Department of Computer Science.
Islamiah College (Autonomous).

Question Bank

Database Management System

For

III B.Sc.,/B.C.A./ B.Sc., (SW)
Third Year – Sixth Semester

(319 Questions)

Unit	Part-A	Part-B	Part-C	
I	27	25	9	
II	13	17	21	
III	14	43	26	
IV	10	28	22	
V	18	29	17	
Total Questions	**82**	**142**	**95**	**Grand Total 319**

Unit I Part A (2 Marks)

1. Define DBMS.
2. What is the primary goal of DBMS?
3. List demerits of file processing system.
4. What is data abstraction? Mention its levels.
5. What is data independence?
6. Define data models.
7. Write the usage of rectangle and diamond symbol in E-R Diagram.
8. Name the three most widely accepted record based data models.
9. List any two physical data models.
10. Define Relationship Sets.
11. Define the integrity rules
12. What is extension and intension?
13. What do you mean by data processing?
14. What is a single-valued attribute? Give examples.
15. What is a multi-valued attribute? Give examples.
16. What is an extension of entity type?
17. What is the difference between the strong entity set and weak entity set?
18. What is data dictionary?
19. What is metadata?
20. What is assertion?
21. Define the term authorization.
22. How are the *nulls* represented in database system?
23. What is view definition language?
24. What is normalization?
25. What is E-R model?
26. Define the terms *Instance*, *Schema*.
27. What is meant by hierarchical model?

Unit I Part B (5 Marks)

1. Which part of the RDBMS takes care of the data dictionary? How?
2. What is the difference between procedural DML and non-procedural DML?
3. What is a view? How it is related to data independence?
4. What is an entity, entity type, entity set?
5. What is a composite attribute? Give examples.
6. What is cardinality? What are its types?
7. Define subtype and super type entities?
8. How the logical structure of a database can be expressed graphically by an E-R diagram?
9. Explain the characteristic of attribute types.
10. Briefly explain about database languages.
11. List the storage manager components of explain.
12. Briefly explain object based logical models.
13. Write a note about the components of disk Storage.
14. Name the functional components of DBMS and explain.
15. What are five main functions of a database administrator?

16. List six major steps that you would take in setting up a database for a particular enterprise.
17. What are views? How they are created in SQL?
18. Explain triggers and its types with examples.
19. Write a trigger to store the deleted records in another backup table.
20. Write a trigger to store user's login name and current time, whenever a record is inserted.
21. What is a primary key, foreign key?
22. Give the syntax of check constraints with example?
23. Construct an E-R diagram for a car-insurance company whose customers own one or more cars each. Each car has associated with it zero to any number of recorded accidents.
24. Explain the distinctions among the terms primary key, candidate key, and superkey.
25. Explain the difference between physical and logical data independence.

Unit I Part C (10 Marks)

1. Discuss about mapping constraints with examples.
2. Explain all record based logical models with examples.
3. Discuss in detail about the purpose of DBMS.
4. List four significant differences between a file-processing system and a DBMS.
5. What is the need for triggers? Write a trigger to display old and new values whenever a record is updated.
6. Consider a database used to record the marks that students get in different exams of different course offerings. Construct an E-R diagram that models exams as entities, and uses a ternary relationship, for the above database.
7. Consider the following relational database:
    employee (employee-name, street, city)
    works (employee-name, company-name, salary)
    company (company-name, city)
    manages (employee-name, manager-name)
    Give an SQL DDL definition of this database. Identify referential-integrity constraints that should hold, and include them in the DDL definition.
8. Construct an E-R diagram for a hospital with a set of patients and a set of medical doctors. Associate with each patient a log of the various tests and examinations conducted.
9. Write an SQL trigger to carry out the following action: On delete of an account, for each owner of the account, check if the owner has any remaining accounts, and if he does not, delete him from the depositor relation.

Unit II Part A (2 Marks)

1. Define relational algebra.
2. What is the difference between a key and a super key?
3. Define union compatibility?
4. What are three characteristics of relational database system?
5. Differentiate between procedural and non-procedural languages.
6. Give the reasons why *null* values should be introduced into the database.
7. What are *null* values? Why they should be avoided?
8. What is an attribute?
9. What is a relation schema and a relation?
10. What is degree of a relation and degree of relationship type?
11. What is relationship, relationship set, and relationship type?
12. What are the unary operations in relational algebra?
13. What is atomicity and aggregation?

