

DATABASE MANAGEMENT SYSTEMS (18CS53)

Module 1 INTRODUCTION

1. Compare DBMS and early file systems , bringing out the major advantages of the database approach. (06 Marks, Jan 2020)
2. With a neat block diagram, explain the architecture of a typical DBMS. (10 Marks, Jan 2020)
3. What Does defining, manipulating and sharing of data? (06 Marks, June 2015)
4. What are the responsibilities of the DBA and Database Designer. (06 Marks, Jan 2019, 2020)
5. Explain the three schema architecture. What is the difference between logical data independence and physical data independence? (04 Marks July 2018, 08 Marks, Dec 2015, 06 Marks 2016, Jan 2019)
6. Discuss the main characteristics of database approach (08 Marks, Dec 2015, Jan 2018)
7. Explain the main characteristics of database approach versus the file processing approach. (08 marks Jan 2018, July 2018)
6. Define the following terms: (10 Marks, Dec 2014, Jan 2020)
 - i) Database ii) Canned Transactions iii) Data model iv) Meta data v) Database designer.
7. List advantages of DBMS over traditional file systems. Briefly explain them. (10 Marks, Dec 2013)
8. Explain three-schema architecture with neat diagram. Why do we need mappings among schema levels? How do different database schema definitions language support this architecture? (08 Marks Jan 2018)
9. Discuss the various component modules of a DBMS with a neat diagram. (08 M, Dec 2012, July 2018)
10. Briefly explain the advantages of object oriented systems. (05 Marks, Dec 2012)
11. Discuss criteria used to classify database management system. (06 Marks, June 2011)
12. Define the terms: DDL, DML, and DCL. Give examples. (06 Marks, June 2011)
13. Briefly discuss the advantages of using the DBMS. (10 Marks, June 2010)
14. Explain the component modules of DBMS and their interaction, with the help of a diagram. (10 Marks, June 2010)
15. Explain the typical components of a DBMS with a neat diagram. (10 Marks, Dec 2009)
16. Define and explain the following terms with an example each:

- i) Snapshot ii) Intension iii) Extension iv) Schema construct **(05 Marks, Dec 2009)**
17. What is meant by “persistent storage for program objects”? Explain. **(05 Marks, Dec 2009)**
18. Define and explain the importance of database catalog. Explain the internal storage format of a catalog with an example. **(06 Marks, Dec 2008)**
19. Differentiate the following:
 a. Entity and Attribute b. Entity type and entity set c. Strong and weak entity d. recursive relationship and identifying relationship. **(08 Marks, June 2016)**
20. A Data base is being constructed to keep track of the team and games of a sports league. A team as a number of players, not all of whom will participate in each game. It is desired to keep track of the players participating for each team, the positions they played in that game and the result of the game. Design ER Diagram for this application stating any assumptions you make. Choose your favorite sport (e.g. cricket, foot ball, base ball) **(12 M, June 2016)**
21. Define the following terms with an example: **(10 Marks, June 2015)**
 i. Composite attribute
 ii) Complex attribute
 iii) Participation constraints iv. Cardinality ratio
 v. Ternary relationship.
22. Design an ER diagram for an insurance company. Assume suitable entity types like CUSTOMER, AGEN, BRANCH, POLICY, PAYMENT and the relationship between them. **(10 Marks, June 2015)**
23. Draw an ER-Diagram of movie database. Assume your own entities (minimum 4) attributes and relationships. **(08 Marks, Jan 2019)**
24. Define the following, with an example
 i) Weak entity type ii) participation constraints iii) cardinality ratio iv) Ternary relationship
 v) recursive relationship. **(10 Marks, Dec 2013)**
25. List the summary of the notations for ER diagrams. Include symbols used in ER diagrams and their meaning. **(10 Marks, Dec 2013)**
26. Define and explain a partial key, with an example. **(04 Marks, Dec 2012)**
27. What is meant by recursive relationship? Bring out the importance of role names in recursive relationship, with an example. **(06 Marks, Dec 2011)**
28. Design an ER diagram for maintaining a movie database taking into account at least four

