? (06 Marks)
b. Describe the actions taken by the recovery manager during checkpointing. (06 Marks)
c. Explain shadow paging with an example. (08 Marks)

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CBCS SCHEME

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15CS53

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

Time: 3 hrs.

Max. Marks: 80

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

Module-1

- 1 a. What do you mean by Database Management System? Explain the various advantages of using a Database Management System. (10 Marks)
b. Describe the three schema architecture with block diagram. Why do we need mappings between schema levels? (06 Marks)

OR

- 2 a. Explain DBMS component modules along with a neat diagram. (10 Marks)
b. Define Entity , Entity set, Attribute with respect to ER model. List different types of attributes along with their symbols. (06 Marks)

Module-2

- 3 a. Discuss the Entity integrity and Referential integrity constraints. Why is each considered important? (06 Marks)
b. Discuss the following relational algebra operations. Illustrate with an example for each : JOIN , DIFFERENCE , SELECT , UNION. (10 Marks)

OR

- 4 a. Give the E.R to relational mapping algorithm. Discuss each step with an example. (10 Marks)
b. Explain the following in SQL :
i) Unspecified WHERE – clause and use of the Asterisk.
ii) Explicit sets and NULLS.
iii) Renaming attributes and joined tables. (06 Marks)

Module-3

- 5 a. Considered the following relations for a database that keeps track of business trips of sales persons in a sale office.
SAILORS (SID, SNAME , RATING , AGE)
BOATS (BID , BNAME, COLOR)
RESERVES (SID , BID , DAY).
Specify the following queries in SQL.
i) Find the names of sailors who have reserved a red or a green boat.
ii) Find the names of sailors who are older than the oldest sailors with a rating of 10.
iii) Find sailors whose rating is better than same sailor called “Ramesh”. (10 Marks)
b. How does SQL allow implementation of general integrity constraints? (06 Marks)

OR

- 6 a. Describe the concept of a cursor and how it is used in embedded SQL. (06 Marks)
b. Explain the term stored procedure and give examples why stored procedures are useful. (05 Marks)
c. What are the differences between JDBC and SQLJ? (05 Marks)

Module-4

- 7 a. Explain any two informal quality measures employed for a relational schema design. (04 Marks)
b. Explain 1NF , 2NF and 3NF with an example for each. (12 Marks)

OR

- 8 a. Define Multivalued dependency. Explain 4NF, with an example. (08 Marks)
b. Define JOIN dependency. Explain 5NF, with an example. (08 Marks)

Module-5

- 9 a. Briefly explain the two phase locking protocol used in concurrency control. (08 Marks)
b. What is Schedule? Illustrate with an example. (05 Marks)
c. What is Shadow paging scheme? Where it is used? (03 Marks)

OR

- 10 a. Discuss the ACID properties of the database transaction. (04 Marks)
b. What is Time stamping? Explain a mechanism of concurrency control that uses time stamping with the help of an example. (08 Marks)
c. Write a note on Write ahead log protocol. (04 Marks)



10CS54

Fifth Semester B.E. Degree Examination, Aug./Sept.2020
Database Management Systems

Time: 3 hrs.

Max. Marks:100

Note: Answer any **FIVE** full questions, selecting atleast **TWO** questions from each part.

PART - A

1. a. Explain the component modulus of DBMS and their interaction , with the help of a diagram. (10 Marks)
 b. Briefly discuss the advantages of DBMS over flat file systems. (10 Marks)
2. a. With respect to ER model, explain with examples :
 i) Cardinality Ratio ii) Participation constraints. (04 Marks)
 b. Define an Attribute. Explain different types of attributes that occur in an ER diagram. (08 Marks)
 c. Design an ER diagram for keeping track of information about a hospital database taking into account atleast entities. (08 Marks)
3. a. Consider the following schema :
 SAILORS (Sid, Sname, rating , age)
 BOATS (bid , bname , color)
 RESERVES (Sid, bid , day)
 Specify the following queries in relational algebra.
 i) Find the name of sailors who reserved green boat.
 ii) Find the colour of the boat reserve by "Naresh".
 iii) Find the name of the sailor who has reserved boat 1.
 iv) Find the sid of sailors with age over 20 who have not reserved a red boat. (08 Marks)
 b. Explain the need of primary and foreign keys, with suitable examples. (04 Marks)
 c. Briefly discuss the different types of update operations on relational database. Show an example of violation of the referential integrity in each of the update operation. (08 Marks)
4. a. Explain the following : i) SELECT statement ii) ALTER command
 iii) Aggregate functions in SQL. (08 Marks)
 b. Given the schema :
 EMP (fname , lname , Ssn , bdate , address , sex , 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, sex)
 Write the SQL queries for the following :
 i) List female employees from dno = 20 earning more than 50000.
 ii) Find the name of employees who work on all projects controlled by department 5.
 iii) Retrieve the names of such employees who are supervised by some other employer.
 iv) List the name of all employees with atleast two dependents.
 v) Select the name of employees whose 1st letter is R and 3rd letter is M.
 vi) Retrieve the department name and average.
 Salary of such departments which have an average salary of such department which have an average salary more than 50000. Print the names of such departments in ascending order. (12 Marks)

PART - B

- 5 a. How are triggers and assertions defined in SQL? Explain with examples. (08 Marks)
 b. Explain the following with examples :
 i) DROP command ii) Dynamic SQL iii) Embedded SQL. (12 Marks)
- 6 a. What is Functional dependency? Write an algorithm to find a minimal cover for a set of function dependencies. (10 Marks)
 b. What is the need of normalization? Explain first and second normal forms with examples. (10 Marks)
- 7 a. Explain Multivalued dependency and fourth normal form with an example. (10 Marks)
 b. Explain : i) Inclusion dependencies ii) Template dependencies. (10 Marks)
- 8 a. Discuss the ACID properties of a database transaction. (04 Marks)
 b. Describe the three phases of the ARIES recovery model. (08 Marks)
 c. Briefly discuss the two phase locking protocol used in concurrency control. (08 Marks)


CBCS SCHEME

17CS53

Fifth Semester B.E. Degree Examination, Aug./Sept.2020
Data Base 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 a neat diagram, explain the components modules of DBMS and their interactions. (08 Marks)
- b. Explain the main characteristics of the database approach versus the file processing approach. (08 Marks)
- c. Define the following with example :
 i) Value set ii) Data model iii) Metadata iv) Database. (04 Marks)

OR

2. a. List the advantages and disadvantages of DBMS. Discuss any five advantages by comparing with file system. (08 Marks)
- b. What are the structural constraints on a relationship type? Explain with an example. (06 Marks)
- c. Write a short note on Specialization and Generalization, with an example for each. (06 Marks)

Module-2

3. a. Consider the following schema and write the relational algebra :
 Sailors (SID , Sname , Rating , Age)
 BOATS (BID , Bname , Color)
 RESERVE (SID , BID , Day)
 - i) Retrieve the sailors name who have reserved red and green boats.
 - ii) Retrieve the sailors name with age over 20 years and reserved black boat.
 - iii) Retrieve the sailors name who have reserved green boat on Monday.
 - iv) Retrieve the number of boats which are not reserved.
 - v) Retrieve the sailors names who is the oldest sailor with rating 10. (10 Marks)
- b. List Set theory operations, used in relational data model. Explain any two with an example. (06 Marks)
- c. Define the followings :
 i) Relation state ii) Domain iii) Relation schema iv) Arity. (04 Marks)

OR

4. a. Discuss the various types of JOIN operations with an example. Why is THETA join required? (06 Marks)
- b. Describe the steps of an algorithm for ER – to – Relational mapping. (10 Marks)
- c. Describe any two characteristics of relations with suitable example for each. (04 Marks)

Module-3

5. a. How is view created and dropped? What problems are associated with updating views? (08 Marks)
- b. Consider the schema for COMPANY database :
 EMPLOYEE (SSN, Name, Address, Sex, Salary, SuperSSN, DNo)
 DEPARTMENT (DNo, Dname, MgrSSN, MgrStartDate)
 DLOCATION (DNo, DLoc)
 PROJECT (PNo, PName, PLocation, DNo)
 WORK_ON (SSN, PNo , Hours)

Write the SQL queries to :

- Make a list of all project numbers for projects that involve an employee whose last name is 'Scott', either as a worker or as a manager of the department that controls the project.
- Show the resulting salaries if every employee working on the 'IOT' project is given a 10% raise.
- Find the sum of salaries of all Employees of the 'accounts' departments as well as the maximum salary, the minimum salary and the average salary in this department.
- Retrieve the name of each Employee who works on all the projects controlled by department number 5 (Use NOT EXISTS Operator).
- For each department that has more than five employees, retrieve the department number and the number of its Employee who are making more than Rs 6,00,000. (12 Marks)

OR

- 6 a. Define Stored Procedure. Explain the creating and calling of stored procedure with suitable example. (08 Marks)
- b. Explain three – tier architecture, with a neat diagram. (04 Marks)
- c. Consider the schema for STUDENT database.
 STUDENTS (SID, Sname, Major , GPA)
 FACULTY (FID, Fname, Dept, Designation, Salary)
 COURSE (CID, Cname, FID)
 ENROL (CID, SID, GRADE)
 Write the following query in SQL :
 1) Give a 15% raise to salary of all faculty.
 2) List all the departments having an average salary of above Rs 20,000.
 3) List the names of all faculty members beginning with 'R' and ending with letter "U".
 4) List the names of students enrolled for the course 'GS – 53' and have received 'A' grade. (08 Marks)

Module-4

- 7 a. Explain informal design guidelines for relation schemes. (06 Marks)
- b. What is the need for normalization? Explain 1st , 2nd , 3rd normal forms, with an examples. (14 Marks)

OR

- 8 a. Find the minimal cover of F.D.
 $E : \{B \rightarrow A, D \rightarrow A, AB \rightarrow D\}$. (06 Marks)
- b. Consider R(A, B, C, D) with FD = {A → B, B → C, C → D}.
 i) Find the key ii) Indicate the highest normal form and convert the relation into BCNF. (08 Marks)
- c. Write an algorithm to find the closure of 'X' and 'F'. (06 Marks)

Module-5

- 9 a. Explain the desirable properties of a transaction. (08 Marks)
- b. Explain with a neat diagram, the state transition diagram for a transaction. (08 Marks)
- c. What is two phase locking? Describe with the help of an example. (04 Marks)

OR

- 10 a. Why concurrency control is needed demonstrate with example? (10 Marks)
- b. When deadlock and starvation problems occurs? Explain how these problems can be resolved? (10 Marks)

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CBCS SCHEME



15CS53

Fifth Semester B.E. Degree Examination, Aug./Sept.2020 Database Management System

Time: 3 hrs.

Max. Marks: 80

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. What is Data Independent? Explain different types of Data Independence. (04 Marks)

OR

2. a. Explain the component modules of DBMS and their interaction with a neat diagram. (06 Marks)
- b. Explain different types of attributes that occur in ER model with an example. (06 Marks)
- c. Design a ER diagram for keeping track of information about Bank database taking into an account atleast four entities. (04 Marks)

Module-2

3. a. Discuss the characteristics of relations that make them different from ordinary tables and files. (08 Marks)
- b. Explain the steps to convert the basic ER model to relational database schema. (08 Marks)

OR

4. a. What are the basic data types available for attributes in SQL? Explain with example. (06 Marks)
- b. Define foreign key. Explain all possible options that can be specified when a referential integrity constraint is violated. (04 Marks)
- c. Write the SQL syntax with example for the following :
 (i) ALTER (ii) INSERT (iii) UPDATE (06 Marks)

Module-3

5. a. Explain the following with an example.
 (i) Correlated nested queries
 (ii) Assertions. (06 Marks)
- b. Explain aggregate functions in SQL with example. (04 Marks)
- c. Consider the following tables:

WORKS(Pname, Cname, Salary)

LIVES(Pname, Street, City)

LOCATED_IN(Cname, City)

MANAGER(Pname, Mgrname)

Write the SQL Query for the following :

(i) Retrieve the names of the people who work for Wipro along with the address they live in.

(ii) Retrieve the name of the person who gets second highest salary.

(iii) Find the number of employee and average salary of each company. (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.

15CS53

OR

- 6 a. Explain the following with an example:
 (i) Cursor
 (ii) Database Stored Procedure.
 b. Explain the Standard Three-Tier Architecture and list the advantages. (08 Marks)
 (08 Marks)

Module-4

- 7 a. What is Functional Dependency? Explain the inference rules for functional dependency with proof. (08 Marks)
 b. Define 1NF, 2NF and 3NF by taking an example. (08 Marks)

OR

- 8 a. Write an algorithm to find a minimal cover for a set of functional dependencies. (04 Marks)
 b. Find the closure sets with respect to F.
 $F = \{ssn \rightarrow \{Ename, Bdate, Address, Dnumber\}, Dnumber \rightarrow \{Dname, Dmgr_ssn\}\}$ (04 Marks)
 c. Which normal form is based on the concept of multivalue functional dependency? Explain the same with example. (08 Marks)

Module-5

- 9 a. What are the problems faced when concurrent transactions are executed in an uncontrolled manner? Give an example and explain. (06 Marks)
 b. With a neat diagram explain the states for transaction execution. (06 Marks)
 c. Briefly explain the desirable properties of transactions. (04 Marks)

OR

- 10 Write a note on:
 a. Timesamp ordering
 b. NO-UNDO/REDO recovery algorithm. (08 Marks)
 (08 Marks)

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17CS53

Fifth Semester B.E. Degree Examination, Dec.2019/Jan.2020
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. Compare DBMS and early file systems , bringing out the major advantages of the database approach. (06 Marks)
 b. With a neat block diagram, explain the architecture of a typical DBMS. (10 Marks)
 c. What are the responsibilities of the DBA and the database designers? (04 Marks)

OR

- 2 a. Define the following terms :
 i) Data model ii) Schema iii) Instance iv) Canned Transaction. (08 Marks)
 b. Draw an ER diagram to represent the Election Information System based on the following description :
 In the Indian national election, a state is divided into a number of constituencies depending upon the population of the state. Several candidates contest elections in each constituency. Candidates may be from some party or independent. The election information system must record the number of votes obtained by each candidate. The system also maintains the voter list and a voter normally belongs to a particular constituency.
 Note that the party details must also be taken care in the design. (12 Marks)

Module-2

- 3 a. Define the following terms : i) Key ii) Super key iii) Candidate key
 iv) Primary key v) Foreign key. (05 Marks)
 b. Enumerate the steps involved in converting the ER constructs to corresponding relational tables. (07 Marks)
 c. Considering the schema
 Sailors (sid , sname , rating , age)
 Boats (bid , bname , color)
 Reserves (sid , bid , day)
 Write relational algebraic queries for the following :
 i) Find names of sailors who have reserved boat # 103.
 ii) Find names of sailors who have reserved a red boat.
 iii) Find names of sailors who have reserved a red or green boat.
 iv) Find names of sailors who have reserved all boats. (08 Marks)

OR

- 4 a. Explain with examples , the basic constraints that can be specified when a database table is created in SQL. (12 Marks)
 b. Write SQL queries for the following relational schema :
 CUSTOMER (CID , CNAME , EMAIL , ADDR , PHONE)
 ITEM (ITEM_NO , ITEM_NAME , PRICE , BRAND)
 SALES (CID , ITEM_NO , # ITEMS , AMOUNT , SALE_DATE)
 SUPPLIER (SID , SNAME , SPHONE , SADDR)
 SUPPLY (SID , ITEM_NO , SUPPLY_DATE , QTY)

- i) List the items purchased by customer ‘Prasanth’.
- ii) Retrieve items supplied by all suppliers starting from 1st Jan 2019 to 30th Jan 2019.
- iii) Get the details of customers whose total purchase of items worth more than 5000 rupees.
- iv) List total sales amount, total items , average sale amount of all items.
- v) Display customers who have not purchased any items. (08 Marks)

Module-3

- 5 a. What are assertions and triggers in SQL? Write a SQL program to create an assertion to specify the constraint that the salary of an employee must not be greater than the salary of the department. The employee works for in the COMPANY database. (07 Marks)
- b. Write a trigger in SQL to call a stored procedure INFORM_SUPERVISOR() whenever a new record is inserted or updated, check whether an employee’s salary is greater than the salary of his or her direct supervisor in the COMPANY database. (07 Marks)
- c. How do you create a view in SQL? Give examples. Can you update a view table? If yes, how? If not, why not? Discuss. (06 Marks)

OR

- 6 a. With real world examples, explain the following : i) JDBC ii) Correlated queries iii) Stored Procedure iv) Schema change statements in SQL. (12 Marks)
- b. Write a complete high level language program (in Java or C) to display the rows of a customer table created in oracle having < custid , custname , balance > columns with embedded SQL. (08 Marks)

Module-4

- 7 a. What are the problems caused by insertion , updation and deletion anomalies? Discuss with an example. (06 Marks)
- b. For the below given relation R (A, B, C, D, E) and its instance , check whether the FDs given hold or not. Give reasons. (04 Marks)

- i) $A \rightarrow B$ ii) $B \rightarrow C$ iii) $D \rightarrow E$ iv) $CD \rightarrow E$.