Unit II Part B (5 Marks)

1. Explain why intersection of two relations cannot be performed if they are not union compatible?
2. Explain the division operations with its importance.
3. Consider the relational database given below:
   employee (emp_name, street, city)
   works (emp_name, company_name, Salary)
   company (company_name, City)
   For each of the given query, give an expression in relational algebra,
   a. Find the emp_name, street and cities of residence whose salary exists in between 10000 and 20000 and work for ABC Ltd.
   b. Find the name, street and cities of employees who live in the same city as the company they work for.
4. What are tuples, spurious tuples? How are they generated?
5. What is the data structure used to describe relational model? Give an example of a relational database.
6. What is rename operation in relational algebra? Illustrate your answer with example.
7. Given the following relations:
   vehicle (Reg_no, make, color)   person (eno, name, address) owner (eno, reg_no)
   Write expressions in the relational algebra to answer the following queries:
   a. List the reg_no of vehicles owned by John.
   b. List the names of persons who own Maruti cars.
   c. List the entire red colored vehicle.
8. Consider the relations
   city (city_name, state)hotel (name, address)city_hotel (hotel_name, city_name, owner)
   Answer the following queries in relational algebra:
   a. Find the names and address of hotels in Agra.
   b. List the names of cities which have no hotel.
   c. List the names of the hotels owned by "Taj Group".
9. Give example for the following relationships:
   a. Many-to-One   b.One-to-One c.One-to-Many d.Many-to-Many
10. Differentiate between Cartesian product and natural join operations used in relational algebra.
11. What are aggregate functions?

12. Explain tuple relational calculus with format definition, safety of expressions and example.
13. Explain domain relational calculus with format definition, safety of expressions and example.
14. Let the following relation schemas be given: R = (A,B,C) S = (D,E,F). Let relations $r(R)$ and $s(S)$ be given. Give an expression in the tuple relational calculus that is equivalent to each of the following:

 a. $\Pi_A(r)$
 b. $\sigma_{B=17}(r)$
 c. $r \times s$
 d. $\Pi_{A,F}(\sigma_{C=D}(r \times s))$

15. Let R = (A, B) and S = (A, C), and let r (R) and s (S) be relations. Using the special constant *null*, write tuple-relational-calculus expressions equivalent to each of the following:

 a. $r \rtimes s$
 b. $r \ltimes s$
 c. $r \bowtie s$

16. Give a tuple-relational-calculus expression to find the maximum value in relation r (A).
17. How does tuple relational calculus differ from domain relational calculus?

Unit II Part C (10 Marks)

1. Name the different types of joins supported in SQL.
2. Discuss the fundamental operations in relational algebra with examples.
3. Elaborate extended relational algebra operations.
4. Explain database modification using relational algebra.
5. Explain all join operations in relational algebra.
6. Explain the basic relational algebra operations with the symbol used and an example for each.
7. Name all the integrity constraints and explain.
8. Consider the following Relational Schema:

 > person (*ss#, name, address*)
 > car (*registration_number, year, model*)
 > owns (*ss#, licence*)
 > accident (*date, driver, car_reg_no*)

 Construct the following relational algebra queries:
 a. Find the names of persons who are involved in an accident.
 b. Find the registration number of cars which were not involved in any accident.
9. Explain different types of outer join operations with example.
10. Consider the relational database.

 > employee(*person_name,street,city*)
 > works(*person_name,company_name,salary*)
 > company(*company_name,city*)
 > manages(*person_name,manager_name*)

 Give an expression in the relational algebra to express each of the following queries:
 a. Find the names of all employees who live in the same city and on the same street as do their managers.
 b. Find the names of all employees in this database who do not work for First Bank.
 c. Find the names of all employees who earn more than every employee of Small Bank.
 d. Find the names of all employees who work for First Bank.

e. Find the names and cities of residence of all employees who work for First Bank.

11. Consider the relational database.

   employee(person_name,street,city)
   works(person_name,company_name,salary)
   company(company_name,city)
   manages(person_name,manager_name)

   Give an expression in the relational algebra to express each of the following queries:

   a. Find the names, street address, and cities of residence of all employees who work for First Bank and earn more than 10000 per annum.
   b. Find the names of all employees in this database who live in the same city as the company for which they work.
   c. Assume the companies may be located in several cities. Find all companies located in every city in which Small Bank is located.
   d. Give all employees of First Bank a 10 percent salary raise.
   e. Give all managers in this database a 10 percent salary raise, unless the salary would be greater than 100000. In such cases,give only a 3 percent raise.