- (10 Marks, Dec 2012)
- entities.
29. What is the concept of weak entity used in data modeling? Define the terms owner entity type, weak entity type, identifying relationship type and partial key. (08 Marks, June 2011)
30. A company database needs to store information about employees (identified by ssn, with salary and phone as attribute) 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, June 2011)
31. Define an entity and an attribute. Explain the different types of attributes that occur in an ER model, with an example. (10 Marks, June 2010, Jan 2018)
32. Define the following. (08 Marks, Jan 2019)
- i) Relation state ii) Relation schema
 - iii) Arity
 - iv) Domain
33. Define the following with an example: (10 Marks, June 2010) i) Weak entity type ii) Participation constraints iii) Cardinality ratio iv) Ternary relationship v) Recursive relationship
34. Explain how role names are assigned in case of recursive relationships? Illustrate this concept with a diagram. (06 Marks, Dec 2009)
35. What is meant by partial key? Explain. (04 Marks, Dec 2009)
36. Design an ER diagram for keeping track of information about an AIRLINE database taking into account at least six entities. (10 Marks, Dec 2009)

37. Design an ER diagram for keeping track of information about an BANK database taking into account at least six entities. Also mention primary key & Structural constraints

(10 Marks, Jan 2018)

38. Draw an ER diagram to represent the Election Information System based on the following . description: (12 Marks, Jan 2020)

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.

39. Discuss concepts related to structural constraints of a relationship type with examples.

(10 Marks, Dec

- 2008) 39. Design an ER diagram for keeping track of information about a hospital database taking into account at least entities.

(10 Marks, Dec 2008)

MODULE 2

RELATIONAL MODEL AND RELATIONAL ALGEBRA

1. Consider the following Schema:

Emp(name, id, age, salary)

Works_for(pid, eid, #hrs)

Proj(pid, name)

Write the relational algebra for the following?

i. Retrieve employee name and employee id who works for all the project. ii.

Retrieve employee name and age whose salary > 1000

iii. For each employee, get the number of projects and number of hours worked on projects iv. Retrieve the employee name who is working for "CSE" project

(08 Marks, June 2016)

2. Explain entity integrity and referential integrity constraints. Why each is considered as

- important? (06 Marks, June 2016)
3. Define the following terms : i) Key ii) Super key iii) Candidate key iv) Primary key v) Foreign key. (05 Marks Jan 2020)
4. Enumerate the steps involved in converting the ER constructs to corresponding relational tables. (07 Marks Jan 2020)
5. Discuss the various types of set theory operations with example. (08 Marks, Jan 2019)
6. Briefly discuss how the different update operations on a relation deal with constraint violations? (08 Marks, June 2015)
5. Discuss the characterization of a relation, with example. (06 Marks, Dec 2014, Jan 2018)
6. What are the basic operations that can change the states of relations in the database? Explain how the basic operations deal with constraints violations. (08 Jan 2018)
7. Define referential integrity constraint, Explain importance of referential integrity constraint. (06 Marks, Dec 2013)
8. Briefly discuss the different types update operations on relational database. Show an example of a violation of the referential integrity on each of the update operations. (08 Marks, Dec 2012, 06 Marks 2016)
9. Explain foreign key and its importance. Can a foreign key exist, only for a single table? Explain. (05 Marks, Dec 2011)
10. How can an intersection operator be implemented using union and minus operator? (03 Marks, Dec 2011)
11. Write queries in relational algebra for the following:
- Retrieve the number of dependents for an employee named "Ram".
 - Retrieve the name of managers working in location named "XYZ" who has no female dependents.
 - Retrieve the name of employee who works in the same department as that of "Raj".
- (12 Marks, Dec 2011)
12. Discuss the characteristics of a relation, with examples. (08 Marks, June 2010)
13. 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, June 2010)

14. What is a valid state and an invalid state, with respect to a database? (03 Marks, June 2010)

15. Define referential integrity constraint. Explain the importance of referential integrity constraint. How is this constraint implemented in SQL? (08 Marks, Dec 2009)

16. Consider the following relations and write relational algebra queries:

Employee(Fname,SSN,Salary,Super-SSN,DNo)’ WorksON(ESSN,PNO,hours);
Department(Dname,Dnumber,Mgr-SSN); Dependent(ESSN, Depenedentname)

- 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 employees and their average salary working in each department.

(12 Marks, Dec 2009)

12. Define the following terms with an example for each.

(June 2009)

(12 Marks,

i) Super key ii)Domain iii)Tuple iv)Nulls

v) A relational database schema S. vi) The entity integrity constraint

13. Explain the need of primary and foreign keys with suitable examples. (04 M, Dec 2008)

14. Explain the division operator with an example. How can division operator can be implemented using other relational algebraic operators? (04 Marks, Dec 2008)

15. Give complete syntax of SELECT statement in SQL and discuss all the clauses with examples. (05 Marks, June 2016)

16. What are aggregate functions in SQL? Explain with an Examples. (05 Marks, June 2016)

17. Consider the following Relational schema:

LIVES(Name, Street, City)

WORKS(Name, Cname, Salary)

LOCATED(Cname, City)

MANAGER(Name, MGR_Name)

- i. Find the people who earn more than every employee of “CANARA BANK”

- ii. Find the company employing the most people.