A	B	C	D	E
a ₁	b ₁	c ₁	d ₁	e ₁
a ₁	b ₂	c ₁	d ₁	e ₁
a ₂	b ₂	c ₁	d ₂	e ₃
a ₂	b ₃	c ₃	d ₂	e ₂

- c. Using the minimal cover algorithm , find the minimal cover for the following FDs : $F = \{AB \rightarrow C, A \rightarrow D, BD \rightarrow C, D \rightarrow BG, AE \rightarrow F\}$. (10 Marks)

OR

- 8 a. Normalize the below relation upto 3NF :

Module	Dept	Lecturer	Text
M1	D1	L1	T1
M1	D1	L1	T2
M2	D1	L1	T1
M2	D1	L1	T3
M3	D1	L2	T4
M4	D2	L3	T1
M4	D2	L3	T5
M5	D2	L4	T6

(10 Marks)

- b. Define Multi valued Dependency and Join Dependency. Explain 4NF and 5NF with examples. (10 Marks)

Module-5

- 9 a. Describe the database inconsistency problems : Lost update , dirty read and blind write. (06 Marks)
b. With a neat diagram, explain the various states of a transaction execution. (07 Marks)
c. Check whether the below schedule is conflict serializable or not.
{b2 , r2(X) , b1 , r1(X) , w1(X) , r1(Y) , w1(Y) , w2(X) , e1 , c1, e2, c2}. (07 Marks)

OR

- 10 a. What is 2PL? Explain with an example. (06 Marks)
b. How do you detect a deadlock during concurrent transaction execution? (06 Marks)
c. Explain the various database recovery techniques, with examples. (08 Marks)

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15CS53

Fifth Semester B.E. Degree Examination, June/July 2019

Database Management System

Time: 3 hrs.

Max. Marks: 80

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

Module-1

- 1 a. Define DBMS. Discuss the advantages of DBMS over the traditional file system. (08 Marks)
 b. Explain the component modulus of DBMS and their interaction, with the help of a diagram. (08 Marks)

OR

- 2 a. Define the following with an example :
 i) Weak entity type ii) Participation constraints
 ii) Cardinality ratio iv) Recursive relationship. (08 Marks)
 b. Draw an ER diagram of Banking system taking into account atleast five entities, indicate all keys, constraints and assumptions that are made. (08 Marks)

Module-2

- 3 a. What is meant by Integrity Constraint? Explain the importance of referential integrity constraint. How referential integrity constraint is implemented in SQL? (08 Marks)
 b. Consider the following Movie database ;
 Movie (Title , director , Myear , Rating)
 Actors (Actor , Aage)
 Acts (Actor , Title)
 Directors (Director , dage)
 Write the following queries in relational algebra on the database given ;
 i) Find movies made by "Hanson" after 1997.
 ii) Find all actors and directors.
 iii) Find "Coen's" movie with "Mc Dormand".
 iv) Find (director , actor) pairs where the director is younger than the actor. (08 Marks)

OR

- 4 a. Discuss insulation , deletion and modification anomalies. Why are they considered bad?
 Illustrate with an example. (08 Marks)
 b. Write the SQL queries for the following relational schema ;
 Sailors (Sid , Sname , Rating, Age)
 Boats (Bid , Bname , color)
 Reserve (Sid , Bid , Day)
 i) Retrieve the Sailor's name who have reserved red and green boat.
 ii) Retrieve the no : of boats which are not reserved.
 iii) Retrieve the Sailors name who have reserved boat number 103.
 iv) Retrieve the Sailors name who have reserved all boats. (08 Marks)

Module-3

- 5 a. How are triggers and assertions defined in SQL? Explain. (08 Marks)
 b. How are views created and dropped? Explain how the views are implemented and updated. (08 Marks)

OR

- 6 a. Explain the Single – tier and Client – server architecture, with a neat diagram. (08 Marks)
b. Explain the following :
i) Embedded SQL ii) Database stored procedure. (08 Marks)

Module-4

- 7 a. Which Normal form is based on the concept of transitive functional dependency? Explain the same with an example. (08 Marks)
b. What is the need for normalization? Consider the relation :
 $\text{Emp - proj} = \{\text{SSn, Pnumber, Hours, Ename, Pname, Plocation}\}$.
Assume $\{\text{SSn, Pnumber}\}$ as primary key.
The dependencies are ;
 $\{\text{SSn, Pnumber}\} \rightarrow \text{Hours}$
 $\text{SSn} \rightarrow \text{Ename}$
 $\text{Pnumber} \rightarrow \{\text{Pname, Plocation}\}$
Normalize the above relation to 3NF. (08 Marks)

OR

- 8 a. What is Functional Dependency? Find the minimal cover using the minimal cover algorithm for the following functional dependency.
 $F = \{\text{AB} \rightarrow D, B \rightarrow C, AE \rightarrow B, A \rightarrow D, D \rightarrow EF\}$. (08 Marks)
b. 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? (08 Marks)

Module-5

- 9 a. Discuss the ACID properties of a database transaction. (04 Marks)
b. Why Concurrency control is needed? Demonstrate with an example. (12 Marks)

OR

- 10 a. Discuss the UNDO and REDO operations and the recovery techniques that use each. (06 Marks)
b. Discuss the time – stamp ordering protocol for concurrency control. (05 Marks)
c. Explain how shadow paging helps to recover from transaction failure. (05 Marks)

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CBCS SCHEME

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15CS53

Fifth Semester B.E. Degree Examination, Dec.2018/Jan.2019
Database Management System

Time: 3 hrs.

Max. Marks: 80

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

Module-1

- 1 a. What are the responsibilities of the DBA and Database Designer? (06 Marks)
 b. With neat diagram, explain "three schema Architecture". (05 Marks)
 c. Discuss the different types of user friendly interfaces and the types of user who typically use each. (05 Marks)

OR

- 2 a. Explain with block diagram the different phases of database design. (08 Marks)
 b. Draw an ER-Diagram of movie database. Assume your own entities (minimum 4) attributes and relationships. (08 Marks)

Module-2

- 3 a. Discuss the characteristics of relations. (06 Marks)
 b. Outline the steps to convert the basic ER Model to relational Database schema. (06 Marks)
 c. Define the following:
 i) Relation state
 ii) Relation schema
 iii) Arity
 iv) Domain. (04 Marks)

OR

- 4 a. Discuss the various types of set theory operations with example. (08 Marks)
 b. Consider the two tables, show the results of the following:

T ₁		
A	B	C
10	a	5
15	b	8
25	a	6

T ₂		
P	Q	R
10	b	6
25	c	3
10	b	5

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

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

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)

Module-3

- 5 a. How does SQL implement the entity integrity constraints of the relational data model? Explain with an example. (04 Marks)
b. Discuss: i) Shared variables ii) Communication variables. (06 Marks)
c. Explain with examples in SQL:
i) Drop command
ii) Delete command
iii) Update command. (06 Marks)

OR

- 6 a. With program segment, explain retrieving of tuples with embedded SQL in C. (06 Marks)
b. Consider the following tables:
works (Pname, Cname, Salary)
lives (Pname, Street, City)
located-In (Cname, City)
write the following queries in SQL:
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. (10 Marks)

Module-4

- 7 a. What do you mean by closure of attribute? Write an algorithm to find closure of attribute. (06 Marks)
b. Explain any two informal quality measures employed for a relation schema design. (04 Marks)
c. Given below are two sets 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. Suggest and explain three different techniques to achieve INF using suitable example. (04 Marks)
c. Consider the following relation for CARSALE (CAR-NO, Date-Sold, Salesman No, Commission, Discount)
Assume a car can be sold by multiple salesman and hence primary key is {CAR_No, Salesman_No}.
Additional dependencies are
 $Date_Sold \rightarrow Discount$
 $Salesman_No \rightarrow Commission$
i) Is this relation in 1NF, 2NF or 3NF? Why or why not?
ii) How would you normalize this completely? (06 Marks)

Module-5

- 9 a. Discuss the ACID properties of a transaction. (04 Marks)
b. What are the anomalies occur due to interleaved execution? Explain them with example. (06 Marks)

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- c. Consider the three transactions T_1 , T_2 and T_3 and schedules S_1 and S_2 given below. Determine whether each schedule is serializable or not? If a schedule is serializable write down the equivalent serial schedule (S).

$T_1 : R_1(x); R_1(z); W_1(x);$
 $T_2 : R_2(x); R_2(y); W_2(z); W_2(y);$
 $T_3 : R_3(x); R_3(y); W_3(y);$

$S_1 : R_1(x); R_2(z); R_1(z); R_3(x); R_3(y); W_1(x); W_3(y); R_2(y); W_2(z); W_2(y);$
 $S_2 : R_1(x); R_2(z); R_3(x); R_1(z); R_2(y); R_3(y); W_1(x); W_2(z); W_3(y); W_2(y);$

(06 Marks)

OR

- 10 a. Describe the problems that occur when concurrent execution uncontrolled. Give examples. (06 Marks)
- b. What is two phase locking? Describe with the help of an example. (04 Marks)
- c. What is Deadlock? Consider the following sequences of actions listed in the order they are submitted to the DBMS.
Sequence S1: $R_1(A); W_2(B); R_1(B); R_3(C); W_2(C); W_4(B); W_3(A)$
Draw waits-for graph in case of Deadlock situation. (06 Marks)

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CBCS Scheme

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Fifth Semester B.E. Degree Examination, June/July 2018
Database Management Systems

Time: 3 hrs.

Max. Marks: 80

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

Module-1

- 1 a. Discuss the main characteristics of the database approach and how it differs from traditional file systems. (04 Marks)
 b. Describe the three – schema architecture. Why do we need mappings among schema levels? (04 Marks)
 c. Discuss various components of a DBMS, with a neat diagram. (08 Marks)

OR

- 2 a. Define an Entity and Attribute. Explain the different types of attributes that occur in an ER – diagram model, with an example. (06 Marks)
 b. Draw an ER – diagram of an Airline reservation system, taking into account at least five entities. Indicate all keys, constraints and assumptions that are made. (10 Marks)

Module-2

- 3 a. Explain the data types available for attribute specification in SQL. (04 Marks)
 b. Explain briefly violations in entity integrity constraint, key and referential integrity constraints, with example. (06 Marks)
 c. Consider the following RESORT database,
 RESORT (resortno, resortname, resorttype, resortaddr, resortcity, numsuite)
 SUITE(suite, resortno, suiteprice)
 RESERVATION (reservationno, resortno, visitorno, checkin, checkout, totalvisitor, suiteno)
 VISITOR (visitorno, firstname, lastname, visitoraddr)
 i) Write the SQL to list full details of all the resorts on Los Angeles.
 ii) Write the SQL to list full details of all the resorts having number of suites more than 30.
 iii) Write the SQL to list visitors in ascending order by firstname. (06 Marks)

OR

- 4 a. Explain how constraints are specified in SQL during table creation, with suitable example. (04 Marks)
 b. Consider the following relations for a database that keeps track of student enrollment in courses and the books adopted for each course :
 STUDENT (SSn, Name, Major, bdate)
 COURSE (Courseno, Cname, dept)
 ENROLL (SSn, Courseno, Quarter, grade)
 BOOK_ADOPTION (Courseno, Quarter, book_isbn)
 TEXT (book_isbn, book_title, Publisher, Author)
 Write the following queries in relational algebra on the database schema :
 i) List the number of courses taken by all students named John Smith in winter 2009 (i.e. Quarter = WO9).
 ii) Produce a list of text books (include courseno, book_isbn, book_title) for courses offered by the ‘CS’ department that have used more than two books.
 iii) List any department that has all its adopted books published by ‘Pearson’ publishing.
 c. Give an example of mapping of generalization or specialization into relation schemas. (06 Marks)

Module-3

- 5 a. Discuss how each of the following constructs is used in SQL and discuss the various options for each construct : (06 Marks)
- i) Nested Queries ii) Aggregate functions iii) Triggers iv) Views and their updatability v) Schema change statements vi) Group by and having clause.
- b. Draw and explain 3 – tier Architecture and technology relevant to each tier. Write the advantages of 3 – tier architecture. (06 Marks)
- c. What is CGI? Why was CGI introduced? What are the disadvantages of an architecture using CGI scripts? (04 Marks)

OR

- 6 a. What is Dynamic SQL and how is it different from Embedded SQL? (04 Marks)
- b. What is SQL J and how is it different from JDBC? (04 Marks)
- c. Consider the following company database :
- EMP (Name, Ssn , Salary, Superssn, dno)
DEPT (dnum, dname, mgrssn)
DEPT_LOC (dnum, dlocation)
PROJECT (Pname, Pnumber, Plocation, dnum)
WORKS_ON (Essn, Pno, Hours)
DEPENDENT (Essn, dept_name, sex)
- Write SQL queries for the following :
- i) Retrieve the names of all employees who work in the department that has the employee with the highest salary among all employees.
 - ii) Retrieve the names of employees who make atleast 10,000 more than the employee who is paid the least in the company.
 - iii) A view that has the employee name, supervisor name and employee salary for each employee who works in the 'Research' department.
 - iv) A view that has the project name, controlling department name, number of employees and total hours worked per week on the project for each project with more than one employee working on it. (08 Marks)

Module-4

- 7 a. Discuss insertion, deletion and modification anomalies. Why are they considered bad? Illustrate with examples. (04 Marks)
- b. Define Multivalued dependency. Explain fourth normal form, with an example. (06 Marks)
- c. Consider the Universal relation $R = \{A, B, C, D, E, F, G, H, I, J\}$ and the set of functional dependencies $F = \{\{A, B\} \rightarrow \{C\}, \{A\} \rightarrow \{D, E\}, \{B\} \rightarrow \{F\}, \{F\} \rightarrow \{G, H\}, \{D\} \rightarrow \{I, J\}\}$. What is key of R? Decompose R into 2NF and then 3NF relations. (06 Marks)

OR

- 8 a. Define Non – additive join property of a decomposition and write an algorithm of testing for non – additive join property. (04 Marks)
- b. A relation $R(A, C, D, E, H)$ satisfies the following FDs : $A \rightarrow C, AC \rightarrow D, E \rightarrow AD, E \rightarrow H$ Find the Canonical cover for this set of FD's. (06 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)

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Module-5

- 9 a. Discuss ACID properties of a database transaction. (04 Marks)
b. Explain transaction support in SQL. (06 Marks)
c. Discuss the UNDO and REDO operations and the recovery techniques that use each. (06 Marks)

OR

- 10 a. What is two – phase locking protocol? How does it guarantee serializability? (04 Marks)
b. What is Serializability? How can serializability be ensured? Do you need to restrict concurrent execution of transaction to ensure serializability? Justify your answer. (06 Marks)
c. Discuss the time – stamp ordering protocol for concurrency control. (06 Marks)

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CBCS Scheme

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15CS53

Fifth Semester B.E. Degree Examination, Dec.2017/Jan.2018

Database Management Systems

Time: 3 hrs.