12. Consider the relational database.

   employee(person_name,street,city)
   works(person_name,company_name,salary)
   company(company_name,city)
   manages(person_name,manager_name)

   Give an expression in the relational algebra to express each of the following queries:

   a. Delete all tuples in the works relation for employees of Small Bank Corporation.
   b. Find the company with the most employees.
   c. Find the company with the smallest payroll.
   d. Find those companies whose employees earn a higher salary, on average, than the average salary at First Bank Corporation.

13. Let R = (A, B, C), and let *r1* and *r2* both be relations on schema R. Givean expression in the domain relational calculus that is equivalent to each of thefollowing:

   a. $\Pi_A(r_1)$
   b. $\sigma_{B=17}(r_1)$
   c. $r_1 \cup r_2$
   d. $r_1 \cap r_2$
   e. $r_1 - r_2$
   f. $\Pi_{A,B}(r_1) \bowtie \Pi_{B,C}(r_2)$

14. Let .R = (A, B) and S = (A, C), and let *r*(R) and *s*(S) be relations. Write relational-algebra expressions equivalent to the following domain-relationalcalculusexpressions:

   a. $\{<a> \mid \exists b (<a,b> \in r \wedge b = 17)\}$
   b. $\{<a,b,c> \mid <a,b> \in r \wedge <a,c> \in s\}$
   c. $\{<a> \mid \exists b (<a,b> \in r) \vee \forall c (\exists d (<d,c> \in s) \Rightarrow <a,c> \in s)\}$
   d. $\{<a> \mid \exists c (<a,c> \in s \wedge \exists b_1, b_2 (<a,b_1> \in r \wedge <c,b_2> \in r \wedge b_1 > b_2))\}$

15. Consider the relations:

   suppliers(sid, sname, rating)
   parts(pid, pname, color)

catalog(sid, pid, cost)

Write expressions in the relational algebra to retrieve SIDs of Suppliers:
   a. whose rating > 10.
   b. who supplied red parts.
   c. retrievesname who supplied red parts.
   d. to supply some red part or some green part.
   e. to supply some red part and some green part.

16. Consider the relations:

    suppliers(sid, sname, rating)
    parts(pid, pname, color)
    catalog(sid, pid, cost)

Write expressions in the relational algebra to retrieve SIDs of Suppliers who supplied:
   a. atleastone part.
   b. atleast two parts.
   c. atleast three parts.
   d. exactly two parts.
   e. atmost two parts.

17. Consider the relations:

    suppliers(sid, sname, rating)
    parts(pid, pname, color)
    catalog(sid, pid, cost)

Write expressions in the relational algebra to retrieve SIDs of Suppliers:
   a. whose rating >10 and who supplied some red part.
   b. who don't supply any part.
   c. who supply every part.
   d. who supplied every red part.
   e. who supplied every red part or green part.

18. Given two relations R1 and R2, where R1 contains N1 tuples and R2 contains N2 tuples, and N2 > N1 > 0, give the maximum and minimum possible sizes(in tuples) for the result relation produced by each of the following relational algebra expressions.In each case, state any assumptions about the schemas for R1 and R2 that are needed to make the expression meaningful.
   (a) $R1 \cup R2$ (b) $R1 \cap R2$ (c) R1 - R2   (d) $R1 \times R2$
   (e) $\sigma a{=}5(R1)$ (f) $\pi a\ (R1)$ (g) R1/R2

19. Consider the following relational database:

    employee(e-name, street, city)
    works(e-name, c-name, salary)
    company(c-name, city)
    manages(e-name, m-name)

    For each of the following queries, give an expression in
    i) relational algebra   ii) tuple relational calculus   iii) domain relational calculus.
   a. Find the names and cities of residence of all employees who work for the First Bank
   b. Find the names, street address, and cities of all employees who work for First Bank and earn more than 10000 per annum. Assume each person works for at most one company.
   c. Find the names of all employees in this database who live in the same city as the company for which they work.

d. Find the names of all employees who live in the same city and on the same street as do their managers.