- iii. Find the Name and city of the all the people who work for "SBI" and earn more than 55000 iv. Show 20 % raise in salary of all managers
- v. Find the companies located in every city in which "ICICI" is located
- (10 Marks, June 2016)
18. Explain how the GROUP BY clause works. What is the difference between the WHERE and HAVING clause?
- (05 Marks, June 2015)
19. Given the schema
- EMP(Fname, Lname, SSN, BDate, Address, Sex, salary, super_SIN, Dno)
- DEPT(Dname, Dnumber, Mgr SSN Mgr_startdate)
- DEPT_LOC(Dnumber, Dc), 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:
- 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 also work in department no 50
- iv) Retrieve the name of the manager of each department
- v) Retrieve the name and address of all employees who work for the sport department
- vi) Retrieve the names of employer who have no dependents.
- (12 Marks, Dec 2014)
20. Explain the ALTER TABLE command? Explain how a new constraint can be added and also existing constraint can be removed, using suitable examples.
- (08 Marks, Dec 2013)
21. Explain all possible options that can be specified when a referential integrity constraint is violated using suitable example for all options.
- (08 Marks, Dec 2011)
22. Write queries in SQL for the following.
- 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.

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)

(12 Marks, Dec 2011)

23. Write SQL syntax with example for the following SQL statements

i) CREATE TABLE ii) SELECT-statement

iii) UPDATE command iv) ALTER command

(08 Marks, June 2011)

24. List the data types that are allowed for SQL2 attributes.

(06 Marks, June 2011)

25. Consider the following two tables T₁ and T₂. Show the results of the following operations:

i) T₁ \bowtie T₁.P=T₂.A T₂ (10 Marks, June 2010) ii) T₁ \bowtie T₁.Q=T₂.B T₂

iii) T₁ \bowtie T₁.P=T₂.A T₂ iv. T₁ (T₁.P = T₂.A AND T₁.R = T₂.C) T₂ and T₁ U T₂

\bowtie (Assume T₁ and T₂ are union compatible).

Table T ₁		
P	Q	R
10	A	5
15	B	8
25	A	6

Table T ₂		
A	B	C
10	b	6
25	c	3
10	b	5

26. Explain with an example, the basic constraints that can be specified, when you create a table in SQL. (10 Marks, June 2010)

27. Explain IN and EXISTS operators with suitable examples. (08 Marks, Dec 2009)

28. 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, Dec 2009)

29. With respect to SQL, explain with example. (08 Marks, July 2009)

- i) The drop command ii) The alter command

30. Differentiate: i) trigger and assertion ii) Embedded and Dynamic SQL iii) Outer join and Self join iv) Super key and candidate key. (08 Marks, June 2016)

31. Explain insert, delete and update statements in SQL and give example for each. (08 Marks, June 2015, 06 Marks, June 2016)

32. Explain the syntax of a SELECT statement in SQL. Write the SQL Query for the following relation algebra expression $\pi_{Bdate, Address} (\sigma_{fname='John'} \text{ and } Minit = 'B' \text{ AND } LName='SUMITH' (Employee))$ (06 Marks, Dec 2014)

33. 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, Dec 2012)

34. What is meant by impedance mismatch? Explain. (06 Marks, Dec 2012)

35. Create a view which will display the department name, number of employees working and total salary for each department. (06 Marks, Dec 2011)

36. How does SQL allow implementation of the entity integrity and referential integrity constraints? Explain. (10 Marks, June 2011)

37. Explain the following: i) Embedded SQL ii) Database stored procedure. (10 Marks, June 2011)

38. Explain DROP command with an example. (04 Marks, June 2010)

39. Consider the following tables:

WORKS(Pname,Cname,Salary)

LIVES(Pname,Street,City)

LOCATED-IN(Cname,City)

MANAGER(Pname,mgname)

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 'Infosys' 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.

Find the average salary of all 'Infosians'.