Max. Marks: 80

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

Module-1

- 1 a. Explain the main characteristics of the database approach versus the file processing approach. (08 Marks)
b. Explain the three – schema architecture with neat diagram. Why do we need mappings among schema levels? How do different schema definition languages support this architecture? (08 Marks)

OR

- 2 a. Discuss with examples, different types of attributes. (07 Marks)
b. Draw an ER diagram for a BANK database schema with atleast five entity types. Also specify primary key and structural constraints. (09 Marks)

Module-2

- 3 a. Describe the characteristics of relations with suitable example for each. (08 Marks)
b. What are the basic operations that can change the states of relations in the database? Explain how the basic operations deal with constraint violations. (08 Marks)

OR

- 4 a. Describe the steps of an algorithm for ER – to – relational mapping. (10 Marks)
b. In SQL which command is used for table creation? Explain how constraints are specified in SQL during table creation with suitable example. (06 Marks)

Module-3

- 5 Consider the COMPANY DATABASE

EMPLOYEE (Fname, Minit, Lname, Ssn, Bdate, Address, Sex, Salary, super-ssn, Dno)

DEPARTMENT (Dname, Dnumber, Mgr_ssn, Mgr_st_date)

DEPART_LOCATIONS(Dnumber, Dlocation)

PROJECT (Pname, Pnumber, Plocation, Dnum)

WORKS_ON (Essh, Pno, Hours)

DEPENDENT (Essh, 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 manager's last name, address and birth date. (04 Marks)
b. List the names of all employees who have a dependent with the same first name as themselves. (02 Marks)
c. For each project, list the project name and the total hours per week (by all employees) spent on that project. (04 Marks)
d. Retrieve the name of each employee who works on all the projects controlled by 'Research' department. (06 Marks)

OR

- 6 a. Define Stored Procedure. Explain the creating and calling of stored procedure with suitable example. (08 Marks)
b. Explain the Single – tier and Client – server architecture, with neat diagram. (08 Marks)

Module-4

- 7 a. Explain the informal design guidelines used as measures to determine the quality of relation schema design. (08 Marks)
b. Define Normal form. Explain 1NF, 2NF and 3NF with suitable examples for each. (08 Marks)

OR

- 8 a. Define Minimal cover. Write an algorithm for finding a minimal cover F for a set of functional dependencies E. Find the minimal cover for the given set of FDs be (08 Marks)
 $E : \{B \rightarrow A, D \rightarrow A, AB \rightarrow D\}$.
b. Consider the universal relation $R = \{A, B, C, D, E, F, G, H, I, J\}$ and the set of functional dependencies (08 Marks)
 $F = \{\{A, B\} \rightarrow \{C\}, \{A\} \rightarrow \{D, E\}, \{B\} \rightarrow \{F\}, \{F\} \rightarrow \{G, H\}, \{D\} \rightarrow \{I, J\}\}$.
Determine whether each decomposition has the lossless join property with respect to F.
 $D_1 = \{R_1, R_2, R_3\}$; $R_1 = \{A, B, C, D, E\}$; $R_2 = \{B, F, G, H\}$; $R_3 = \{D, I, J\}$.

Module-5

- 9 a. Why Concurrency control is needed demonstrate with example? (12 Marks)
b. Discuss the desirable properties of transactions. (04 Marks)

OR

- 10 a. When deadlock and starvation problems occurs? Explain how these problems can be resolved. (09 Marks)
b. Explain how shadow paging helps to recover from transaction failure. (07 Marks)

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10CS54

Fifth Semester B.E. Degree Examination, June/July 2017
Database Management Systems

Time: 3 hrs.

Max. Marks: 100

Note: Answer any **FIVE** full questions, selecting atleast **TWO** questions from each part.

PART – A

1. a. Discuss the main characteristics of the database approach. How does it differ from traditional file system? (08 Marks)
- b. With a neat diagram, explain the component modules of DBMS and their interactions. (08 Marks)
- c. Define i) Snapshot ii) Metadata iii) Intention iv) Database. (04 Marks)
2. a. Design an ER diagram for an employee database with atleast four entities considering all the constraints. (08 Marks)
- b. What are the structural constraints on a relationship type? Explain with examples. (04 Marks)
- c. Define i) Primary key ii) Weak entity type iii) Candidate key iv) Recursive relationship with an example. (08 Marks)
3. a. Explain Explicit or Schema based constraint on relational model. (06 Marks)
- b. Discuss any 4 relational algebra operations with examples. (08 Marks)
- c. Consider the following schema :
 Sailors (Sid, Sname, rating, age)
 Boats (bid, bname, color)
 Reserves (Sid, bid, day)
 Write the queries in relational algebra.
 i) Find the names of sailors who have reserved boat no '103'.
 ii) Names of Sailors who have reserved red and green boat. (06 Marks)
4. a. Explain the different constraints that can be applied during table creation in SQL with example. (06 Marks)
- b. Explain how group by clause works. What is the difference between where and having clause. (04 Marks)
- c. Consider the following schema and write the SQL queries :
 Emp (SSN, name, Addr, Sal, Sex, Dno)
 Dep (Dno, Dname, Mgrssn)
 DeptLoCN(Dno, DLocn)
 Proj (Pno, Pname, Plocn, Dno)
 Workson (SSN, Pno, Nohrs)
 Dependent (SSN, Deptname, Deptsex, Dept Relationship)
 i) Retrieve the managername with atleast one dependent.
 ii) Retrieve the Pno, Pname, no of hrs works done on each project.
 iii) Retrieve the Pname which are controlled by 'Research' dept.
 iv) Retrieve employee name who works for dept no 10 and have a daughter.
 v) Retrieve the employee name who work on any project that Kumar works. (10 Marks)

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PART – B

- 5 a. How is view created and dropped? What problems are associated with updating views? (08 Marks)
b. How are triggers and assertions defined in SQL? Explain. (06 Marks)
c. Explain the concept of Stored procedure in brief. (06 Marks)
- 6 a. State the informal guidelines for relational schema design. (06 Marks)
b. Define First, Second and Third normal forms by taking an example. (08 Marks)
c. What are the inference rules on FDs? How they are useful? Explain with examples. (06 Marks)
- 7 a. Explain the properties of Relational Decomposition. (06 Marks)
b. Define Multivalued dependency. Explain 4NF with an example. (08 Marks)
c. Consider $R = \{A, B, C, D, E, F\}$
FDS { $AB \rightarrow CD$; $D \rightarrow CF$, $B \rightarrow F$, $BYD \rightarrow F$, $D \rightarrow F$, $DE \rightarrow F$ }
What is the key of R? Find an irreducible cover for this set of FD's. (06 Marks)
- 8 a. What are ACID properties? Explain with example. (06 Marks)
b. Briefly discuss the two phase locking protocol used in concurrency control. (08 Marks)
c. Briefly explain the recovery process. (06 Marks)

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1	S	B	1	A	C	S	0	8	3
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10CS54

Fifth Semester B.E. Degree Examination, Dec.2016/Jan.2017
Database Management Systems

Time: 3 hrs.

Max. Marks: 100

Note: Answer FIVE full questions, selecting at least TWO questions from each part.

PART – A

- 1 a. Explain with a neat diagram, the component modules of DBMS. (10 Marks)
 b. Define DBMS. Discuss the advantages of DBMS over traditional file system. (06 Marks)
 c. Explain additional implications of using database approach. (04 Marks)

- 2 a. Discuss the concepts related to structural constraints of relationship type with suitable examples. (10 Marks)
 b. Write an ER diagram for hospital management considering at least four entities. (10 Marks)

- 3 a. List any five relational algebra operators along with their syntax and purpose. (10 Marks)
 b. Consider the following COMPANY database:
 EMP (Name, SSN, Salary, SuperSSN, Dno)
 DEPT (Dnum, Dname, MgrSSN)
 DEPT_LOC (Dnum, Dlocation)
 Works_ON (ESSN, Pno, Hours)
 Dependent (ESSN, Dep_name, Sex)
 Write the relational algebra queries for the following:
 (i) Retrieve the name of the employee who works in the same department as that of “Ravi”.
 (ii) Retrieve the number of dependents for an employee named “Ravi”.
 (iii) Retrieve the name of managers working in location “DELHI” who has no female dependents. (10 Marks)

- 4 a. Explain with suitable example, how can you retrieve information from multiple tables. (08 Marks)
 b. Referring to the COMPANY database above, write SQL queries for the following:
 (i) Retrieve the name of employees whose salary is greater than all employees working in department 3.
 (ii) For each department that has more than four employees, retrieve the department number and the number of its employees who have more than 4000 salary.
 (iii) Retrieve name of an employee who gets second highest salary. (12 Marks)

PART – B

- 5 a. Explain with example, how assertions are defined. (05 Marks)
 b. What is a view? Explain how views are created and dropped. (05 Marks)
 c. What is a cursor? Explain with example, retrieving multiple tuples with embedded SQL. (10 Marks)

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- 6** a. Explain update anomalies with examples. **(05 Marks)**
b. What is a functional dependency? List the conditions for a set of functional dependencies to be minimal. **(05 Marks)**
c. Consider the relation $R(A, B, C, D, E, F)$ and the functional dependencies $A \rightarrow B$, $C \rightarrow DF$, $AC \rightarrow E$, $D \rightarrow F$. What is the primary key of this relation R ? What is its highest normal form? Preserving the dependency, decompose R into third normal form. **(10 Marks)**
- 7** a. Explain properties of relational decomposition. **(05 Marks)**
b. Which normal form specifies multivalued functional dependency? Explain it with examples. **(10 Marks)**
c. Define inclusion dependency, and write the inference rules for it. **(05 Marks)**
- 8** a. Explain transition diagram of a transaction. **(06 Marks)**
b. Explain the principles used behind ARIES algorithm. **(06 Marks)**
c. What is a schedule? Explain conflict serializable schedule with example. **(08 Marks)**

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Fifth Semester B.E. Degree Examination, Dec.2015/Jan.2016**Database Management System**

Time: 3 hrs.

Max. Marks: 100

Note: Answer **FIVE** full questions, selecting
at least **TWO** questions from each part.

PART – A

- 1 a. Write a note on various types of end users who use DBMS. (08 Marks)
- b. Explain the three level DBMS architecture, with a neat diagram. Why do we need mappings between schema levels? Explain mapping in DBMS architecture. (12 Marks)
- 2 a. Explain the ER notations used for various constructs in database schema (10 Marks)
- b. With respect to ER model, explain with example
- i) Composite attributes
 - ii) Cardinality ratio
 - iii) Participation constraints
 - iv) Binary relationship
- (10 Marks)
- 3 a. Discuss the various type of JOIN operations. Why is theta join required? (06 Marks)
- b. Consider the following relational schema;
 users (uid, uname, cost)
 groups (gid, title, category, n, gsize, owner)
 posts (pid, uid, gid, tid, ptext, pdate)
 Write the following queries in relational algebra.
- i) Show the text and number of all the posts made by user number 4 before March 1, 2007.
 - ii) Show the names of the all the users who responded to post number 2.
 - iii) Show the uid and cost of all the users who are group owners and posted a thread on 1.1.2003. (09 Marks)
- c. Explain the SELECT and PROJECT operations in relational algebra with example. (05 Marks)
- 4 a. Explain the following : (06 Marks)
- i) Primary key
 - ii) Foreign key
 - iii) Candidate key
- b. Consider the following relations:
 Hotel (hotelno, name, address)
 Room (roomno, hotelno, type, price)
 Booking (hotelno, guestno, datefrom, dateto, roomno)
 Guest (guestno, name, address)
 Write the SQL statements for the following :
- i) List the names and addresses of all guest booked the hotel, which is located in Chandigarh, alphabetically ordered by name.
 - ii) List all family rooms with a price below Rs 400 per night, in ascending order of price in hotel “RVH”
 - iii) How many hotels are there? (09 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.

- c. Explain with example in SQL
i) Drop command
ii) Delete command

(05 Marks)

PART – B

- 5 a. What is a view? Explain how to create the view and how view can be dropped? (08 Marks)
b. Explain the following
i) Embedded SQL
ii) Database stored procedure (12 Marks)
- 6 a. Explain informal design guidelines for relation schemas. (06 Marks)
b. What is the need for normalization? Explain the first, second and third normal forms with examples. (14 Marks)
- 7 a. Consider the schema
 $R = (A, B, C, D, E)$. Suppose the following functional dependencies hold
 $E \rightarrow A$
 $CD \rightarrow E$
 $A \rightarrow BC$
 $B \rightarrow D$
State whether the following decomposition of R are lossless join decomposition or not, Justify.
 $\{(A, B, C), (A, D, E)\}$
 $\{(A, B, C), (C, D, E)\}$ (10 Marks)
- b. Explain the following
i) Inclusion dependencies
ii) Domain key Normal Form (10 Marks)
- 8 a. Explain why a transaction execution should be atomic? Explain ACID properties by considering the following transaction
Ti : read (A);
A := A - 50;
write (A);
read (B);
B := B + 50;
write (B); (10 Marks)
- b. Briefly discuss on the two phase locking protocol used in concurrency control. (10 Marks)

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Fifth Semester B.E. Degree Examination, June/July 2015
Database Management Systems

Time: 3 hrs.

Max. Marks: 100

Note: Answer any FIVE full questions, selecting atleast TWO questions from each part.

PART - A

1. a. Discuss the main characteristics of the database approach. (08 Marks)
b. Explain the three-schema architecture. What is the difference between logical data independence and physical data independence? (08 Marks)
c. Define the database and briefly explain the implicit properties of the database. (04 Marks)
2. a. Define the following terms with an example:
i) Composite attribute
ii) Complex attribute
iii) Participation constraints
iv) Cardinality ratio
v) Ternary relationship. (10 Marks)
b. Design an ER diagram for an insurance company. Assume suitable entity types like CUSTOMER, AGENT, BRANCH, POLICY, PAYEMENT and the relationship between them. (10 Marks)
3. a. Briefly discuss how the different update operations on a relation deal with constraint violations? (08 Marks)
b. Consider the following schema for a COMPANY database:
EMPLOYEE (Fname, Lname, Ssn, Address, Super-ssn, Salary, Dno)
DEPARTMENT (Dname, Dnumber, Mgr-ssn, Mgr-start-date)
DEPT-LOCATIONS (Dnumber, Dlocation)
PROJECT (Pname, Pnumber, Plocation, Dnum)
WORKS-ON (Essn, Pno, Hours)
DEPENDENT (Essn, Dependent-name, Sex, Bdate, Relationship)
Write the queries in relational algebra.
i) Retrieve the name and address of all employees who work for 'Sales' department.
ii) Find the names of employees who work on all the projects controlled by the department number 3.
iii) List the names of all employees with two or more dependents.
iv) Retrieve the names of employees who have no dependents. (12 Marks)
4. a. Consider the database schema of Fig.Q.3(b), write the SQL query for the following:
i) List the names of managers who have at least one dependent.
ii) Retrieve the list of employees and the projects they are working on, ordered by department and, within each department, ordered alphabetically by last name, first name.
iii) For each project, retrieve the project number, the project name, and the number of employees who work on that project.
iv) For each project on which more than two employees work, retrieve the project number, the project name, and the number of employees who work on the project.
v) For each project, retrieve the project number, the project name, and the number of employees from department 4 who work on the project. (10 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.

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- b. List and explain the basic data types available for attributes in SQL and give example. (05 Marks)
- c. Explain how the GROUP BY clause works. What is the difference between the WHERE and HAVING clause? (05 Marks)

PART – B

- 5 a. Explain insert, delete and update statements in SQL and give example for each. (08 Marks)
- b. Write a note on:
- i) Views in SQL
 - ii) Aggregate functions in SQL
 - iii) Database stored procedures and functions. (12 Marks)
- 6 a. Explain the informal design guidelines for relation schemes. (08 Marks)
- b. Define and explain the first, second and third normal forms. (12 Marks)
- 7 a. Define multivalued dependency. Explain 4NF with an example. (10 Marks)
- b. Let $R = \{Ssn, Ename, Pnumber, Pname, Plocation, Hours\}$ and $D = \{R_1, R_2, R_3\}$ where
 $R_1 = EMP = \{Ssn, Ename\}$
 $R_2 = PROJ = \{Pnumber, Pname, Plocation\}$
 $R_3 = WORKS-ON = \{Ssn, Pnumber, Hours\}$
The following functional dependencies hold on relation R.
 $F = \{Ssn \rightarrow Ename; Pnumber \rightarrow \{Pname, Plocation\}; \{Ssn, Pnumber\} \rightarrow Hours\}$
Prove that the above decomposition of relation R has the lossless join property. (10 Marks)
- 8 a. Draw a state diagram and discuss the typical states that a transaction goes through during execution. (10 Marks)
- b. Explain the problems that can occur when concurrent transactions are executed. Give example. (10 Marks)

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10CS54

Fifth Semester B.E. Degree Examination, Dec.2014/Jan.2015
Database Management System

Time: 3 hrs.

Max. Marks: 100

Note: Answer any **FIVE** full questions, selecting atleast **TWO** questions from each part.