20. Consider the following relational database:

   employee(e-name, street, city)
   works(e-name, c-name, salary)
   company(c-name, city)
   manages(e-name, m-name)

   For each of the following queries, give an expression in
   i) relational algebra   ii) tuple relational calculus   iii) domain relational calculus.
   a. Find the names of all employees in this database who do not work for the First Bank. Assume that all people work for exactly one company.
   b. Find the name of all employees who earn more than every employee of Small Bank. Assume that all people work for at most one company.
   c. Assume the companies may be located in several cities. Find all companies located in every city in which Small Bank is located.

21. Let R = (A, B) and S = (A, C), and let r(R) and s(S) be relations. The relational algebra expression
   $\Pi_A(\sigma_{B=10}(r))$ s equivalent to the following domain relational calculus expression:
   $\{<a> \mid \exists b\,(<a, b> \in r \wedge b = 10)\}$
   Give an expression in the domain relational calculus that is equivalent to each of the following:

   a) $r \bowtie s$ b) $\Pi_{r.A}\,((r \bowtie s) \bowtie_{c=r2.A \,\wedge\, r.B>r2.B}\,(\rho_{r2}(r)))$

Unit III Part A (2 Marks)

1. What are Views? Why they can't be used for updates?
2. Write the purpose of trigger.
3. What is storage definition language?
4. What are the primitive operations common to all record management systems
5. Distinguish between static and dynamic SQL.
6. What are cursors give its different types.
7. Give difference between *exists*&*all*and*any*insql.
8. Give the syntax and purpose of *coalesce*() and *case* in sql.
9. What are properties of a transaction?
10. What is a Composite Primary Key?
11. What is self-join?
12. What are the characteristics of SQL?
13. What are the SQL logical operators?
14. Write the quantity in words from northwindorderdetails table for quantity 0 to 99

Unit III Part B (5 Marks)

1. Differentiate between *group* by and *having* clause in SQL.
2. Differentiate between DDL and DML.
3. List two major problems with processing of update operations expressed in terms of views.
4. How might the type of index available influence the choice of a query processing strategy?
5. List the SQL statements used for transaction control.
6. Explain different SQL DDL Commands.
7. Explain different SQL DML Commands.
8. Explain different SQL DCL Commands.
9. Discuss the use of *NULL* value with example.
10. Explain join operations in SQL.
11. Explain role of selection operation in query processing.
12. Explain how views are different from tables.
13. Differentiate between *where*and*having*clause in SQL.
14. What is *NULL*? Give an example to illustrate testing for *NULL* in SQL.
15. Describe the circumstances in which you would choose to use embedded SQL rather than SQL alone or only a general purpose programming language.
16. Assume a sample database, and explain how add, remove or change information in the database.
17. Explain the embedded SQL with a suitable example.
18. What are Nested Queries? Explain with example.
19. Discuss the various relational operations with examples.
20. Explain the basic structure of an SQL expression.
21. Write SQL to perform the following:
    1. Create a table from existing table.
    2. Insert data in your table from another table.
22. Consider the following relational schemas:
    employee(employee_name, street, city)
    works(employee_name, companyname, salary)
    company(company_name, city)

Specify the table definitions in SQL.

23. Differentiate between the following:(i) Theta Join (ii) Equi Join (iii) Natural Join (iv) Outer Join
24. Consider the relations

    employee(eno,ename,age,basic_salary)

    work _in(eno,dno)

    dept(dno,dname,city)

    Write SQL queries for the following:
    a. Find names of employees who work in a department in Pune.
    b. Get the dname in which more than one employee works.
    c. Find name of employee who earns highest salary in 'HR' department.
25. How does a foreign key play a major role in the join operation?
26. What are various data types in SQL?
27. What is the purpose of group by clause in the SELECT statement?
28. What is the difference between *union* and *unionall* in sqlqueries?
29. What are the different types of indexes?
30. Give the differences between *delete*, *drop* and *truncate* commands?
31. How can you create an empty table from an existing table?
32. Given two tables: fibonacci (id), prime(id). Write a sql query to fetch values from table fibonacci that are not in table prime.
33. Write sql to get employee details from employees table where name starts with 'J' and name contains 4 letters.
34. Write sql query to find second highest salary from employees table.
35. Give the syntax and differences between a stored procedure and function?
36. Write sql to fetch common records between two tables without using join.
37. Write sql to find the duplicate records in a table.
38. What is the difference between a primary key and a unique key?
39. Create a procedure to display the employees of a given department_id.
40. Create a procedure to display the names beginning with a given character.
41. Create a procedure to display the employee full name and salary for a given employee_id.
42. Create a procedure to print the ascii table.
43. Write a procedure to generate a sequence of integers in the range 1 through 1,000 using a table.

