QUESTION BANK

Subject Name: Database Management System
Subject Code: 21CS53
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Website: https://vtucode.in

Module 1

1. Discuss the main characteristics of the database approach and how it differs from traditional file systems?
2. What are the responsibilities of the DBA and the database designers?
3. What are the different types of database end users? Discuss the main activities of each.
4. Define the following terms:
    a. Data model
    b. Database
    c. DBMS
    d. Database system
    e. Metadata
    f. Database schema
    g. Database state
    h. Application program
    i. Transaction
    j. DDL, DML, SDL, VDL, query language, host language.
5. What is the difference between a database schema and a database state?
6. Describe the three-schema architecture. How do different schema definition languages support this architecture?
7. What do you mean by data independence? Differentiate between logical data independence and physical data independence?
8. What is the difference between procedural and nonprocedural DMLs?
9. Discuss the different types of user-friendly interfaces and the types of users who typically use each.

10. With neat diagram, explain different components and their interaction in database environment.
11. What is the difference between the two-tier and three-tier client/server architectures?
12. With suitable example, explain different types of attributes.
13. With suitable example define the following
    a. Entity type.
    b. Entity.
    c. Entity set.
    d. Relationship type.
    e. Relationship set.
    f. Relationship instance.
14. With suitable example, explain different cardinality ratios and participation ratios.
15. Explain the difference between an attribute and a value set.
16. With suitable example, describe recursive relationship type.
17. Write an ER diagram to represent CAR entity type with 2 key attributes reg_no and vehicle_id.
18. Design an entity–relationship (ER) diagram for the movie database schema with at least five entities. Also specify primary key and structural constraints (cardinality and participation ratios). Assume meaningful attributes and relationship types.
19. Design a ER diagram for AIRLINES database schema with at least five entities. Also specify primary key and structural constraints (cardinality and participation ratios). Assume meaningful attributes and relationship types.
20. Design an ER diagram for banking database schema with at least five entities. Also specify primary key and structural constraints (cardinality and participation ratios). Assume meaningful attributes and relationship types.

Module 2

1. With suitable example, domain D, relation schema R, relation state r and Cartesian product.
2. Describe the Characteristics of Relations.
3. List three different types of Relational Model Constraints.
4. With suitable example, explain the different schema based constrains.
5. With suitable example, explain the concept of super key, primary key and candidate key.
6. What are the different update operations can be performed on relational database? Explain different types of constraints may be violated by each update operation and how such violations can be handled?
7. Describe the concept of relational algebra. Why relational algebra is very important?
8. With general form and suitable example, describe the working procedure of unary relational operations.
9. With suitable example, explain in-line expression and sequence of operations.
10. What are the different relational operations from set theory (binary relational operators)? Describe with suitable example.
11. What do you mean by type compatibility? With suitable example, explain how type compatibility is important to perform binary relational operations.
12. With suitable example, explain the following binary relational operations
    a. Theta join
    b. Equijoin
    c. Natural join
    d. Outer join (left outer join and right outer join)
13. Explain the ER to relational mapping algorithm with suitable example for each step.
14. Consider the two tables T1 and T2 shown in Figure below. Write the results of the following operations:
    a. $T1 \bowtie_{T1.P = T2.A} T2$
    b. $T1 \bowtie_{T1.Q = T2.B} T2$
    c. $T1 \rhd\lhd_{T1.P = T2.A} T2$
    d. $T1 \bowtie\!\!\!\!\!\!\subset_{T1.Q = T2.B} T2$
    e. $T1 \cup T2$
    f. $T1 \bowtie (T1.P = T2.A \text{ AND } T1.R = T2.C)\ T2$

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

MODULE 3

1. Discuss the history and features of SQL language. Why SQL is called as declarative language?
2. What are the different SQL statements/commands used for data definition? Explain.
   What do you mean by base relations and virtual relations?
3. List and explain different data types available in SQL.
4. How key and referential integrity constraints are specified while creating schema? What are the different referential triggered actions available in SQL for database designer to handle referential integrity constraint violation? Explain.
5. With syntax and suitable example, explain the basic retrieval statement in SQL.
6. With syntax and suitable example, explain two different symbols used with keyword **like** for pattern matching in SQL.
7. With syntax and suitable example, explain the SQL commands INSERT, UPDATE, ALTER AND DELETE.
8. With suitable example explain ESISTS and NOT EXISTS in SQL.
9. List and explain the different aggregate functions available in SQL.
10. With syntax and suitable example, explain GROUP BY and HAVING clause.
11. With suitable example, explain the concept of views in SQL.
12. How views are created and updated? What problems are associated with updating view?
13. With syntax, explain the schema change commands (DROP and ALTER) in SQL.
14. How SQL statements are used/embedded in application programs? Explain. Also mention the drawbacks of embedded SQL.
15. What is dynamic SQL? How it is different from embedded SQL?
16. What is CURSER? With simple program, explain how tuples are retrieved using cueser.
17. With neat diagram explain JDBC architecture.
18. Explain the classification of JDBC drivers.
19. Write a note on
    a. Java classes and interfaces.
    b. SQLJ.

MODULE 4

1. What are two implicit goals of database schema design? Describe.
2. What are informal guidelines for database schema design? Explain with example.
3. With example, explain different update anomalies.
4. What is functional dependency? Explain the inference rules/Armstrong's axioms/properties of functional dependency with proof.
5. With example, explain different types of functional dependencies.
6. What do you mean by lossy and loss-less/non-additive joins? Give example.
7. What do you mean by normalization of a relation? With suitable example, explain 1NF, 2NF and 3NF.
8. With suitable example explain BCNF.

MODULE 5

1. What are the anomalies occurring due to interleave execution? Explain with example.
2. With neat state transition diagram explain different states for transaction execution.
3. Why concurrency control is needed? Explain with an example.
4. Explain different types of locks used in concurrency control.
5. How shadow paging helps to recover from transaction failure? Explain.
6. Explain ACID property of transaction and system log.
7. Explain transaction support in SQL.
8. When deadlock and starvation problem occur? How these problems can be resolved? Explain.
9. Explain ARIES recovery algorithm with example.
10. What is schedule? with example explain conflict and view serializability schedule.
11. Discuss the two-phase locking protocol used in concurrency control.
12. Discuss the REDO and UNDO operation used in recovery technique.
13. Write a short note on
    a. Single user and multi user system.
    b. Transaction rollback and cascading rollback.
    c. Database backup and recovery from catastrophic failure.
    d. Deadlock prevention protocol.