PART - A

1. a. Explain the typical components module of a DBMS, with a neat diagram. (10 Marks)
 b. Define the following with examples :
 i) Value set ii) Complex attribute iii) Data model iv) Schema construct
 v) Metadata. (10 Marks)
2. a. What are structural constraints on a relation type? Explain with examples. (05 Marks)
 b. What is a weak entity type? Explain the role of partial key in design of weak entity type. (05 Marks)
 c. Design an ER diagram for the mail order Database considering the following requirements. Here employee takes order for parts from customers.
 i) The mail order company has employees each identified by a unique employee ID, first and last name, Address, Gender, Zip code.
 ii) Each customer of the company is identified by a unique customer ID, first and last name, Address, Location & Zip code.
 iii) Each part sold by the company is identified by a unique part number, part name , price & quantity in stock.
 iv) Each order placed by a customer taken by an employee and is given a unique order number. Each order contains specified quantities of one or more parts. Each order has a date of receipt as well as an expected ship date. The actual ship date is also recorded.
 v) Each customer can place number of orders & each order placed by one customer only.
 vi) Each Employee can take any number of orders but each order belongs to only one employee.
 vii) Each part placed by number of customers and each customer can place order for number of parts.
 viii) Write assumptions made. (10 Marks)
3. a. Discuss the entity integrity and referential integrity constraints. Why is each considered important? (05 Marks)
 b. Discuss the various types of JOIN operations. Why is Theta Join required? (05 Marks)
 c. Give the schema :
 Student (USN, NAME, BRANCH, PERCENTAGE)
 Faculty (FID, FNAME, DEPT, DESIGNATION, SALARY)
 Course (CID, CNAME, FID)
 Enroll (CID, USN, GRADE)
 Give the relation algebra expression for the following :
 i) Retrieve the name and percentage of all students for the course 10CS54.
 ii) List the Departments having a average salary of the faculties above Rs 30,000.
 iii) List name of the course having students grade 'A' maximum. (10 Marks)

- 4 a. Explain the different constraints that can be applied during table creation in SQL, with an example. (08 Marks)
- b. Write the SQL query for the following Database Schema :
- Works (Pname, Cname, Salary)
Lives (Pname, Street, City)
Located_in (Cname, City)
Manager (Pname, Mgrname)
- 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 50,000 and Rs 90,000.
iii) Find the names of all persons who lives and work in 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. (12 Marks)

PART - B

- 5 a. Explain the syntax of SELECT statement in SQL. (04 Marks)
- b. How is view created and dropped? What problems are associated with updating views? (06 Marks)
- c. Explain the following i) Embedded SQL ii) Database stored procedure. (10 Marks)
- 6 a. What is a functional dependency and who specifies the functional dependency that hold among the attributes of a relation schema? (05 Marks)
- b. Consider $R = \{A, B, C, D, E, F\}$. FDS are $\{A \rightarrow BC, C \rightarrow E, CD \rightarrow EF\}$. Show that $AD \rightarrow F$. (05 Marks)
- c. Find the key and normalize
Book tittle | Auth_name | Book_type | List_Price | Affiliation | Publication.
FDs are { Book tittle \rightarrow Book type, Publication
Auth_name \rightarrow Affiliation
Book_type \rightarrow List_Price }. (10 Marks)
- 7 a. Which normal form is based on the concept of multi value functional dependency? Explain the same with example. (10 Marks)
- b. Given relation R with 4 attributes $R = (A, B, C, D)$ and following FDs. Identify the candidate keys for R and highest normal form.
i) $C \rightarrow D, C \rightarrow A, B \rightarrow C$ ii) $B \rightarrow C, D \rightarrow A$. (10 Marks)
- 8 Write short notes on the following :
a. Two phase locking protocol.
b. Transaction support in SQL.
c. Time stamp ordering algorithms.
d. Acid properties. (20 Marks)



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10CS54

Fifth Semester B.E. Degree Examination, June/July 2014
Database Management Systems

Time: 3 hrs.

Max. Marks: 100

Note: Answer any FIVE full questions, selecting atleast TWO questions from each part.

PART – A

1. a. What is database? Explain the implicit properties of database. (08 Marks)
 b. With neat diagram, explain “three schema architecture”. (08 Marks)
 c. Define the following terms:
 i) Data model ii) Schema iii) Metadata iv) Snapshot. (04 Marks)

2. a. Explain with sketch the different phases of database design. (10 Marks)
 b. Write an ER diagram of hospital management system. Assume your own entities (minimum 4), attributes and relations. (10 Marks)

3. a. What is constraint? Give the detailed explanation of key constraints. (10 Marks)
 b. Consider the following schema and write the relational algebra expressions for the queries given below:
 Suppliers (sid : integer, sname : string, address : string)
 Parts (pid : integer, pname : string, color : string)
 Catalog (sid : integer, pid : integer, cost : real)
 i) Find the names of suppliers who supply some red parts.
 ii) Find the sids of suppliers who supply some red parts or at 221 packer street.
 iii) Find the sids of suppliers who supply some red part and some green part. (10 Marks)

4. a. Consider the same data given in question 3(b) and write the following queries in SQL:
 i) Find the sids of suppliers who supply some red and some green parts.
 ii) Find the pairs of sids such that the supplier with first sid charges more for some part than the supplier with second sid.
 iii) Find the pids of parts supplied by at least two different suppliers. (10 Marks)
 b. Write a note on NULL and three valued logic. (10 Marks)

PART – B

5. a. Explain insert, delete and update statements in SQL, with example. (09 Marks)
 b. How is a view created and dropped? What problems are associated with updating of views? (11 Marks)

6. a. State the informal guidelines for relational schema design. Illustrate how violation of these guidelines may be harmful. (12 Marks)
 b. What is normalization? Explain third normal form with example. (08 Marks)

- 7 a. Define multi valued dependency. Explain 4NF with an example. (10 Marks)
- b. Let $R = \{Ssn, Ename, Pnumber, Pname, Plocation, Hours\}$ and $D = \{R_1, R_2, R_3\}$, where
 $R_1 = EMP = \{Ssn, Ename\}$
 $R_2 = PROJ = \{Pnumber, Pname, Plocation\}$
 $R_3 = WORKS_ON = \{Ssn, Pnumber, Hours\}$.
The following functional dependencies hold on relation R.
 $F = \{Ssn \rightarrow Ename; Pnumber \rightarrow \{Pname, Plocation\}; \{Ssn, Pnumber\} \rightarrow Hours\}$. Prove that the above decomposition of relation R has the lossless join property. (10 Marks)
- 8 Write a short note on:
a. Two phase locking protocol.
b. Transaction support in SQL.
c. Write ahead log protocol.
d. Time stamp ordering algorithm. (20 Marks)

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10CS54

Fifth Semester B.E. Degree Examination, Dec.2013 / Jan. 2014

Database Management Systems

Time: 3 hrs.

Max. Marks: 100

Note: Answer any FIVE full questions, selecting atleast TWO questions from each part.

PART - A

- 1 a. What are the responsibilities of DBA and Database designers? (04 Marks)
 b. With a diagram, explain the components modules of DBMS and their interactions. (08 Marks)
 c. List the advantages and disadvantages of DBMS. Discuss any five advantages by comparing with file systems. (08 Marks)

- 2 a. Define the following terms : i) Recursive relationship ii) Weak entity type iii) Atomic attributes iv) Participation role. (04 Marks)
 b. Discuss the conventions for displaying an ER schemas as an ER diagram. (04 Marks)
 c. Draw an ER diagram for Musicians who perform for album. Assume any four entities. Indicate all key and cardinality constraints and any assumptions that are made. (12 Marks)

- 3 a. List and explain characteristics of relations. (06 Marks)
 b. List set theory operations used in relational data model. Explain any two with example. (06 Marks)
 c. Consider the following relations for a sailors database that keeps track of reservation of boats by sailors.

SAILORS (SID, SNAME , RATING, AGE)

BOATS (BID, BNAME ,COLOR)

RESERVES (SID, BID, DAY)

Specify the following queries in relational algebra.

- i) Find the sids of sailors with age over 20 who have not reserved a 'Red' boat.
 ii) Find the names of sailors who have reserved all boats.
 iii) Find the names of sailors who have reserved boat 103. (08 Marks)

- 4 a. Describe the six clauses in the syntax of an SQL Retrieval Query. Show what type of constructs can be specified in each of the six clauses. Which of the six clauses are required and which are optional. (06 Marks)
 b. Explain how the group by clause works. What is the difference between the Where and Having clause? (04 Marks)

c. Consider the following relations for a database.

Supplier (Sno, Sname, Status, City)

Product (Pno, Pname, Color, Weight, City)

Shipments (Sno, Pno, Qty)

Specify the following queries in SQL.

- i) Retrieve names of supplier who supply part P₂.
 ii) Retrieve the names of suppliers who do not supply any part supplied by S₂.
 iii) Retrieve parts number for all parts supplied by more than one supplier.
 iv) For each part supplied, get the part number, maximum quantity, minimum quantity supplied for that part.
 v) Retrieve supplier numbers for suppliers with status less than the current maximum in the supplier table. (10 Marks)

PART - B

- 5 a. List the differences between Independent nested and co – related nested query. (04 Marks)
b. Discuss main approaches to database programming. What you mean by Impedance mismatch. (08 Marks)
c. With program segment, explain retrieving of tuples with embedded SQL. (08 Marks)
- 6 a. Discuss insertion, deletion and modification anomalies. Why are they considered bad? Illustrate with examples. (08 Marks)
b. What you mean by closure of attribute? Write an algorithm to find closure of attribute. (06 Marks)
c. Given below are two sets 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)
- 7 a. Consider the following Universal relation
 $R = \{A, B, C, D, E, F, G, H, I, J\}$ and the set of function dependencies.
 $F = \{ \{A, B\} \rightarrow C, A \rightarrow \{D, E\}, B \rightarrow F, F \rightarrow \{G, H\}, D \rightarrow \{I, J\} \}$. What is the key of R? Decompose R into 2NF, then 3NF relations. (08 Marks)
b. What is the dependency preservation property for a decomposition? Why is it important? (06 Marks)
c. Define fourth normal form. When is it violated? Why is it useful? (06 Marks)
- 8 a. What are the anomalies occur due to interleaved execution? Explain them with example. (08 Marks)
b. Consider the three transactions T_1 , T_2 and T_3 and schedules S_1 and S_2 given below. Determine whether each schedule is serializable or not. If a schedule is serializable. Write down the equivalent serial schedule (S).
 $T_1 : R_1(X) ; R_1(Z) ; W_1(X) ;$
 $T_2 : R_2(Z) ; R_2(Y) ; W_2(Z) ; W_2(Y) ;$
 $T_3 : R_3(X) ; R_3(Y) ; W_3(Y) ;$
 $S_1 : R_1(X) ; R_2(Z) ; R_1(Z) ; R_3(X) ; R_3(Y) ; W_1(X) ; W_3(Y) ; R_2(Y) ; W_2(Z) ; W_2(Y) ;$
 $S_2 : R_1(X) ; R_2(Z) ; R_3(X) ; R_1(Z) ; R_2(Y) ; R_3(Y) ; W_1(X) ; W_2(Z) ; W_3(Y) ; W_2(Y) ;$
c. Describe the three steps in crash Recovery in Aries. What is the goal of the each phase? (04 Marks)

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Fifth Semester B.E. Degree Examination, June/July 2013

Database Management System

Time: 3 hrs.

Max. Marks: 100

Note: Answer FIVE full questions, selecting atleast TWO questions from each part.

PART - A

1. a. What are the main characteristics of the database approach over the file processing approach? (08 Marks)
- b. Explain the different categories of data models. (06 Marks)
- c. Explain the three – schema architecture. (06 Marks)

2. a. Explain the different types of attributes that occur in the ER model. Write their corresponding notations. (08 Marks)
- b. 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.
 (12 Marks)

3. a. 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 employees who have no dependents
 - iii) Find the names of employees who work on all the projects controlled by department number 2.
 (12 Marks)
- b. Explain the relational algebra operations from set theory, with examples. (08 Marks)

4. a. Explain the different constraints that can be applied during table creation in SQL, with a suitable example. (08 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.
 (12 Marks)

PART - B

5. a. Define views. Give an example to create a view. (08 Marks)
- b. Explain the different approaches for database programming. Explain the problem that arise in some of the approaches. (12 Marks)

- 6 a. List the inference rules for functional dependencies. Write the algorithm to determine the closure of X(set of attributes) under F(set of functional dependencies). (08 Marks)
b. Define the 1NF, 2NF and 3NF with a suitable example for each. (12 Marks)
- 7 a. Write the algorithm fro testing non additive join property. (10 Marks)
b. Explain the 4NF with a suitable example. (10 Marks)
- 8 a. Explain the ACID properties of a database transaction. (04 Marks)
b. Briefly explain the two phase locking protocol used in concurrency control. (08 Marks)
c. Explain the three phases of the ARIES recovery model. (08 Marks)

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06CS54

Fifth Semester B.E. Degree Examination, June/July 2013

Database Management Systems

Time: 3 hrs.

Max. Marks: 100

Note: Answer FIVE full questions, selecting at least TWO questions from each part.

PART – A

1. a. Define the terms:
 - i) Data
 - ii) Database
 - iii) Metadata
 - iv) Data model.(08 Marks)
- b. Explain with neat diagram the operation of a two-tier client server architecture for RDBMS. (08 Marks)
- c. What are data base utilities? List the few functions that utilities perform. (04 Marks)

2. a. List out the notations for E-R diagram and their meaning. (10 Marks)
- b. Design an E-R diagram for hospital information system by taking into account with at least four entities. (10 Marks)

3. a. Discuss the characteristics of relations with examples. (06 Marks)
- b. Define referential integrity constraint. Explain the importance of referential integrity constraint in SQL. (06 Marks)
- c. Consider the two tables, show the results of the following operations: (08 Marks)

R	
Col A	Col B
A	1
B	2
D	3
F	4
E	5

S	
Col A	Col B
A	1
C	2
D	3
E	4

$R \bowtie_{R.\text{ColA} = S.\text{ColA}} S$
 $R \Rightarrow\!\!\! \bowtie_{R.\text{ColA} = S.\text{ColA}} S$
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(08 Marks)

4. a. Explain with syntax the sin clauses in SQL including EXISTS and ORDER BY clause. (12 Marks)
- b. Explain with examples in SQL: i) Drop command; ii) Delete command. (08 Marks)

PART – B

5. a. Define virtual table. Explain how to create the view and how view can be dropped. (07 Marks)
- b. Write a note on aggregate functions with examples. (13 Marks)

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- 6 a. Explain the informal guidelines for relational schema. (08 Marks)
b. With examples discuss First normal form 1NF, 2NF, 3NF and 4NF. (12 Marks)
- 7 a. Explain the phases involved in an ARIES algorithm with examples. (10 Marks)
b. Discuss the properties of a transaction with state transition diagram. (10 Marks)
- 8 Write short notes on:
a. Two phase locking
b. Embedded SQL
c. Recursive relationship type
d. Time stamp ordering algorithm. (20 Marks)

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Fifth Semester B.E. Degree Examination, December 2012
Database Management Systems

Time: 3 hrs.

Max. Marks:100

Note: Answer any **FIVE** full questions, selecting atleast **TWO** question from each part.

PART - A

1. a. Define the following with examples: i) Value set ii) Complex attribute iii) Data model iv) Schema v) Metadata. (10 Marks)
 b. Explain the component module of DBMS and their interactions, with the help of a diagram. (10 Marks)

2. a. What are the structural constraints on a relationship type? Explain with examples. (05 Marks)
 b. What is a weak entity type? Explain the role of partial key in design of weak entity type. (05 Marks)
 c. Design an ER – diagram for the Movie – database considering the following requirements :
 i) Each Movie is identified by its title and year of release, it has length in minutes and can have zero or more quotes, language.
 ii) Production companies are identified by Name, they have address, and each production company can produce one or more movies.
 iii) Actors are identified by Name and Date of Birth, they can act in one or more movies and each actor has a role in a movie.
 iv) Directors are identified by Name and Date of Birth, so each Director can direct one or more movie and each movie can be directed by one or more Directors.
 v) Each movie belongs to any one category like Horror, action, Drama, etc. (10 Marks)

3. a. What is meant by integrity constraint? Explain the importance of Referential integrity constraint. How Referential integrity constraint is implemented in SQL? (10 Marks)
 b. Consider the following schema and write the Relational Algebra.
 SAILORS (SID, SNAME, RATING, AGE)
 BOATS (BID, BNAME, COLOR)
 RESERVE (SID, BID, DAY).
 i) Retrieve the sailors names who have reserved red and green boats.
 ii) Retrieve the sailors names with age over 20 years and reserved black boat.
 iii) Retrieve the number of boats which are not reserved.
 iv) Retrieve the sailors names who have reserved green boat on Monday.
 v) Retrieve the sailors names who is the oldest sailor with rating 10. (10 Marks)

4. a. Consider the following schema and write the SQL queries :
 EMP (SSN, NAME, ADDR, SALARY, SEX, DNO)
 DEP(DNO, DNAME, MGRSSN)
 DEP_LOCN (DNO, DLOCN)
 PROJ (PNO, PNAME, PLOCN, DNO)
 WORKSON (SSN, PNO, NOHRS)
 DEPENDENT (SSN, DEPNTNAME, DEPNTSEX, DEPNTRELATIONSHIP)
 i) Retrieve the manager name with atleast 1 dependent.
 ii) Retrieve the employee name who work on any of the project that Kumar works.
 iii) Retrieve the pno, pname, no of man hours work done on each project.
 iv) Retrieve the pname which are controlled by Research department.
 v) Retrieve the employee name who work for dept no. 10 and have a daughter. (10 Marks)

- b. Consider the following schema and write the SQL queries :
- STUDENT (STUDENT_ID, SNAME, MAJOR, GPA)
 FACULTY (FACULTY_ID, FNAME, DEPT, DESIGNATION, SALARY)
 COURSE (COURSE_ID, CNAME, FACULTY_ID)
 ENROLL (COURSE_ID, STUDENT_ID, GRADE)
- Retrieve the student name who is studying under faculties of “Mechanical dept”.
 - Retrieve the student name who have enrolled under any of the courses in which ‘Kumar’ has enrolled.
 - Retrieve the faculty name who earn salary which is greater than the average salary of all the faculties.
 - Retrieve the Sname who are not been taught by faculty ‘Kumar’.
 - Retrieve the faculty names who are assistant professors of computer science department.
- (10 Marks)

PART - B

- 5 a. How is view created and dropped? What problems are associated with updating views? (08 Marks)
- b. How are triggers and assertions defined in SQL? Explain. (06 Marks)
- c. Explain the concept of stored procedure in brief. (06 Marks)
- 6 a. Consider $R = \{A B C D E F\}$; FD'S $\{A \rightarrow BC, C \rightarrow E, CD \rightarrow EF\}$
 Show that $AD \rightarrow F$. (06 Marks)
- b.