Unit III Part C (10 Marks)

1. How many clauses are there in the basic structure of an SQL.
2. Name the different types of joins supported in SQL.
3. Illustrate the uses of embedded SQL and dynamic SQL.
4. Explain various Set operations in SQL.
5. Enumerate various aggregate functions available in SQL.
6. Explain database modification using SQL.
7. Compareandcontrast :   a. Outer join and full outer joinb. Left outer join and right outer join
8. What are integrity constraints? Explain two constraints, *check* and *foreignkey* in SQL with an example and syntax.
9. What are aggregate functions? Explain any five built in aggregate functions in SQL.
10. Discuss the various type of join operations? Why are these joins required?
11. Let the relation schemas be:R= (A, B, C)andS= (D, E, F). Let relations r(R) and s(S) be given. Give an expression in SQL that is equivalent to each of the following queries.

    $\Pi_A(r)$ $\sigma_{B=17}(r)$ r X s $\Pi_{A,F} (\sigma_{C=D}(r \ X \ s))$

12. Give an expression in SQL for each of queries below:
    employee(employee_name, street, city)
    works(employee_name, companyname, salary)
    company(company_name, city)

    a. Find the names of all employees who work for City Bank.
    b. Find the names and company of all employees sorted in ascending order of
       Company name and descending order of employee names of that company.
    c. Change the city of City Bank to "Delhi".

13. Define union compatibility. Explain why *intersection* of two relations cannot be performed if they are not union compatible?

14. Describe substring comparison in SQL. For the relation *person(name,address),* write a SQL query which retrieves the names that begins with 'A' and address contains 'Pune'.

15. Suppose that we have a relation *marks(sid,score).*

Grade	Score
F	< 40
C	40 – 60
B	60 – 80
A	> 80

    Write SQL queries for the following:
    a. Display the grade for each student.
    b. Find the number of students in each grade.

16. What are stored-procedures? And what are the advantages of using them.

17. Give example where keywords *all, any, with* can be used in sql queries.

18. Consider the following relational schema.
    employee(eid,ename,age,salary)
    works(eid,did)
    department(did,dname,budget,managerid)
    Write the following queries in SQL:
    a. List employees who works in more than one department.
    b. List employees whose salary exceeds then budget of all departments that he works in.
    c. Find the managers who manage the departments with budget more than 1 million.
    d. Find the managers who manage the departments with the largest budget.

19. Which operators are used in sql query for pattern matching?

20. Write a SQL query to find the 10th tallest peak (Elevation) from a Mountain table.

21. Create a user defined function to find the maximum of two/three numbers (use if /then/else)

22. Create a function to display number/marks in words

23. Write a function to compute Electricity Bill for given Units.

units	Charges
upto 100 units	Rs.0
upto 200 units	First 100 units free, 101-200 units Rs.1.50 /unit + Rs.20
upto 500 units	First 100 units-free, 101-200 units Rs.2/unit , 201-500 units Rs. 3/unit +Rs. 30
above 500 units	First 100 units-free, 101-200 units Rs.3.50/unit, 201-500 units Rs.4.60/unit, 501 and above Rs.6.60/unit + Rs. 50

Units	1-100 units	101-200	201-500	501 and above	Fixed Charges
<=100	Rs.0				
<=200	Rs.0	Rs.1.50/Unit			Rs.20
<=500	Rs.0	Rs.2/Unit	Rs.3/Unit		Rs.30
>500	Rs.0	Rs.3.50/Unit	Rs.4.60/Unit	Rs.6.60/Unit	Rs.50

24. Write a function to compute Income tax for given total income.

Tax Slabs	Tax Rates
Income up to Rs.2.5 lakhs	Nil
Income between Rs.2.5 lakhs and Rs.5 lakhs	10% of amount exceeding Rs.2.5 lakhs
Income between Rs.5 lakhs to Rs.10 lakhs	Rs. 25,000/ +20% of amount exceeding Rs.5 lakhs
Income above Rs.10 lakhs	Rs. 125,000/+30% of amount exceeding Rs.10 lakhs

25. Write a function to find the maximum salary of a given department (hr database)
26. Write a function to find the average of two largest numbers from given three numbers.