40. How is a view created and dropped? What problems are associated with updating of views?

(10 Marks, Dec 2009)

41. Write a note on Aggregate functions in SQL with examples.

(12 Marks, June 2009)

42. Describe the steps of an algorithm ER-to-relational mapping. (08 marks Jan 2018)

43. 06 marks Jun 2018

Consider the following RESORT database,

RESORT (resortno, resortname, resorttype, resortaddr, resortcity, numsuite)

SUITE(suiteid, resortno, suiteprice)

RESERVATION (reservationno, resortno, visitorno, checkin, checkout, totalvisitor, suiteid)

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)

44. In SQL which command is used for table creation? Explain how constraints are specified in SQL during table creation with example. (08 marks Jan 2018)

45. Give an example of declaring a C language data type in SQL and explain it. (10 Marks, Dec 2008)

46. Consider the two tables, show the results of the following: (08 Marks, Jan 2019)

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

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

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

iv) $T_1 - T_2$

47. Considering the schema (07 marks Jan 2020)

Sailors (sid, sname, rating, age)

Boats (bid, bname, color)

Reserves (sid, bid, day) m =

- Write relational algebraic queries for the following :
- Find names of sailors who have reserved boat # 103.
 - Find names of sailors who have reserved a red boat.
 - Find names of sailors who have reserved a red or green boat.
 - Find names of sailors who have reserved all boats.

MODULE 3

- Mention different applications used for accessing the databases. (06 Marks)
- Explain with examples , the basic constraints that can be specified when a database table is created in SQL. (12 Marks Jan 2020)
- Explain how constraints are specified in SQL during table creation, with suitable example. (04 Marks jun 2018,2020)
- How does SQL implement the entity integrity constraints of the relational data model? Explain with an example. (04 Marks,jan 2019)
- Explain the JDBC with classes and Object Creation. (08 Marks)
- Give an example of mapping of generalization or specialization into relation schemas. (06 Marks jun 2018)
- Discuss: i) Shared variables ii) Communication variables. (06 Marks,jan 2019)
- Explain with examples in SQL:
 - Drop command
 - Delete command
 - Update command. (07 Marks , jan 2019)
- 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 , jan 2020)
- 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 , jan 2020)
- How do you create a view in SQL? Give examples. Can you update a view table? If yes, how? If not, why not? Discuss. (07 Marks , jan 2020)
- With real world examples, explain the following : i) JDBC ii)Correlated queries iii)Stored Procedure iv) Schema change statements in SQL. (12 Marks , jan 2020)
- 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 , jan 2020)

14. How are triggers and assertions defined in SQL? Explain with examples.

(10 Marks, Dec 2008)

15. How is a 'view' created and dropped? What are the problems associated with updation of views? (10 Marks, June 2012)

16. Explain the Presentation Layer of OSI Reference Model in detail. (08 Marks)

17. With program segment, explain retrieving of tuples with embedded SQL in C. (06 Marks, jan 2019)

12. Consider

(16 Marks Jan 2018)

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 :

- 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)
- List the names of all employees who have a dependent with the same first name as themselves. (02 Marks)
- For each project, list the project name and the total hours per week (by all employees) spent on that project. (04 Marks)
- Retrieve the name of each employee who works on all the projects controlled by 'Research' department. (06 Marks)

13. What are views in SQL? Show how views are specified in SQL. List the advantages of

views. (06 Marks, June 2016)

14. What is a view in SQL, and how it is defined? Discuss the problems that may arise when one attempts to update a view. (06 Marks, June 2011)

15. Explain the Application Layer of OSI Reference Model in detail. (08 Marks)

16. Explain the Single - tier and Client - server architecture, with neat diagram.(08 Marks jan 2018)

17. Define Stored Procedure. Explain the creating and calling of stored procedure with example. (08 Marks jan 2018)

18. Explain the three tier Architecture for internet with an example? (08 Marks)

19. June 2018 06 marks

Consider the following relations for a database that keeps track of student enrollment in courses and the books adopted for each course : (06 Marks)

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 :

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 = W09).

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.

20. 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.

iii) Find the persons who works and lives in the same city. (10 Marks, jan 2019)

21. Write SQL queries for the following relational schema : (10 Marks, jan 2020)

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.