Book title	Auth_name	Book type	Listprice	Affiliation	Publication
FDS {Book_title \rightarrow Book_type, publication Auth_name \rightarrow Affiliation Book_type \rightarrow Listprice}	Find the key and normalize. (08 Marks)				
- c. What is a set of functional dependencies F said to be minimal? Give an algorithm for finding a minimal cover G for F. (06 Marks)
- 7 a. Consider $R = \{A B C D E F\}$
 FDS $\{AB \rightarrow CD, A \rightarrow CF, B \rightarrow F, BGD \rightarrow F, D \rightarrow E, DE \rightarrow F\}$
 Find an irreducible cover for this set of FD's. (06 Marks)
- b. Explain the properties of Relational Decomposition. (06 Marks)
- c. Consider $R = \{A B C D E F\}$
 FDS $\{AB \rightarrow C, B \rightarrow E, A \rightarrow DF\}$
 Check weather decomposition is lossless. (08 Marks)
- 8 a. What are ACID properties? Explain. (06 Marks)
- b. What is a schedule? Explain with example conflict Serializable schedule. (08 Marks)
- c. What is two – phase locking protocol? How does it guarantee serializability? (06 Marks)

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06CS54

Fifth Semester B.E. Degree Examination, December 2012
Database Management Systems

Time: 3 hrs.

Max. Marks: 100

**Note: Answer FIVE full questions atleast
TWO questions from each part.**

PART – A

1. a. Define the following terms :
 i) Database ii) Canned Transactions iii) Data model iv) Meta data v) Database designer. (10 Marks)
 b. List advantages of DBMS over traditional file systems. Briefly explain them. (10 Marks)
2. a. Define the following, with an example
 i) Weak entity type ii) participation constraints iii) cardinality ratio iv) Ternary relationship v) recursive relationship. (10 Marks)
 b. List the summary of the notations for ER diagrams. Include symbols used in ER diagrams and their meaning. (10 Marks)
3. a. Discuss the characterisation of a relation, with example. (06 Marks)
 b. Define referential integrity constraint. Explain the importance of referential integrity constraint. (06 Marks)
 c. Briefly discuss the different types of update operations on relational database. Show an example of a violation of the referential integrity in each of the update operations. (08 Marks)
4. a. Given the schema
 EMP(Fname, Lname, SSN, Bdate, Address, Sex, salary, super SIN, Dno.)
 DEPT(Dname, Dnumber, Mgr SSN, Mrestartdate)
 DEPT_LOC(Dnumber, Dloc), PROJECT(Pname, Pnumber, Ploc, Dnum), works_on (ESSN, Pno, Hours) DEPENDENT (ESSN, Dep_name, Sex, Bdate, relation) give the relation algebra expression for the following :
 List female employees from Dno = 20 earning more than 50000
 List ‘CSE’ department details
 Retrieve the first name, last name and salary of all employees also work in department no 50
 Retrieve the name of the manager of each department
 Retrieve the name and address of all employees who work for the sport department
 Retrieve the names of employer who have no dependents. (12 Marks)
- b. Explain the ALTER TABLE command? Explain how a new constraint can be added and also an existing constraint can be removed, using suitable examples. (08 Marks)

PART – B

5. a. Explain the syntax of a SELECT statement in SQL. Write the SQL query for the following relation algebra expression $\pi_{Bdate, Address} (\sigma_{fname = 'John' \text{ AND } Minit = 'B' \text{ AND } Lname = 'SMITH'} (Employee))$ (06 Marks)
 b. Explain DROP command, with an example. (04 Marks)
 c. Write a note on aggregate functions in SQL, with example. (10 Marks)



- 6 a. What is functional dependency? Write an algorithm to find a minimal cover for a sets of functional dependencies. (10 Marks)
- b. What is embedded SQL? With an example, illustrate how would you connect to a data base, fetch records and display. Also explain the concept of stored procedures, in brief. (10 Marks)
- 7 a. Define multivalued dependency. Explain 4NF, with an example. (10 Marks)
- b. Define JOIN dependency. Explain 5NF, with an example. (10 Marks)
- 8 a. Briefly discuss the two phase locking protocol used in concurrency control. (10 Marks)
- b. Write a short note on :
- i) Transaction support in SQL
 - ii) Write ahead los protocol. (10 Marks)

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06CS54

Fifth Semester B.E. Degree Examination, June 2012

Database Management Systems

Time: 3 hrs.

Max. Marks:100

Note: Answer **FIVE** full questions, selecting at least **TWO** questions from each part.

PART – A

- 1** a. Discuss the main characteristics of the database approach. How does it differ from traditional file systems? **(10 Marks)**
b. Explain the component modules of DBMS and their interaction, with the help of a diagram. **(10 Marks)**

2 a. With a diagram, describe the three schema architecture of database systems. **(04 Marks)**
b. Discuss with examples, different types of attributes. **(06 Marks)**
c. Design an ER diagram for keeping track of information about a hospital database taking into account atleast four entities. **(10 Marks)**

3 a. Consider the following two tables T_1 and T_2 . Show the results of the following operations. (Assume T_1 and T_2 are union compatible).

Table T₁

P	Q	R
10	a	5
15	b	8
25	a	6

Table T₂

A	B	C
10	b	6
25	c	3
10	b	5

- i) $T_1 \bowtie_{T_1 \cdot P = T_2 \cdot A} T_2$

ii) $T_1 \bowtie_{T_1 \cdot P = T_2 \cdot A} T_2$

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

iv) $T_1 \cup T_2$

v) $T_1 \bowtie_{T_1 \cdot Q = T_2 \cdot B} T_2$ (10 Marks)

b. Give the ER to relational mapping algorithm. Discuss each step, with an example. (10 Marks)

4 a. Consider the following schema :
 SAILORS (sid, sname, rating, age)
 BOATS (bid, bname, color)
 RESERVES (sid, bid, day)
 Write the queries in relational algebra to :
 i) Find the names of sailors who have reserved boat number ‘103’.
 ii) Find the names of sailors who have reserved a ‘red’ and a ‘green’ boat.
 iii) Find the names of sailors who have reserved at least one boat.
 iv) Find the names of sailors with age over 20 years, who have not reserved a red boat. (12 Marks)

b. Explain IN and EXISTS operators of SQL with suitable examples. (08 Marks)

PART – B

- 5 a. How is a ‘view’ created and dropped? What are the problems associated with updation of views? (10 Marks)
- b. What is embedded SQL? With an example, illustrate how would you connect to a database, fetch records and display. Also explain the concept of stored procedure, in brief. (10 Marks)
- 6 a. What is a functional dependency? Write an algorithm to find the minimal cover for a set of functional dependencies. (10 Marks)
- b. Why normalization is required? Explain the first, second and third normal forms with an example. (10 Marks)
- 7 a. Explain multivalued dependency and fourth normal form, with an example. (10 Marks)
- b. What are ACID properties? Explain. (06 Marks)
- c. Write and explain two phase locking protocol. (04 Marks)
- 8 a. What is write-ahead logging? What is forced to disk at the time a transaction commits? (06 Marks)
- b. Write and explain time stamp based ordering algorithm. (08 Marks)
- c. Write a note on check pointing. (06 Marks)

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CS53

Fifth Semester B.E. Degree Examination, June 2012

Database Management Systems

Time: 3 hrs.

Max. Marks: 100

Note: Answer any FIVE full questions.

- 1 a. What are the advantages of DBMS? (06 Marks)
- b. Differentiate between file, system and DBMS. (06 Marks)
- c. With a neat diagram, explain the structure of DBMS. (08 Marks)

- 2 a. With a neat diagram, explain the main phases of database design. (08 Marks)
- b. What is an attribute? Explain the different types of attributes? (06 Marks)
- c. Write any 6 notations for ER diagrams. (06 Marks)

- 3 a. Explain the characteristics of relation. (06 Marks)
- b. Explain SELECT and PROJECT operation with syntax and examples. (07 Marks)
- c. What is join? Explain the different types of joins. (07 Marks)

- 4 a. Explain division operation with an example. (08 Marks)
- b. Write the SQL queries for the following, using the company database schema.
 Employee (fname, minuit, Lname, SSn, Bdate, sex, sal, supee_ssn, Duo).
 Department (Dname, Dnumber, Mgr_ssn, Mgr_start_date).
 Project (pname, pnumber, ploc, Dnum).
 Works on (Essn, pno, hours).
 Dependent (Essn, dependent-name, sex, Bdate, relationship).
 i) Retrieve the names of all employees who do not have supervisors.
 ii) Show the resulting salaries if every employee working on the “PRODUCTS” project is given a 10 percent raise.
 iii) Retrieve the name of each employee who has a dependent with the first name and sex as the employee. (12 Marks)

- 5 a. Describe the informal design guidelines for relation schemas. (08 Marks)
- b. Explain the first normal form and second normal forms with suitable example. (12 Marks)

- 6 a. Briefly explain the properties of relational decompositions. (10 Marks)
- b. What are the main objectives to be considered when designing a secure data base application? (06 Marks)
- c. Discuss access control and discretionary access control. (04 Marks)

- 7 a. List the ACID properties. Explain them. (08 Marks)
- b. How does the strict 2pL ensure serializability and recoverability? (06 Marks)
- c. What steps are taken in the ARIES method to recover from a DBMS crash? (06 Marks)

- 8 Write short notes on : (20 Marks)
 - a. Transact support in SQL.
 - b. Embedded SQL.
 - c. Views.
 - d. Dead locks.

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Fifth Semester B.E. Degree Examination, December 2011**Database Management Systems**

Time: 3 hrs.

Max. Marks:100

- Note:** 1. Answer any FIVE full questions, selecting at least TWO questions from each part.
 2. For SQL and relational algebra queries refer appropriate tables given at the end of paper.

PART – A

- 1 a. Discuss the various component modules of a DBMS with a neat diagram. (08 Marks)
 b. Briefly explain the advantages of object oriented systems. (05 Marks)
 c. List and explain the main characteristics of database approach. (07 Marks)

- 2 a. Define and explain a partial key, with an example. (04 Marks)
 b. What is meant by recursive relationship? Bring out the importance of role names in recursive relationship, with an example. (06 Marks)
 c. Design an ER diagram for maintaining a movie database taking into account atleast four entities. (10 Marks)

- 3 a. Explain foreign key and its importance. Can a foreign key exist, only for a single table? Explain. (05 Marks)
 b. How can an intersection operator be implemented using union and minus operator? (03 Marks)
 c. Write queries in relational algebra for the following :
 - i) Retrieve the number of dependents for an employee named “Ram”
 - ii) Retrieve the name of managers working in location named “XYZ” who has no female dependents.
 - iii) Retrieve the name of employee who works in the same department as that of “Raj”. (12 Marks)

- 4 a. Explain all possible options that can be specified when a referential integrity constraint is violated using suitable example for all options. (08 Marks)
 b. Write queries in SQL for the following. Refer the relations at the end of the question paper :
 - i) Retrieve the name of the employee who gets second highest salary
 - ii) For each department that has more than five employees, retrieve the department number and the number of its employees who have salary more than Rs.5000.
 - iii) Retrieve the name of employees whose salary is greater than all the employees working in either department 5 or 6. (12 Marks)

PART – B

- 5 a. Discuss the significance of an assertion. Write an assertion to specify a constraint such that the salary of an employee must not be greater than the salary of the manager of the department that the employee works for in SQL. (08 Marks)
 b. What is meant by impedance mismatch? Explain. (06 Marks)
 c. Create a view which will display the department name, number of employees working and total salary for each department. (06 Marks)

- 6 a. Suggest and explain three different techniques to achieve 1NF using a suitable example. (08 Marks)
- b. Differentiate between prime and non-prime attribute, with an example. (04 Marks)
- c. Consider the relation R(A, B, C, D, E, F) and the FD $A \rightarrow B$, $C \rightarrow DF$, $AC \rightarrow E$, $D \rightarrow F$. What is the key and highest normal form of R? If it is not in 3NF find a decomposition that is lossless and dependency preserving? (08 Marks)
- 7 a. Which normal form is based on the concept of multi valued functional dependency? Explain the same with an example. (10 Marks)
- b. Explain two phase locking protocol and its disadvantages. (10 Marks)
- 8 Write short notes on :
a. Tune stamp ordering algorithm
b. ARIES algorithm
c. Embedded SQL
d. Fifth normal form. (20 Marks)

Tables/Relations :

Employee (Name, SSN, Salary, Super SSN, DNo)

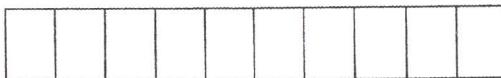
Department (DNum, DName, Mgr SSN)

Dept-Locations (DNum, Dlocation)

Work ON (ESSN, PNo, Hours)

Dependent (ESSN, Dep Name, Sex)

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Fifth Semester B.E. Degree Examination, December 2011
Database Management Systems

Time: 3 hrs.

Max. Marks:100

Note: Answer any FIVE full questions.

1. a. Explain with a neat diagram, on the typical components of DBMS. (10 Marks)
b. Discuss the main characteristics of the database approach. (06 Marks)
c. What are the responsibilities of a DBA? (04 Marks)

2. a. Define entity and attribute. With example, explain different types of attributes that occur in ER model. (10 Marks)
b. With respect to ER models, explain with examples :
 i) Strong entity ii) Weak entity iii) Cardinality ratio relationship iv) Recursive (10 Marks)
 v) Ternary relationship.

3. a. List the characteristics of relation and discuss each of them, with example. (08 Marks)
b. Explain the DIVISION operation, with an example. How can a division operator be implemented using other relational algebraic operations? (06 Marks)
c. Define referential integrity and entity integrity constraint. Why is it considered to be important? (06 Marks)

4. a. Consider the following schema for a company database :
EMPLOYEE (Name, SSN, Address, Sex, Dno, Salary)
WORKS_ON (ESSN, PNO, HOURS)
DEPARTMENT (Dname, Dnumber, MGR_SSN)
PROJECT (Pname, Pnumber, Plocation, Dnum)
DEPENDENT (ESSN, Dependent_name, Sex, Relationship)
Write the following queries in SQL :
 i) Retrieve the SSN of all employees who work on project numbers 1, 2 or 3.
 ii) Retrieve the name of the employees who do not have supervisors.
 iii) Retrieve the names of employees who do not have dependents.
 iv) Retrieve the name of each employee who works on all projects controlled by department number 5. (12 Marks)
b. List the data types that are allowed for SQL attributes. (04 Marks)
c. Write a note on aggregate functions in SQL, with examples. (04 Marks)

5. a. Briefly explain the following, with respect to SQL giving examples :
 i) Views ii) Assertions. (06 Marks)
b. What is embedded SQL? Write a C program segment to read SSN value to retrieve the employee tuple from the database using embedded SQL command. (10 Marks)
c. Write a note on cursors. (04 Marks)

- 6 a. When is a set of functional dependencies F said to be minimal? Give an algorithm for finding a minimal cover for F and E. (10 Marks)
- b. Define normalization. Explain INF,2NF, 3NF with an example for each. (10 Marks)
- 7 a. Explain the three phases involved in an ARIES algorithm, with an appropriate example. (10 Marks)
- b. Define multivalued dependency. Explain 4NF, with an example. (10 Marks)
- 8 Write short notes on :
a. Two phase locking protocol.
b. ACID properties.
c. Access control.
d. Serializability. (20 Marks)

Fifth Semester B.E. Degree Examination, June/July 2011
Database Management Systems

Time: 3 hrs.