Unit IV Part A (2 Marks)

1. Define functional dependency.
2. Why it necessity to decompose a relation?
3. What is multivalued dependency?
4. State Armstrong's axioms for functional dependency.
5. Give a simple definition for multivalued Dependencies.
6. When is a functional dependency F said to be minimal?
7. What is lossless join property?
8. What is fully functional dependency?
9. What is lossy decomposition?
10. What is transitive dependency?

Unit IV Part B (5 Marks)

1. What is the need for normalization?
2. Compare BCNF and 3NF.
3. Why certain functional dependencies are called trivial functional dependencies?
4. Why BCNF is considered a stronger form of 3NF?
5. Why is a relation that is in 3NF generally considered good?
6. What is decomposition? What are the desirable properties of decomposition?
7. Explain BCNF with example.
8. Explain why 4NF is more desirable than BCNF.
9. Describe BCNF and describe a relation which is in BCNF.
10. Explain the basic concepts of functional dependencies with examples.
11. Explain with a simple, the lossless-join decomposition.
12. Consider the following relation: R ($\underline{A}$, $\underline{B}$, C, D, E).The Primary key of the relation is AB. The functional dependencies hold: A→C, B→D, AB→E.Is the above relation is second normal form?
13. Consider the following relation: R ($\underline{A}$, B, C, D). The Primary Key of the relation is A. The functional dependencies hold: A→B, C,B→D. Is the above relation in third normal form?
14. Give a set of functional dependencies for the relation schema R(A, B, C, D, E) with primary key AB under which R is in 2NF but not in 3NF.
15. Prove that any relation schema with two attributes is in BCNF.
16. Consider a relation R that has three attributes ABC. It is decomposed into relations R_1 with attributes AB and R_2 with attributes BC. State the definition of lossless join decomposition with respect to this example. Answer this question concisely by writing a relational algebra equation involving R, R_1 and R_2.
17. Give an example of a relation schema R and a set of dependencies such that R is in BCNF, but not in 4NF.
18. Show that, if a relational database is in BCNF, then it is also in 3NF.
19. What are Armstrong rules? How they are complete.
20. Use Armstrong's axioms to prove the soundness of the union ruIe.
21. Explain functional dependency and trivial functional dependency with examples.
22. Define the relational data model.
23. What is redundancy? How this can be avoided?
24. What is 1NF, 2NF, 3NF and BCNF?
25. Explain canonical cover and extraneous attributes with examples.
26. What do you understand by dependency preservation?

27. Consider a relation R(A, B, C, D) with FD's AB→C, AC→B, BC→A, B→D. Determine all the keys of relation R. Is the relation R in BCNF?

28. List all functional dependencies satisfied by the relation of

A	B	C
a_1	b_1	c_1
a_1	b_1	c_2
a_2	b_1	c_1
a_2	b_1	c_3

Unit IV Part C (10 Marks)

1. List the three design goals for relational databases, and explain why each is desirable.
2. Explain 1NF, 2NF, 3NF, with suitable example.
3. Give BCNF decomposition algorithm and explain it with example.
4. Write short note on:
    a. 4NF b. Multivalued Dependencyc. 5NFd. DKNF   e. Denormalization
5. Using functional dependencies, define normal forms that represent good database design.
6. Explain at least two of the desirable properties of decomposition.
7. State the goal of decomposition / normalization. Explain the different level of normalization.
8. Briefly discuss about the multivalued dependency?
9. What is Normalization? Give the various normal forms of relational schema and define a relation which is in BCNF and explain with suitable example.
10. What is Normalization? Explain 1NF, 2NF, 3NF, and BCNF with simple example.
11. Discuss how schema refinement through dependency analysis and normalization can improve schemas obtained through E-R design.
12. What is Normalization? Explain normalization techniques using functional dependencies with relevant examples.
13. Describe about the multi-valued dependencies and fourth normal form with suitable example.
14. Describe about the join dependencies and fifth normal form with suitable example.
15. Explain the Codd's rules for relational database design.
16. Suppose that we decompose the schema R= (A, B, C, D, E) into (A, B, C) and (A, D, E).Show that this decomposition is lossless decomposition if the set F of functional dependencies holds: A→ BC, CD→E, B→D, E→A
17. Explain closure of set of functional dependency and closure of attribute sets?
18. What is the need of the normalization? Explain the first three steps involed in the normalization.
19. Consider a relation R(A, B, C, D, E) with FD's AB→C, CD→E, C→A, C→D,D→B.
    The possible candidate keys for R are AB, AD, C
    (a) List all the functional dependencies that violate 3NF. If any, then decompose R accordingly.
    (b) List all the FD's that violate BCNF. If any, then decompose R accordingly.
20. Consider R (A, B, C, D, E, F, G) with the Set D of FD's and MVD's given by D (A→→B, B→→G, B→→EG, CD→→D) decompose R into 4NF. Show that the decomposition is not dependency preserving.
21. Explain what is meant by repetition of information and inability to represent information. Explain why each of these properties may indicate a bad relationaldatabasedesign.
22. In designing a relational database, why might we choose a non-BCNF design?