MODULE 4

1. What is BCNF? How it is different from 3NF? Prove that a relation with two attributes is always in BCNF. (08 Marks, June 2016)

2. What are the problems caused by insertion , updation and deletion anomalies? Discuss with an example. (06 M, jan 2020)

3. What do you mean by closure of attribute? Write an algorithm to find closure of attribute. (06 Marks, jan 2019)

4. Explain the informal design guidelines for relation schemes. (08 M, jan 2018 , June 2015, 06 M, June 2016)

5. 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, Dec 2014)

5. Suggest and explain three different techniques to achieve 1NF using a suitable example. (08 Marks, Dec 2013)

6. Differentiate between prime and non-prime attribute, with an example. (04 Marks, Dec 2013)

7. Consider the relation R(A,B,C,D,E,F) and the FD A->B, C->DF,AC->E,D->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, Dec 2012)

8. Summarize the correspondences between ER model constructs and the relational model constructs. (05 Marks, June 2012)

9. What is a functional dependency? Who specifies the functional dependencies that hold among the attributes of a relation schema? (05 Marks, June 2011)

10..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 M, jan 2020)

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 ₂	d ₂	e ₂

11. Using the minimal cover algorithm , find the minimal cover for the following FDs :
 $F = \{AB \rightarrow C, A \rightarrow D, BD \rightarrow C, D \rightarrow BG, AE \rightarrow FG\}$ (10 M, Jan 2020)

12. Define first, second and third normal forms by taking an example.

(10 Marks Jan 2018, June 2011, 06 M, June 2016)

11. What is a functional dependency? Write an algorithm to find a minimal cover for a set of functional dependencies.

(10 Marks, June 2010)

12. Explain any two informal quality measures employed for a relation schema design. (04 Marks, Jan 2019)

13. 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 Jan 2019)

1. What is the need for normalization? Explain second normal form. Consider the relation $EMPPROJ=\{ SSn, Pnumber, Hours, Ename, Pname, Plocation \}$. 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, June 2010)

2. Which normal form is based on the concept of transitive functional dependency? Explain with an example the decomposition into 3NF.

3. Define multi valued dependency. Explain 4NF with an example. (05 Marks, Dec 2016, 10 Marks, Dec 2009)

4. Which normal form is based on the concept of full functional dependency? Explain with an example. (08 Marks, Dec 2008)

5. 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, Dec 2008)

6. Define multivalued dependency. Explain 4NF with an example.

(10 Marks, June 2015)

Let $R = \{SSn, Ename, Pnumber, Pname, Plocation, Hours\}$ and $D = \{R1, R2, R3\}$, where

$R1 = EMP = \{SSn, Ename\}$

$R2 = PROJ = \{Pnumber, Pname, Plocation\}$

$R3 = WORK-ON = \{SSn, Pnumber, Hours\}$

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, June 2015, 10 Marks, June 2016)

7. Normalize the below relation upto 3NF : (10 M, Jan 2020)

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

8. Define Multi valued Dependency and Join Dependency. Explain 4NF and 5NF with examples. (10 M, Jan 2020)

(05 Marks, Dec 2016)

9. Define Join Dependency and 5NF.

(10 Marks, Dec 2012)

10. Define JOIN dependency. Explain 4NF, with an example.

(06 Marks, June 2012)

11. What are ACID properties? Explain.

(06 Marks, June 2012)

12. What do you mean by multivalued dependency? Explain the 4NF with example. (06 Marks Jan 2019)

13. Which normal form is based on the concept of multi valued functional dependency?

Explain the same with an example. (10 Marks, Dec 2011)

14. Suggest and explain three different techniques to achieve INF using suitable example. . (06 Marks Jan 2019)

15. 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 Jan 2019)

16. Explain two phase locking protocol and its disadvantages. (10 Marks, Dec 2011)

17. Define Minimal cover. Write an algorithm for finding a F for a set of (08 Marks Jan 2018) functional dependencies E. Find the minimal cover for the it set FD s be (08 Marks)

18. E:{B \rightarrow A, D \rightarrow A, AB \rightarrow D}.

19. Consider the universal relation R = {A, B, C, D, E, F, H}, set of functional dependencies (08 Marks Jan 2018)

$F = \{\{A, B\} \rightarrow \{C\}, \{A\} \rightarrow \{D, E\}, \{B\} \rightarrow \{F\}, \{F\} \rightarrow \{G, H\}, \{D\} \rightarrow \{I, J\}\}$

Determine whether each decomposition has the lossless join property with respect to F.
 $D1=\{R1, R2, R3\}; R1=\{A, B, C, D, E\}; R2=\{B, F, G, H\}; R3=\{D, I, J\}$