Max. Marks: 100

Note: Answer any FIVE full questions.

- 1 a. List the advantages of DBMS over conventional file system. (06 Marks)
b. Explain the structure of a typical DBMS and give the block diagram. (08 Marks)
c. What is data independence? Bring out different types of independence. (06 Marks)

2 a. Explain the following terms briefly and give one example for each:
i) Composite attributes ii) One-to-many relationship iii) Weak entity set. (06 Marks)
b. A company database needs to store the information about employees (identified by ssn, with salary and phone as attributes); departments (identified by dno, with dname and budget as attributes) and children of employees (with name and age as attributes). Employees work in department; each dept is managed by an employee; a child must be identified uniquely by name when the parent is known. Draw an ER diagram that captures this information and highlight all the properties. (14 Marks)

3 a. Consider the following schema and answer the following, using relational algebra:
Sailor (sid, sname, srat, sage)
Boats (bid, bname, colour)
Reserves (sid, bid, day)
i) Find the names of sailors who have reserved boat 103.
ii) Find the color of the boat, reserved by sailor X.
iii) Find the sailor who have reserved a red and a green boat. (06 Marks)

b. Compare the natural join with θ -join in relational algebra. Illustrate with an example. (06 Marks)

c. Explain the updation anomalies, in detail. Give one example for each. (08 Marks)

4 a. Explain the following SQL commands: i) CREATE ii) SELECT iii) INSERT iv) VIEW.
Give their syntax and atleast one example for each. (14 Marks)
b. Write the SQL statements for the Q.3(a) (06 Marks)

5 a. Give the definitions of 2NF and 3NF.
Consider the following schema :
Employee_Proj (Eid, Ename, Esalary, Eposition, dno, dname, dlocation, Pid, P_name, Hours, P_manager)
Convert this schema into 2NF and 3NF. Show the steps involved. (14 Marks)

b. Explain the multi valued dependencies and 4NF. Give one example for each. (06 Marks)

6 a. Explain the four important properties of a transaction. (08 Marks)
b. What is serializability? Explain the serializability checking algorithm, with an example. (12 Marks)

7 a. What is a lock? Why it is needed? Explain the binary locking system and give the disadvantages of it. (10 Marks)
b. Explain the basic 2PL. Highlight on the different types of 2PL locking systems. (10 Marks)

8 Write short notes on:
a. ER-to-relational mapping
b. Embedded SQL
c. Database security
d. Write-ahead log protocol. (20 Marks)

Fifth Semester B.E. Degree Examination, June/July 2011
Database Management Systems

Time: 3 hrs.

Max. Marks:100

Note: Answer *FIVE* full questions selecting at least *TWO* questions from each part.

PART - A

- 1 a. Discuss the main characteristics of the database approach and how it differs from traditional file system. (08 Marks)
b. Discuss criteria used to classify database management system. (06 Marks)
c. Define the terms : DDL, DML and DCL. Give examples. (06 Marks)

2 a. What is the concept of a weak entity used in data modeling? Define the terms owner entity type, weak entity type, identifying relationship type and partial key. (08 Marks)
b. A company database needs to store information about employees (identified by ssn, with salary and phone as attributes) departments (identified by the dno, with dname, and budget as attributes), and children of employees (with name and age as attributes). Employees work in departments; each department is managed by an employee; a child must be identified uniquely by name when the parent (who is an employee; assume that only one parent works for the company) is known. We are not interested in information about a child once the parent leaves the company. Draw an ER diagram that captures this information. (12 Marks)

3 a. Discuss the entity integrity and referential integrity constraints. Why is each considered important? (05 Marks)
b. Discuss the various types of JOIN operations. Why is theta join required? (05 Marks)
c. List the operations of relational algebra and the purpose of each. (10 Marks)

4 a. Write SQL syntax with example for the following SQL statements :
i) CREATE TABLE ii) SELECT – statement
iii) UPDATE command iv) ALTER TABLE (08 Marks)
b. What is a view in SQL, and how is it defined? Discuss the problems that may arise when one attempts to update a view. (06 Marks)
c. List the data types that are allowed for SQL2 attributes. (06 Marks)

PART – B

- 5 a. How does SQL allow implementation of the entity integrity and referential integrity constraints? Explain. (10 Marks)

b. Explain the following : i) Embedded SQL ii) Database stored procedure. (10 Marks)

6 a. Summarize the correspondences between ER model constructs and the relational model constructs. (05 Marks)

b. What is a functional dependency? Who specifies the functional dependencies that hold among the attributes of a relation schema? (05 Marks)

c. Define first, second and third normal forms by taking an example. (10 Marks)

7 a. What is meant by the attribute preservation condition on decomposition? (06 Marks)

b. Discuss the null value and dangling tuple problems. (06 Marks)

c. Define fourth normal form. Why is it useful? (08 Marks)

8 a. Explain the following with suitable example :
i) The lost update problem ii) The temporary update (or dirty read) problem. (10 Marks)

b. Why is the two-phase locking protocol? How does it guarantee serializability? (10 Marks)



Fifth Semester B.E. Degree Examination, December 2010

Database Management Systems

Time: 3 hrs.

Max. Marks: 100

Note: Answer any **FIVE** full questions, selecting at least **TWO** questions from each part.

PART – A

- 1 a. Discuss the main characteristics of the database approach. How does it differ from traditional file systems? (08 Marks)
- b. Explain the difference between logical and physical data independence. (04 Marks)
- c. Explain the operation of two – tier client/server architecture for RDBMS. (08 Marks)

- 2 a. Design an ER – diagram for keeping track of information about bank database, taking into account at least 4 entities. (10 Marks)
- b. Describe how to map the following scenarios in ER – model to schema, with suitable examples : i) Strong entity ; ii) One – to – one relationship. (10 Marks)

- 3 a. List the characteristics of relation. Discuss each one. (05 Marks)
- b. Discuss various types of inner join operations. (06 Marks)
- c. Consider the following schema –
 Sailors (sal – ID, sal – name, rating, age)
 Reserves (sal – ID, boat – ID, day)
 Boats (boat – ID, boat – name, color).
 Using the above schema solve the queries in relational algebra.
 i) Find the names of sailors, who have reserved all boats, called Interlake.
 ii) Find the sids of sailors, with age over 20, who have not reserved a red boat.
 iii) Find the names of sailors, who have reserved at least two boats. (09 Marks)

- 4 a. Explain how the GROUP by clause works. What is the difference between the WHERE and HAVING clause? (04 Marks)
- b. How does SQL implement the entity integrity constraints of the relational data model? Explain with an example. (04 Marks)
- c. Using the same tables given in Q.No.3(c), write SQL queries to :
 i) Find all sailors ID of sailors who have a rating of 10 or reserved the boat 105.
 ii) Find sailors whose rating is better than a sailor called “RAJ”.
 iii) Find the names of sailors who are older than the oldest sailor with a rating of 10. (12 Marks)

PART – B

- 5 a. List the approaches to DB programming. What are the main issues involved in DB programming? (08 Marks)
- b. What is the impedance mismatch problem? Which of the three programming approaches minimizes this problem? (06 Marks)

- c. How are triggers and assertions defined in SQL? Explain. (06 Marks)
- 6 a. Explain any two informal quality measures employed for a relational schema design. (06 Marks)
- b. Consider the following relations : CAR – SALE (car – no, date – sold, salesman – no, commission %, discount). Assume a car can be sold by multiple salesmen and hence primary key is {car – no, salesman – no}.
- Additional dependencies are :
- Date – sold → Discount and
Salesman – no → Commission %.
- i) Is this relation in 1NF, 2NF or 3NF? Why or why not?
- ii) How would you normalize this completely? (10 Marks)
- c. Discuss the minimal sets of functional dependencies. (04 Marks)
- 7 a. What are the ACID properties? Explain each one. (06 Marks)
- b. What is serializability? How can serializability be ensured? Do you need to restrict concurrent execution of transaction to ensure serializability? Justify your answer. (10 Marks)
- c. What is the phantom problem? Explain with an example. (04 Marks)
- 8 Write short notes on :
- a. 2PL protocol
- b. Deadlocks
- c. Aries
- d. Multivalued dependency. (20 Marks)

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Fifth Semester B.E. Degree Examination, December 2010

Database Management Systems

Time: 3 hrs.

Max. Marks:100

Note: Answer any FIVE full questions.

- 1 a. Discuss the main characteristics of the database approach. How does it differ from the traditional file systems? (10 Marks)
- b. What is the difference between logical data independence and physical data independence? (05 Marks)
- c. Discuss the conventions for displaying an ER schema as an ER diagram. (05 Marks)
- 2 a. Discuss the entity integrity and referential integrity constraints. Why is each considered important? (10 Marks)
- b. Explain how the different update operations deal with constraint violations. (10 Marks)
- 3 a. List the operations of relational algebra and the purpose of each. (10 Marks)
- b. Consider the following relations for a database of the company:
Employee (name, ENo, sex, salary, super No, DNo.)
Department (Dname, Dnumber, Mgr No)
Dept locations (Dnumber, Dlocations)
Project (Pname, Pnumber, Plocations, Dnumber)
Works ON (EENO, PNo, Hours)
Dependent (EENO, Dependent name, sex)
Specify the following queries in relational algebra :
i) Retrieve the name and address of all the employees who work for the design department
ii) Find the names of employees who work on all the projects controlled by department No.3
iii) Retrieve the names of employees who have no dependents. (10 Marks)
- 4 a. Discuss the correspondences between the ER model constructs and the relational model constructs. Show how each ER model construct can be mapped to the relational model. (10 Marks)
- b. Describe the six clauses in the syntax of an SQL query and show what types of constructs can be specified in each of the six clauses? Which of the six clauses are required and which are optional? (10 Marks)
- 5 a. Considering database schema of problem of Q3(b) above, specify the following queries in SQL:
i) Show the resulting salaries if every employees working on the product X project is given a ten percent raise.
ii) For every project located in Chennai, list the project number, the controlling department number and the department manager's last name and address.
iii) Retrieve the names of employees who have no dependents. (10 Marks)
- b. Discuss insertion, deletion and modification anomalies. Why are they considered bad? Illustrate with an example. (10 Marks)

- 6** a. Define and explain the first second and third normal forms. (10 Marks)
b. What is the lossless (or non additive) join property of decomposition? Why is it important? (10 Marks)
- 7** a. Define the fourth normal forms. When is it violated? Why is it useful? (10 Marks)
b. What is the difference between discretionary and mandatory access control? (06 Marks)
c. List the types of privileges available in SQL. (04 Marks)
- 8** a. Discuss the ACID properties of a database transaction. (04 Marks)
b. Discuss the problems of deadlock and starvation and the different approaches to dealing with these problems. (08 Marks)
c. Describe the three phases of the ARIES recovery model. (08 Marks)

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Fifth Semester B.E. Degree Examination, May/June 2010

Database Management Systems

Time: 3 hrs.

Max. Marks:100

Note: Answer any FIVE full questions, selecting at least TWO questions from each part.

PART – A

- 1 a. Briefly discuss the advantages of using the DBMS. (10 Marks)
- b. Explain the component modules of DBMS and their interaction, with the help of a diagram. (10 Marks)
- 2 a. Define an entity and an attribute. Explain the different types of attributes that occur in an ER model, with an example. (10 Marks)
- b. Define the following with an example:
- i) Weak entity type
 - ii) Participation constraints
 - iii) Cardinality ratio
 - iv) Ternary relationship
 - v) Recursive relationship. (10 Marks)
- 3 a. Discuss the characteristics of a relation, with examples. (08 Marks)
- b. Briefly discuss the different types of update operations on relational database. Show an example of a violation of the referential integrity in each of the update operation. (09 Marks)
- c. What is a valid state and an invalid state, with respect to a database? (03 Marks)
- 4 a. Consider the following two tables T_1 and T_2 . Show the results of the following operations:
- i) $T_1 \bowtie_{T_1.P=T_2.A} T_2$
 - ii) $T_1 \bowtie_{T_1.Q=T_2.B} T_2$
 - iii) $T_1 \bowtie_{T_1.P=T_2.A} T_2$
 - iv) $T_1 \bowtie (T_1.P = T_2.A \text{ AND } T_1.R = T_2.C) T_2$
 - v) $T_1 \cup T_2$.
- (Assume T_1 and T_2 are union compatible). (10 Marks)

Table T_1			Table T_2		
P	Q	R	A	B	C
10	a	5	10	b	6
15	b	8	25	c	3
25	a	6	10	b	5

- b. Explain with an example, the basic constraints that can be specified, when you create a table in SQL. (10 Marks)

PART – B

- 5 a. Explain the syntax of a SELECT statement in SQL. Write the SQL query for the following relation algebra expression.
$$\pi_{Bdate, Address}(\sigma_{Fname = "John" \text{ AND } Minit = 'B' \text{ AND } Lname = 'Smith'}(EMPLOYEE))$$
 (06 Marks)
- b. Explain DROP command with an example. (04 Marks)
- c. Consider the following tables:
WORKS (Pname, Cname, Salary)
LIVES (Pname, Street, City)
LOCATED-IN (Cname, City)
MANAGER (Pname, mgrname)
Write the SQL query for the following:
i) Find the names of all persons who live in the city ‘Mumbai’.
ii) Retrieve the names of all person of ‘Infosis’ whose salary is between Rs.30,000 and Rs.50,000.
iii) Find the names of all persons who live and work in the same city.
iv) List the names of the people who work for ‘Wipro’ along with the cities they live in.
v) Find the average salary of all ‘Infosians’. (10 Marks)
- 6 a. What is a functional dependency? Write an algorithm to find a minimal cover for a set of functional dependencies. (10 Marks)
- b. What is the need for normalization? Explain second normal form. Consider the relation EMP-PROJ = {SSn, Pnumber, Hours, Ename, Pname, Plocation}. Assume {SSn, Pnumber} as primary key. The dependencies are
 $SSn \text{ Pnumber} \rightarrow \{Hours\}$
 $SSn \rightarrow \{Ename\}$
 $Pnumber \rightarrow \{Pname, Plocation\}$. Normalize the above relation into 2NF. (10 Marks)
- 7 a. Explain multivalued dependency and fourth normal form, with an example. (10 Marks)
- b. Let $R = \{SSn, Ename, Pnumber, Pname, Plocation, Hours\}$ and $D = \{R_1, R_2, R_3\}$, where $R_1 = \text{EMP} = \{SSn, Ename\}$
 $R_2 = \text{PROJ} = \{Pnumber, Pname, Plocation\}$
 $R_3 = \text{WORK-ON} = \{SSn, Pnumber, Hours\}$. The following functional dependencies hold on relation R.
 $F = \{SSn \rightarrow Ename ; Pnumber \rightarrow \{Pname, Plocation\} ; \{SSn, Pnumber\} \rightarrow Hours\}$. Prove that the above decomposition of relation R has the lossless join property. (10 Marks)
- 8 a. Explain the problems that can occur when concurrent transactions are executed. Give examples. (10 Marks)
- b. Briefly discuss the two phase locking protocol used in concurrency control. (10 Marks)

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Fifth Semester B.E. Degree Examination, Dec.09/Jan.10**Database Management Systems**

Time: 3 hrs.

Max. Marks:100

Note: Answer any FIVE full questions, selecting at least TWO questions from each part.