Unit V Part A (2 Marks)

1. Define client and server.
2. What is transaction?
3. Why concurrency is used in database?
4. Define lock. How it is released?
5. What is deadlock?
6. Define replication.
7. Define fragmentation.
8. Define networks and its types.
9. What is recovery?
10. Define protocols.
11. Define query. Write an example.
12. Write the advantages of query.
13. What are the ACID properties of a transaction?
14. List out the states of a transaction.
15. How can deadlocks be avoided when using 2PL?
16. What are transaction logs?
17. What do you mean by rollback?
18. What are redo and undo logs?

Unit V Part B (5 Marks)

1. Give differences between client server system and distributed system.
2. Write any four advantages of parallel system.
3. With neat sketch draw the client server architecture.
4. List out the applications of distributed systems.
5. Write on two phases of locking concept.
6. With neat diagram draw the server system architecture.
7. Write the difference between homogeneous and heterogeneous distributed databases.
8. Write the differences between global and local transactions.
9. What is distributed systems? Is distributed system required for databases?
10. Write the differences between distributed database storage and non-distributed database storage.
11. What are the different phases of transaction?
12. Define the terms with examples: (i) isolation (ii) consistency (iii) atomicity (iv) durability
13. What is two-phase locking and how does it guarantee serializability?
14. Differentiate between two phase locking and rigorous two-phase locking.
15. How share and exclusive locks differ?Explain
16. .How precedence graph can be used to detect deadlock?
17. What is a system log? What is the purpose of the system log in system recovery?
18. What is database recovery? Why backups are important?
19. What is the difference between volatile and non-volatile storage?
20. What is a timestamp? State its advantages.
21. What is shadow paging? State its advantages.
22. What are the methods used to prevent the system from dead lock?
23. Explain shadow paging recovery scheme in detail.

24. How might a distributed database designed for a local-area network differ from one designed for a wide-area network?
25. Give an example where the read one, write all available approach leads to an erroneous state.
26. Give an example where lazy replication can lead to an inconsistent database state even when updates get an exclusive lock.
27. What are coarse and fine granularity parallelism?

28. What are the factors that can work against linear scaleup in a transaction processing system? Which of the factors are likely to be the most important in each of the architectures: shared memory, shared disk, and shared nothing?
29. What is lock de-escalation, and under what conditions is it required?

Unit V Part C (10 Marks)

1. Discuss in detail on centralized system.
2. Explain the types of deadlock with neat diagram.
3. Explain parallel system processing? What is its need?
4. Discuss in detail on distributed data storage.
5. Discuss in detail the role of concurrency control in distributed database system.
6. Explain how to recover a database system.
7. Discuss the immediate update recovery technique is both single and multiuser environment.
8. Explain the purpose of checkpoint mechanism. How often should checkpoints be performed?
9. List and explain various types of specialized locking techniques used in DBMS.
10. Why is concurrency control needed? Explain lost update, inconsistent retrievals and uncommitted dependency anomalies.
11. What is a deadlock? How can a deadlock occur? Explain.
12. Briefly explain one deadlock prevention algorithm.
13. What if time stamping is used? Explain briefly.
14. Discuss the concurrency control mechanism in detail using suitable example.
15. What do you understand by distributed databases? Give the various advantages and disadvantages of distributed database management system.
16. Explain the difference between data replication in a distributed system and the maintenance of a remote backup site.
17. Processors speeds have been increasing much faster than memory access speeds. What impact does this have on the number of processors that can effectively share a common memory?