20. What is meant by the attribute preservation condition on decomposition? (06 Marks, June 2011)

21. Discuss the null value and dangling tuple problems. (06 Marks, June 2011)

22. Explain i) Inclusion dependencies ii) Domain key normal form. (10 Marks, July 2009)

23. Define fourth normal form. Why is it useful? (08 Marks, June 2011)

24. Explain the three phases involved in an ARIES algorithm with an appropriate example. (10 Marks, Dec 2009)

24. Give 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. (10 Marks, Dec 2009)

i) $C \rightarrow D, C \rightarrow A, B \rightarrow C$ ii) $B \rightarrow C, D \rightarrow A$ **MODULE -V****TRANSACTION PROCESSING**

1. What are the problems with concurrency? Explain each with an example.

(06 Marks, June 2016)

2. With a neat state transition diagram, discuss the different states of a transaction.

(06 Marks, June 2016, Jan 2020)

3. Draw a state diagram and discuss the typical states that a transaction goes through during execution.

(10 Marks, June 2015)

4. Describe the database inconsistency problems : Lost update, dirty read and blind write. (6 Marks Jan 2020)

5. What is write-ahead logging? What is forced to disk at the time a transaction commits?

(06 Marks, June 2012)

6. Write and explain time stamp based ordering algorithm.

(08 Marks, June 2012)

7. Discuss the ACID properties of a transaction. (04 Marks Jan 2019, Jun 2018)

8. Consider the three transactions T1, T2 and T3 and schedules S1 and S2 given below.

Determine whether each schedule is serializable or not? If a schedule is serializable write down the equivalent serial schedule (S).

T1 : R1(x); R1(z); W1(x);

T2 : R2(x); R2(y); W2(z); W2(y);

T3 : R3(x); R3(y); W3(y);

S1 : R1(x); R2(z); R1(z); R3(x); R3(y); W1(x); W3(y); R2(y); W2(z); W2(y);

S2 : R1(x); R2(z); R3(x); R1(z); R2(y); R3(y); W1(x); W2(z); W3(y); W2(y);

(06 Marks Jan 2019)

9. Check whether the below schedule is conflict serializable or not. (6 Marks Jan 2020)

{b2, r2(X), bl, rl(X), wl(X), rl(Y), wl(Y), w2(X), el, cl, e2, c21}.

10. Describe the problems that occur when concurrent execution uncontrolled. Give examples.

(06 Marks, Jan 2019)

11. What are the anomalies occur due to interleaved execution? Explain them with example. (06 Marks, Jan 2019)

12. Why concurrency control is needed? Explain each with an example. (08 Marks june 2018)
13. What is two phase locking? Describe with the help of an example. (04 Marks, jan 2019,2020)
14. What is Deadlock? Consider the following sequences of actions listed in the order they are submitted to the DBMS.
- Sequence S1: R1(A); W2(B); R1(B); R3(C); W2(C); W4(B); W3(A)
- Draw waits-for graph in case of Deadlock situation. (06 Marks jan 2019)
15. How do you detect a deadlock during concurrent transaction execution? (04 Marks, jan 2020)
16. Explain the various database recovery techniques, with examples. (04 Marks, jan 2020)
17. Write a note on check pointing. (06 Marks, June 2012)
18. Explain the following with suitable example: i) The lost update problem ii) The temporary update (or dirty read) problem. (10 Marks, June 2011)
19. Why is the two-phase locking protocol for consistency control? How does it guarantee serializability? (08 Marks, jun 2018,June 2016, 10 Marks, June 2011)
16. Write short notes on: (20 Marks, Dec 2011)
- i) Tune stamp ordering algorithm iii) Embedded SQL ii) ARIES algorithm
 - iv) Fifth normal form
17. Explain the problems that can occur when concurrent transactions are executed. Give examples. (10 Marks, June 2010)
18. Briefly discuss the two phase locking protocol used in concurrency control. (10 Marks, June 2010)
19. Explain properties of a transaction with state transition diagram. (10 Marks, Jan 2018)
20. When deadlock and starvation programs occur ? Explain how these problems can be Resolved. (08 Marks jan 2018)
21. Explain how shadow paging helps to occur from transaction failure. (08 marks jan 2018)
22. What is a schedule? Explain with examples serial, nonserial and conflict serializable

schedules.

(10 Marks, July 2009)

23. Write short notes on: *(20 Marks, Dec 2008, Jun 2018, Jun 2018)*

- i) Two phase locking protocol
- ii) Write ahead log protocol
- iii) Write ahead log protocol ii
- iv) Time stamp ordering algorithm
- Transaction support in SQL