PART – A

1. a. Explain the typical components of a DBMS with a neat diagram. (10 Marks)
 b. Define and explain the following terms with an example each :
 i) Snapshot ii) Intension iii) Extension iv) Schema construct (05 Marks)
 c. What is meant by “persistent storage for program objects”? Explain. (05 Marks)

2. a. Explain how role names are assigned in case of recursive relationships? Illustrate this concept with a diagram. (06 Marks)
 b. What is meant by partial key? Explain. (04 Marks)
 c. Design an ER diagram for keeping track of information about an AIRLINE database taking into account at least six entities. (10 Marks)

3. a. Define referential integrity constraint. Explain the importance of referential integrity constraint. How is this constraint implemented in SQL? (08 Marks)
 b. Consider the following relations and write relational algebra queries:
 Employee (Fname, SSN, Salary, Super-SSN, DNo) ; Works ON (ESSN, PNO, hours) ;
 Department (Dname, Dnumber, Mgr-SSN) ; Dependent (ESSN, Dependent name)
 i) Retrieve the highest salary paid in each department.
 ii) Retrieve the name of managers who have more than two dependents.
 iii) Retrieve the number of employee's and their average salary working in each department. (12 Marks)

4. a. Explain IN and EXISTS operators with suitable examples. (08 Marks)
 b. Consider the same data given in Q3(b), and write the following queries in SQL:
 i) Retrieve the name of all employees who do not have supervisor.
 ii) Retrieve the name of each employee who has a dependent with the same first name and same sex as the employee.
 iii) Retrieve the SSN of all employees who work on project numbers 1, 2, 3. (12 Marks)

PART – B

5. a. How is a view created and dropped? What problems are associated with updating of views? (10 Marks)
 b. What is embedded SQL? With an example, illustrate how would you connect to a database, fetch records and display. Also explain the concept of stored procedure in brief. (10 Marks)

6. a. Which normal form is based on the concept of transitive functional dependency? Explain with an example the decomposition into 3NF. (10 Marks)
 b. Define multi valued dependency. Explain 4NF with an example. (10 Marks)

7. a. Explain the three phases involved in an ARIES algorithm with an appropriate example. (10 Marks)
 b. Given a relation R with four attributes R = {A B C D} and the following FD, identify the candidate keys for R and the highest normal form.
 i) $C \rightarrow D$, $C \rightarrow A$, $B \rightarrow C$ ii) $B \rightarrow C$, $D \rightarrow A$ (10 Marks)

8. Write short notes on :
 a. Two phase locking protocol b. Transaction support in SQL
 c. Write ahead log protocol d. Time stamp ordering algorithm (20 Marks)

Fifth Semester B.E. Degree Examination, Dec.09/Jan.10

Database Management Systems

Time: 3 hrs.

Max. Marks:100

Note: Answer any FIVE full questions.

1. a. Discuss the main characteristics of database approach and how it differs from traditional file system. (08 Marks)
- b. With a diagram explain the architecture of DBMS. (08 Marks)
- c. Define schema and instance. (04 Marks)

2. a. Define the following :
 i) Entity ii) Primary key iii) Multi-valued attribute
 iv) Cardinality ratio v) Foreign key. (10 Marks)
- b. Write an E-R diagram for Banking system. Assume your own entities, (minimum 5 entities) attributes and relationships. Mention the cardinality ratio. (10 Marks)

3. a. Consider the following schema for a company database:
 Employee (Name, SSN, Address, Sex, Salary, DNo)
 Department (Dname, Dnumber, MgrSSN, MgrstartDate)
 Dept_Locations (Dnumber, Dlocation)
 Project (Pname, Pnumber, Plocation, Dnum)
 Works_on (ESSN, PNo, Hours)
 Dependent (ESSN, Dependent_Name, Sex, Bdate, Relationship)
 Write the queries in relational algebra to
 i) Retrieve the name and address of all employees who work for the research department.
 ii) Find the names of the employees who work on all projects controlled by dept_number 5.
 iii) List all the projects on which employee Smith is working.
 iv) Retrieve the names of employees who have no departments. (08 Marks)
- b. Discuss the following relational algebra operations. Illustrate with an example for each. JOIN, DIFFERENCE, SELECT, UNION. (12 Marks)

4. a. Consider the following relations for a database that keeps track of business trips-of sales persons in a sales office:
 SAILORS (SID, SNAME, RATING, AGE)
 BOATS (BID, BNAME, COLOR)
 RESERVES (SID, BID, DAY)
 Specify the following queries in SQL.
 i) Find the names of sailors who have reserved a red boat.
 ii) Find the names of sailors who have reserved a red or a green boat.
 iii) Find the names of sailors who have reserved all boats called 'Interlake'. (12 Marks)
- b. Explain the following with respect to SQL giving examples:
 i) Views ii) Aggregate functions. (08 Marks)

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- 5 a. State the informal design guidelines for relational scheme. Illustrate how violation of these guidelines may be harmful. (08 Marks)
- b. What is the need for normalization? Explain the First, Second and Third normal forms with examples. (12 Marks)
- 6 a. Give the algorithm for checking dependency preservation and lossless join. (08 Marks)
- b. Define Join dependency and Fifth Normal Form. (04 Marks)
- c. Compare discretionary access control with mandatory access control. (08 Marks)
- 7 a. Discuss ACID properties of transaction. (04 Marks)
- b. With an algorithm explain 2 phase locking. (10 Marks)
- c. What is serialisability? How can it be ensured? (06 Marks)
- 8 a. What is time stamping? Explain a mechanism of concurrency control that uses time stamping with the help of an example. (10 Marks)
- b. Explain shadow paging recovery technique. (10 Marks)

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06CS54

Fifth Semester B.E. Degree Examination, June-July 2009
Database Management System

Time: 3 hrs.

Max. Marks:100

**Note: Answer any FIVE full questions
choosing at least two from each part.**

Part A

1. a. Define the following terms:
 i) Database ii) Canned transaction iii) Data model
 iv) Metadata v) Database designer. (10 Marks)
- b. Explain characteristic of the database approach. (05 Marks)
- c. What are the responsibilities of database administrators? (05 Marks)
2. a. List the summary of the notations for ER diagrams. Include symbols used in ER diagrams and their meanings. (10 Marks)
- b. With respect to ER model, explain with examples,
 i) Strong entity ii) Weak entity iii) Participation constraints
 iv) Cardinality ratio v) Recurring relationships. (10 Marks)
3. a. Define the following terms with an example for each,
 i) Super key ii) Domain iii) Tuple iv) Nulls
 v) A relational database schema S. vi) The Entity integrity constraint. (12 Marks)
- b. Explain : i) Domain constraints ii) Semantic integrity constraints
 iii) Functional dependency constraint with examples. (08 Marks)
4. a. Given the schema
 EMP(Fname, Lname, SSN, Bdate, Address, Sex, Salary, SuperSSN, DNo)
 DEPT(Dname, Dnumber, MgrSSN, Mgrstartdate)
 DEPT-LOC(Dnumber, Dloc), Project(Pname, Pnumber, Ploc, Dnum)
 WORKS-ON(ESSN, PNO, Hours)
 Give the relation algebra expression for the following:
 i) List female employees from DNo = 20 earning more than 50000.
 ii) List 'CSE' department details.
 iii) Retrieve the first name, last name and salary of all employees who work in department number 50.
 iv) Retrieve the name of the manager of each department.
 v) Retrieve the name and address of all employees who work for the sports department.
 vi) Retrieve the names of employees who have no dependents. (12 Marks)
- b. With respect to SQL, explain with example
 i) The drop command
 ii) The alter command. (08 Marks)

Part B

5. a. Explain Insert, Delete and Update statements in SQL with example. (08 Marks)
- b. Write a note on Aggregate functions in SQL with examples. (12 Marks)
6. a. What is the need for normalization? Explain the first, second and third normal forms with examples. (14 Marks)
- b. Explain informal design guidelines for relation schemas. (06 Marks)
7. a. Explain multivalued dependency and fourth normal form (4NF) with examples. (10 Marks)
- b. Explain i) Inclusion dependencies ii) Domain key normal form. (10 Marks)
8. a. Explain properties of a transaction with state transition diagram. (10 Marks)
- b. What is a schedule? Explain with examples serial, nonserial and conflict serializable schedules. (10 Marks)

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06CS54

Fifth Semester B.E. Degree Examination, Dec.08/Jan.09
Database Management Systems

Time: 3 hrs.

Max. Marks:100

Note: Answer any FIVE full questions, selecting at least TWO questions from each part.

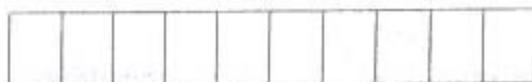
PART – A

1. a. List advantages of DBMS over traditional file systems. Briefly explain them. (08 Marks)
 b. Define and explain the importance of database catalog. Explain the internal storage format of a catalog with an example. (06 Marks)
 c. Describe the three schema architecture. What are the problems associated with three schema architecture. (06 Marks)
2. a. Discuss concepts related to structural constraints of a relationship type with examples. (10 Marks)
 b. Design an E-R diagram for keeping track of information about a hospital database taking into account at least entities. (10 Marks)
3. a. Explain the need of primary and foreign keys with suitable examples. (04 Marks)
 b. Explain the division operator with an example. How can a division operator be implemented using other relational algebraic operators? (04 Marks)
 c. Consider the following schema for a company database:
 Employee (Name, SSN, Salary, DNo, SuperSSN)
 Department (DName, DNos, MGRSSN)
 Project (Pname, Pnumber, DNum)
 Works ON (ESSN, PNo, Hours)
 Dependent (ESSN, Dependent-name, Sex)
 Write the queries in relational algebra to
 (i) List the name of all employees with at least two dependents.
 (ii) Find the name of employees who work on all the projects controlled by department 5
 (iii) Retrieve the name of managers who do not have female dependents. (12 Marks)
4. a. Explain the ALTER TABLE command. Explain how a new constraint can be added and also an existing constraint can be removed using suitable examples. (08 Marks)
 b. Using the same tables given in Q.NO.3(c), write SQL queries to:
 (i) Retrieve the name of employees who are paid the same salary as that of RAJ.
 (ii) Retrieve the name of employees who have two or more dependents.
 (iii) Retrieve the name of employees and their SuperSSN name. (12 Marks)

PART – B

5. a. How are triggers and assertions defined in SQL? Explain with examples. (10 Marks)
 b. Give an example of declaring a C language data type in SQL and explain it. (10 Marks)
6. a. Which normal form is based on the concept of full functional dependency? Explain the same with an example.
 b. A relation R has four attributes ABCD. For each of the following sets of FD, identify the candidate key and the highest normal form:
 (i) $C \rightarrow D$, $C \rightarrow A$, $B \rightarrow C$ (ii) $B \rightarrow C$, $D \rightarrow A$ (iii) $ABC \rightarrow D$, $D \rightarrow A$ (12 Marks)
7. a. Define multivalued dependency. Explain 4NF with an example.
 b. Explain all the phases involved in ARIES algorithm with an example. (10 Marks)
8. Write short notes on:
 a. Two-phase locking protocol. (20 Marks)

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2002 SCHEME

CS53

Fifth Semester B.E. Degree Examination, Dec 08 / Jan 09
Database Management Systems

Time: 3 hrs.

Max. Marks:100

Note : Answer any FIVE full questions.

- 1 a. Why would you choose a database system instead of simply storing data in flat files? When would it make sense not to use Database system? (10 Marks)

b. What is a transaction? In what way is it different from ordinary program in c? (05 Marks)

c. What is a phantom problem? Can it occur in a database where the set of DB objects are fixed and only values can be changed? (05 Marks)

2 a. What characteristics of a relation make it different from ordinary tables and files? (08 Marks)

b. Describe how you would map following scenarios in E – R model to schema with a suitable example : i) A weak entity ii) One – to – many relationship. (12 Marks)

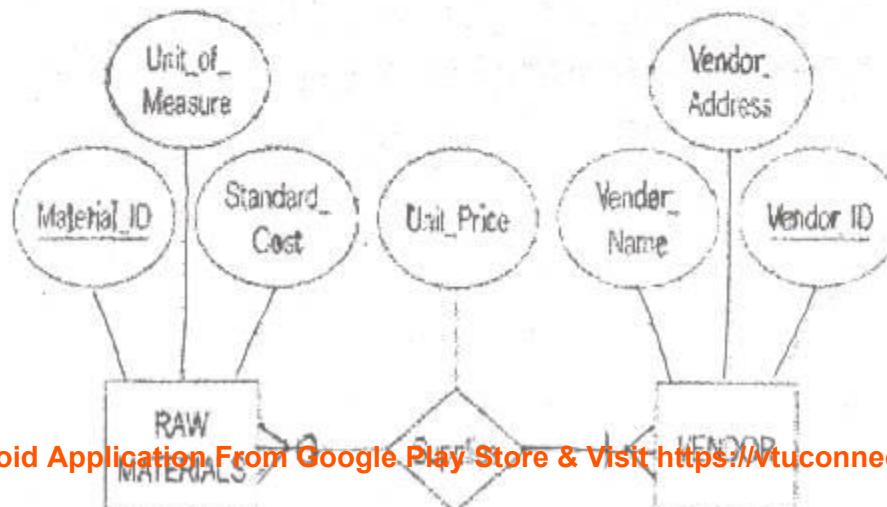
3 a. Explain the facility provided in SQL to exercise discretionary access control in databases. (12 Marks)

b. Define the term Foreign key. Can it be null? (03 Marks)

c. Consider the following relations for a database that keeps track of student enrollment in courses and the books adopted for each course :
STUDENT (USN, Name, Branch, bdate), COURSE (Course #, Course name),
ENROLL (USN, Course #, Grade), BOOK_ADOPTION (Course #, Instructor_ID, Book_ISBN),
TEXT (Book_ISBN, Book_Title, Publisher, Author),
INSTRUCTOR (INSTRUCTOR_ID, Inst_Name)
Specify the foreign keys for this schema, stating any assumptions you make. (05 Marks)

4 a. Describe different mechanisms to be supported by DBMS to help recover DB after crash. (12 Marks)

b. Map following E-R diagram into corresponding set of tables. (08 Marks)



- 5 a. List the basic relational operations classifying them as Unary and binary operations. (05 Marks)
- b. Specify following queries in relational algebra on the database schema shown in Q3(b),
- List the name of all courses taken by student name "XYZ".
 - List all the book titles adopted by Instructor "ABC" that are published by "TMH".
 - List the name of students who need to study books by author "ABC". (15 Marks)
- 6 a. List the approaches to DB programming. What are the main issues involved in DB programming? (08 Marks)
- b. Consider the following relations :
- CAR_SALE(car-no, Date-sold, Salesman_no, Commission %, Discount)
(Assume a car can be sold by multiple salesman and hence primary key is {car-no, salesman_no})
Additional dependencies are : date-sold → Discount_amt and Salesman_no → Commission %
- Is this relation in 1NF, 2NF or 3NF? Why or why not?
 - How would you normalize this completely? (12 Marks)
- 7 a. What are the different anomalies in non – normalized DB? Explain them with examples. (10 Marks)
- b. What are the different data types supported in SQL? Explain. (10 Marks)
- 8 Write notes on :
- Many – to – many relationships
 - INSERT Command
 - Integrity Constraints in SQL
 - DBA.
- (20 Marks)

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CS53

Fifth Semester B.E. Degree Examination, June / July 08
Database Management Systems

Time: 3 hrs.

Max. Marks:100

Note : Answer any FIVE full questions.

1. a. Explain DBMS component modulus along with its diagram. (08 Marks)
- b. Discuss the different types of user – friendly interfaces and the types of users who typically use each. (08 Marks)
- c. What are the responsibilities of DBA? (04 Marks)
2. a. Given the schema
EMP (Fname, Lname, SSN, Bdate, Address, Sex, Salary, Super SSN, dno)
DEPT (dname, Dnumber, Mgrssn, Mgrstardate)
DEPT_LOC (Dnumber, Dloc), PROJ (Pname, Pnumber, Ploc, Dnum) and
WORKS-ON (ESSN, PNo, Hours)
Give the relational algebra to make a list of project numbers for projects that involve an employee whose last name is “Rama”, either as a worker or as a manager of the department that controls the projects. (05 Marks)
- b. Explain Entity, integrity and referential integrity constraints. (07 Marks)
- c. Give the ER – to – Relational Mapping algorithm. (08 Marks)
3. a. List the data types that are allowed for SQL attributes. (05 Marks)
- b. Explain CREATE TABLE SQL command and illustrate different data definition. (10 Marks)
- c. Give the complete syntax of SELECT command. Give one example. (05 Marks)
4. a. Discuss insertion, deletion and modification anomalies. Why are they considered bad? Illustrate with examples. (12 Marks)
- b. Consider the relation R,
R = { Course No, SecNo, Offering Dept, Credit – Hours, Course level, Instructor SSN, Sem, year, Days-Hours, RoomNo, No-Of-students}. Suppose that the following functional dependencies hold on R.
{ CourseNo } → { offering Dept, Credit-Hours, Courselevel }
{ CourseNo, SecNo, Sem, Year } → { Days-Hours, RoomNo, No-of-students, Instructor SSN }
{ RoomNo, Days-Hours, Sem, year } → { InstructorSSN, CourseNo, SecNo }
Try to determine which sets of attribute form keys of R. How would you normalize this relation? (08 Marks)
5. a. Define fourth normal form. Why is it useful? (07 Marks)
- b. Why is the domain-key normal form (DKNF) known as the ultimate normal form? (06 Marks)
- c. What is meant by granting and revoking a privilege? (07 Marks)
6. a. What is a schedule (history)? Define the concepts of recoverable, cascadeless and strict schedules. (08 Marks)
- b. Which of the following schedules is (conflict) serializable? For each serializable schedule, determine the equivalent serial schedules.
i) r₁(x); r₃(x); w₁(x); r₂(x); w₃(x); iii) r₃(x); r₂(x); w₃(x); r₁(x); w₁(x);
ii) r₁(x); r₃(x); w₃(x); w₁(x); r₂(x); iv) r₃(x); r₂(x); r₁(x); w₃(x); w₁(x); (12 Marks)
7. a. Discuss the problems of deadlock and starvation and the different approaches to dealing with these problems. (10 Marks)
- b. Discuss the time stamp ordering protocol for concurrency control. How does strict time stamp ordering differ from other time ordering? (10 Marks)
8. Write short notes on:

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5 sheet 8

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CS53

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NEW SCHEME**Fifth Semester B.E. Degree Examination, July 2007
CS / IS****Database Management Systems**

Time: 3 hrs.]

[Max. Marks:100]

Note :1. Answer any FIVE full questions.**2. Diagrams if any must be neatly drawn.**

- 1 a. Bring out the important advantages and disadvantages of DBMS over file system. (06 Marks)
 - b. With a neat block diagram, explain the DBMS architecture. Also discuss three different levels of abstraction. (10 Marks)
 - c. What are the responsibilities of a DBA? (04 Marks)

 - 2 a. Define Entity, Entity set, attribute with respect to ER model. List different types of attributes along with their symbol. (08 Marks)
 - b. Describe the data pertaining to an insurance company using ER model concepts. Assume suitable entity types like CUSTOMER, AGENT, BRANCH, POLICIES, PAYMENT-DETAILS etc. and the relationship between them. (08 Marks)
 - c. What is cardinality ratio? What are the different types of cardinality ratio in a binary relationship? (04 Marks)

 - 3 a. Define the terms: domain, relation schema, relation state, relational database schema with an example for each. (08 Marks)
 - b. Discuss the entity integrity and referential integrity constraints. Why is each considered important? (06 Marks)
 - c. With an example, explain different set operations in relational algebra. (06 Marks)

 - 4 a. Explain 1NF, 2NF and 3NF with an example for each. (10 Marks)
 - b. List and explain the SQL commands available for retrieving and updating the tables in a database. Command of retrieval must contain all possible clauses. (10 Marks)

 - 5 a. Define the following terms with examples:
 - i) Candidate key.
 - ii) Super key.
 - iii) Foreign key.
 - iv) Prime attribute.
 - v) Key constraint. (10 Marks)
 - b. Consider the following relations of a database that keeps track of business trips of sales persons.
- SALESPERSON (SSN, Name, Start-Year, SEX, Dept-No.)
 EXPENSE (Trip-id, Account-No., Amount, Remarks)

- 6 a. Describe the six clauses of SQL query statement and show what expressions or relations can be specified in each of the six clauses. (06 Marks)
b. Explain different aggregate functions available in SQL with an example. (08 Marks)
c. Explain the term security policy and security mechanism. Also show how to grant, revoke and delegate permissions on objects with an example for each. (06 Marks)
- 7 a. Discuss the ACID properties of a database transaction. (06 Marks)
b. What is schedule? Illustrate with an example. Define the concept of recoverable, cascadeless and strict schedules. (06 Marks)
c. Discuss the problem of deadlock and starvation. Explain different approaches in dealing with these problems. (08 Marks)
- 8 Write short notes on:
a. Embedded SQL.
b. Two-phase locking.
c. Functional and multi-valued dependencies.
d. Write ahead log protocol. (20 Marks)

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NEW SCHEME**Fifth Semester B.E. Degree Examination, Dec.06 / Jan.07****CS / IS****Database Management Systems**

Time: 3 hrs.]

[Max. Marks:100]

Note: 1. Answer any FIVE full questions.

1. a. Discuss the main characteristics of the database approach and how it differs from traditional file system. (10 Marks)
- b. Define the following terms :
 - i) Database
 - ii) DBMS
 - iii) Program data independence
 - iv) Meta data
 - v) Canned transaction. (10 Marks)
2. a. Discuss the main categories of data model. (06 Marks)
- b. Describe the three schema architecture with block diagrams. Why do we need mappings between schema levels? (08 Marks)
- c. Discuss the different types of user friendly interfaces. Mention different types of users. (06 Marks)
3. a. Consider the ER diagram in figure Q3 (a). Assume that an employee may work in upto two departments, but may also be not assigned to any department. Assume that each department must have one and may have up to three phone numbers. Supply (min, max) constraints on this diagram. State clearly any additional assumptions you make. (06 Marks)

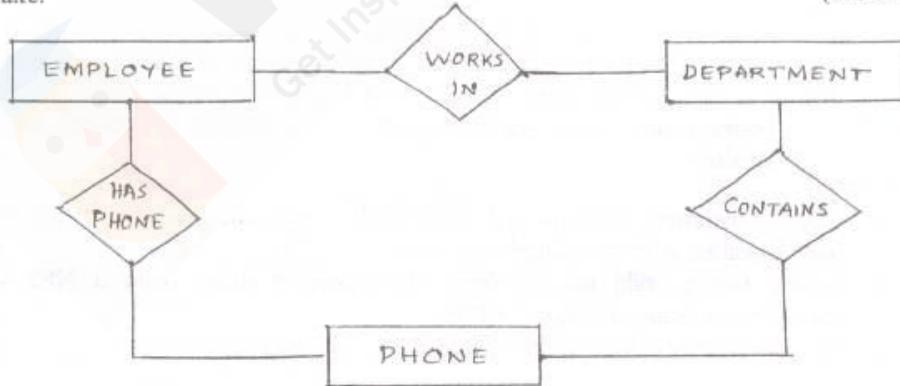


Fig. Q3 (a)

- b. A database is being constructed to keep track of the teams and games of a sports league. A team has a number of players, not all of whom participate in each game. It is desired to keep track of the players participating in each game for each team, the positions they played in that game and the result of the game. Design an ER diagram for this application, stating any assumptions you make. Convert the ER diagram into tables applying mapping algorithm. (10 Marks)
- c. How to convert ER diagram into relational model? Explain. (04 Marks)

- 4 a. What is a complete set of relational algebra operators? Derive the other operators used in relational algebra using the complete set. (10 Marks)
 b. Consider the following two tables T_1 and T_2 , show the result of the following operations.

Table T₁

P	Q	R
10	a	5
15	b	8
25	a	6

Table T₂

A	B	C
10	b	6
25	c	3
10	b	5

- i) $T_1 \bowtie_{T_1.P = T_2.A} T_2$
 ii) $T_1 \bowtie_{T_1.Q = T_2.B} T_2$
 iii) $T_1 \bowtie_{T_1.P = T_2.A} T_2$
 iv) $T_1 \bowtie_{T_1.Q = T_2.B} T_2$
 v) $T_1 \cup T_2$

(10 Marks)

- 5 a. Explain co-related queries with an example. (05 Marks)
 b. How does SQL allow implementation of the entity integrity and referential integrity constraints? (05 Marks)
 c. For the database schema, given below
 Student (Name, Student number, Class, Major)
 Course (Course name, Course number, Credit-hrs, Department)
 Section (Sec ID, Course number, Semester, Year, Instructor)
 Grade report (Student number, Sec ID, Grade)
 Prerequisite (Course number, Prerequisite number)
 Specify the following queries in SQL.
 i) Retrieve the names of all senior student (above class = 7) majoring in 'CS'.
 ii) Retrieve the names of all courses taught by professor keng in 1998 and 1999.
 iii) For each section taught by professor Keng, retrieve the course number, credit hours, course name, semester, year and the number of students who took the section. (10 Marks)
- 6 a. Discuss insertion, deletion and modification anomalies. Why are they considered bad? Illustrate with an example for each. (10 Marks)
 b. Define Boyce-Codd normal form. How does it differ from 3 NF? Why is it considered a stronger form of a 3NF. (06 Marks)
 c. Discuss the problem of spurious tuples and how we may prevent it. (04 Marks)

- 7 a. Consider the following two sets of functional dependencies,
 $F = \{A \rightarrow C, AC \rightarrow D, E \rightarrow AD, E \rightarrow H\}$ and
 $G = \{A \rightarrow CD, E \rightarrow AH\}$, check whether they are equivalent. (04 Marks)
- b. Consider the universal relation $R = \{A, B, C, D, E, F, G, H, I, J\}$ and a set of functional dependencies $F = \{\{A, B\} \rightarrow \{C\}, \{A\} \rightarrow \{D, E\}, \{B\} \rightarrow \{F\}, \{F\} \rightarrow \{G, H\}, \{D\} \rightarrow \{I, J\}\}$. Find the following :
- Key for R.
 - Determine the decomposition.
 $D = \{R_1, R_2, R_3, R_4, R_5\};$
 $R_1 = \{A, B, C\}, R_2 = \{A, D, E\}, R_3 = \{B, F\}, R_4 = \{F, G, H\}, R_5 = \{D, I, J\}$
is lossless join decomposition. (06 Marks)
- c. Draw a state diagram, and discuss the typical states that a transaction goes through during execution. (05 Marks)
- d. Discuss the acid property of transactional database. (05 Marks)
- 8 a. Explain the various operations used in binary locks. Discuss the advantages and disadvantages of binary lock. (06 Marks)
- b. Explain aries recovery algorithm with an example. (10 Marks)
- c. Explain transaction rollback used in recovery. (04 Marks)

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CS53

NEW SCHEME

Reg. No.

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Fifth Semester B.E. Degree Examination, January/February 2006
Computer Science/Information Science Engineering
Database Management Systems

Time: 3 hrs.)

(Max.Marks : 100)

Note: Answer any FIVE full questions.

1. (a) A bank has many branches, the bank has many customers. A customer can open many different kinds of accounts with the bank. Any customer of the bank can take loan from the bank. All branches can give loans. Banks have also installed automatic teller machines, from which a customer can withdraw from his/her bank. Draw the ER diagram for the bank. Create 3 NF tables of your design. Make suitable assumptions, if any. (10 Marks)
- (b) Describe the various functions which are required to be performed by the database administrator. (5 Marks)
- (c) What are the disadvantages of database system? Explain them briefly. (5 Marks)
2. (a) What is a participation role? When is it necessary to use role names in the description of relationship types? (8 Marks)
- (b) Discuss the naming convention used for ER schema diagram. (7 Marks)
- (c) What is the FUNCTION operation? What is it used for? (5 Marks)
3. (a) In relational algebra, discuss some types of queries for which renaming is necessary in order to specify the query unambiguously. (5 Marks)
- (b) Consider the two tables T_1 and T_2 show the result of the following operations :
 - i) $T_1 \bowtie_{T_1.P=T_2.A} T_2$
 - ii) $T_1 \bowtie_{T_1.Q=T_2.B} T_2$
 - iii) $T_1 \Rightarrow_{T_1.P=T_2.A} T_2$
 - iv) $T_1 \bowtie_{T_1.Q=T_2.B} T_2$
 - v) $T_1 \cup T_2$
 - vi) $T_1 \bowtie_{(T_1.P=T_2.A \text{ and } T_1.R=T_2.C)} T_2$(15 Marks)

P	Q	R
10	a	5
15	b	8
25	a	6

Table T_1

A	B	C
10	b	6
15	c	3

4. (a) Consider the following relations for a database that keeps track of business trips of sales persons in a sales office.
SAILORS (SID, SNAME, RATING, AGE)
BOATS (BID, BNAME, COLOR)
RESERVES (SID, BID, DAY)
- Specify the following queries in SQL and in relational algebra.
- Find the names of sailors who have reserved a red boat.
 - Find the names of sailors who have reserved a red or a green boat.
 - Find the names of sailors who have reserved all boats called 'Interlake'.
- (12 Marks)
- (b) How do the relations (tables) in SQL differ from the relations defined formally? Discuss the differences in terminology. Why does SQL allow duplicate tuples in a table or in a query result?
- (8 Marks)
5. (a) Discuss insertion, deletion and modification anomalies. Why are they considered bad? Illustrate with examples.
- (9 Marks)
- (b) Consider the universal relation $R = \{A, B, C, D, E, F, G, H, I, J\}$ and the set of functional dependencies $F = \{A, B\} \rightarrow \{C\}, \{A\} \rightarrow \{D, E\}, \{B\} \rightarrow \{F\}, \{F\} \rightarrow \{G, H\}, \{D\} \rightarrow \{I, j\}$. What is the key for R? Decompose R into 2NF, then 3NF relations.
- (8 Marks)
- (c) Discuss the problem of spurious tuples and how we may prevent it.
- (3 Marks)
6. (a) What is serialisability? How can serialisability be ensured? Do you need to restrict concurrent execution of transaction to ensure serialisability? Justify your answer. Give an example of transactions and how you can force serialisability in those transactions.
- (10 Marks)
- (b) What are the steps one must take with its database management system, in order to ensure disaster recovery? Define the process of recovery in case of disaster.
- (10 Marks)
7. (a) What is two phase locking? Describe with help of an example. Will two phase locking result in serialisable schedule? Will two phase locking result in deadlock? Justify your answer with the help of an example.
- (10 Marks)
- (b) What is shadow paging scheme? Where is it used?
- (5 Marks)
- (c) What is the multi-version technique of concurrency control? Describe with the help of an example. Will this scheme result in rollback and/or deadlock? Justify your answer.
- (5 Marks)
8. (a) What is time stamping? Explain a mechanism of concurrency control that uses time stamping with the help of an example.
- (10 Marks)
- (b) What is intention mode locking? Describe the various intention mode locks with the help of an example.
- (10 Marks)

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Fifth Semester B.E. Degree Examination, January/February 2016
Computer Science Engineering
Data base management systems

Time: 3 hrs.]

[Max Marks : 1]

Note: Answer any FIVE full questions.

1. (a) Discuss the main characteristics of database approach and how it differs from traditional file system. (8 Mar)
(b) With a diagram explain typical software component modules of a DBMS. (8 Mar)
(c) Define Schema and instance. (4 Mar)

2. (a) Draw an E-R Diagram for hospital management system. Assume your own entities (Minimum of 5 entities), attributes and relations. Mention cardinality ratio. (10 Mar)
(b) Define the following terms with an example :
i) Candidate key ii) Partial Primary key
iii) Foreign Key iv) Super key (10 Mar)

3. (a) Consider the following Schema for a company database
Employee (Name, SSN, Address, Sex, Salary, Dno)
Department (Dname, Dnumber, MGRSSN, MGRSTART DATE)
Dept. Locations (Dnumber, Dlocations)
Project (Pname, Pnumber, Plocation, Dnum)
Works-On (ESSN, PNO, Hours)
Dependent (ESSN, Dependent-name, Sex, Ddate, Relationship)
Write the Queries in Relational Algebra to
i) Retrieve the name and address of all employees who work for the Research department.
ii) Find the names of the employees who work on all projects controlled by dept. number 5.
iii) List all the projects on which employee Smith is working.

Page two....

(b) Discuss the following relational algebra operations. Illustrate with an example

for each.

(12 Marks)

JOW, DIFFERENCE, SELECT, UNION

4. (a) What is the need for normalization? Explain the first, second and third
normal forms with example. (12 Marks)

- (b) Consider the Scheme R = (A, B, C, D, E) which is decomposed into R1 =
(A, B, C) and R2 = (C, D, E) with the following functional dependencies

$$A \rightarrow BC, CD \rightarrow E, B \rightarrow D, E \rightarrow A.$$

Show that the above decomposition of the Scheme R is not a loss-less join
decomposition. (8 Marks)

5. (a) List and explain the commands available for retrieving and updating the
database in SQL. (8 Marks)

- (b) Explain joins and views in SQL with examples. (8 Marks)

- (c) Explain the following clauses :

- i) From ii) Having iii) Order by iv) Group by (4 Marks)

6. (a) Explain properties of a transaction with state transition diagram. (10 Marks)

- (b) With an algorithm explain 2-phase locking. (10 Marks)

7. (a) Explain the database recovery techniques. (10 Marks)

- (b) Explain the terms

i) Database authorization ii) Access control

iii) Data Encryption iv) Privileged account

v) Database audit

(10 Marks)

8. Write short notes on :

i) Database System Utilities ii) Two-Phase Commit Protocol

iii) Data Models iv) Indexes in SQL

(20 Marks)

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